ECO-SENSITIVE MANAGEMENT:
Transitions towards, and the style of, Eco-Sensitive Management of Business Organisations
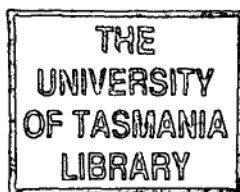
By

Dallas Hanson
BA (Hons), Dip. Ed., M.Soc.Sc.

Dept of Geography & Environmental Studies

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Dallas Hanson

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ABSTRACT

In a multi-disciplinary discussion that includes major contribution from sociology, economics, environmental sciences, ecophilosophy and management theory, I outline transitions towards, and the style and practice of eco-sensitive management. Eco-sensitivity means the presence of eco-centric values together with the ability to put these into practice. The argument proceeds in two sections.

In the first the deep roots of industrial exploitation of the natural world are established. In chapter one industrial capitalism is discussed while chapter two outlines the moves towards what I have called 're-organised capitalism'. As is pointed out in chapter three, whilst both systems involve exploitation of the natural world, there are indications within re-organised capitalism of an opportunity to 'turn around' the juggernaut of exploitative expansionary capitalism and adopt more eco-sensitive approaches. Business organisations, now entering a period of yet greater influence on world affairs, are a key to this, but as I point out in chapter four, in striving to become more eco-sensitive they must deal with the complex structures of the natural world, a point made by an examination of biodiversity.

In the second section the shape of eco-sensitive management is outlined. In chapter five important transitions in the 'world view' of organisations are discussed; they must become less anthropocentric, adopt holistic thinking practices and use the notion of 'risk for nature' instead of financial risk. They will also use 'new science' and ecological economics, sets of ideas developed and discussed in chapter six. Incrementalist and learning based models of strategic planning and an eco-centred scenario based planning style that is used in conjunction with systems thinking are discussed in chapters seven and eight. An organisation structure suitable for eco-organisations and an eco-leadership style are elaborated on in chapter nine.

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INTRODUCTION

The broad argument in this thesis is that business organisations in the dawning world of what is herein called re-organised capitalism are under pressure to become more actively concerned about their impact on the natural world. They must become more eco-sensitive which means that they combine eco-centric values together with the ability to put these into practice.

This is a multi-disciplinary discussion with major contributions from sociology, economics, environmental science, ecophilosophy and management theory. The argument is integrated and issue focused. It therefore does not seek to answer the challenges of a single discipline oriented approach but to use the insights from a variety of sources to further the argument. Answers are arrived at in a discussion of theory chosen from European, North American and Australian writings, integrated into a coherent whole.

This represents a variation on much conventional academic writing, one justified by the fact that globally sourced multidisciplinarity is the only way to answer the fundamental questions raised:

- what are the roots of industrial exploitation of the natural world?
- How has the industrial system changed, and how do these changes provide an opportunity for a re-orientation of the approach of business organisations to nature? Assuming these opportunities exist, what challenges are posed by the complexity of the natural world?

- What is the shape of eco-sensitive management that can answer such challenges?
- What are the transitions that have taken place towards this eco-sensitivity?

Discussion is divided into two sections with part A considering the first three sets of issues and part B the last two. Part A effectively poses the problem and establishes the deep rooted nature of industrial exploitation of the natural world and part B points the way towards solutions. The introduction to part A follows, and that to part B is presented from pages 139 to 153.

What follows is limited only in that basic reading finished in September 1995. Otherwise, to use Isaac Newton's terms, (but without claiming his eminence), I have 'stood on the shoulders of giants' to reach the conclusions presented in the following discussion. The argument is ecologically optimistic but cautious, to paraphrase Simon Schama (1995:19), it is a journey through ideas, eyes wide open, that may help us keep faith with a future on this tough, lovely old planet.

INTRODUCTION TO PART A

Part A includes four chapters. The aim of the first is to present an overview of the process of modernisation and industrialisation, and their results, leading to a summary of their impact on the natural world. One basic theme within the narrative is that business organisations have been (and remain) active agents for change in the modernisation process which transformed the 'Western World' and continues to exert significant influence both there and in elements of the 'Third World' that are still industrialising. Another is that the expansionary system of modern capitalism is overwhelmingly negative in its impact on nature and that the complex systems of production, state control, science and business activity are inter-related in a culture which legitimates this impact. This broad conclusion is important for later argument in which the complexities involved in establishing and operating eco-sensitive organisations in opposition to this culture are discussed.

Chapter two examines the work of the range of commentators since the 1960s who have detected major changes within the systems of modern industrial capitalism, with the suggestion that these changes were evident by the mid 1960s (see Harvey 1989:141). However, as the discussion indicates, there are important disagreements between them on a range of matters: the reasons for this change; whether it amounts to a new form of modernism (late modernism can serve as a summary term) or 'post modernism'; whether it is a new form of capitalism or a gradual disorganisation of capitalism; whether it represents a real discontinuity or an

extension of existing patterns. There remains a consensus that important changes to the modern world have taken place, and these will be described in a discussion with three parts.

The first part of chapter two called 'Theories of Change', presents various theoretical views of these changes. Theorists discussed, basically presented in line with the year of their major contributing publication in order to facilitate development of the analysis, include Drucker (1969), Bell (1973), Lash and Urry (1987), Harvey (1989), Crook, Pakulski and Waters (1992), all of whom deal with change in a general fashion, and then Beck (1992) and Giddens (1990, 1991), whose contributions to the discussion are more specifically eco-centric. This part of the discussion is also important because some of the analytical tools and perspectives presented by these theorists will be used in later discussion.

The second part, 'Re-organised Capitalism in the 1990s', draws the analyses together, and updates the discussion by referring to important changes in key areas that have taken place in the late 1980s and 1990s. The following elements of change are discussed: knowledge and services; a global finance system; mass marketing; increased power of information; computers and flexible manufacturing; the nation state, trade blocs, and renaissance of the market philosophy; changes to the pattern of core nations; business alliances and smaller firms; trans-national corporations; and the individual in re-organised capitalism.

The third part of chapter two contains concluding comments, and brings elements of the previous two sections together.

There are three parts to chapter three. In the first, which I call 'The Negatives', the problems of the natural world in re-organised capitalism are analysed, with separate discussion of macro and meso

level problems. In the second, 'The Positives', elements of change in re-organised capitalism that offer hope for the natural world are analysed with separate discussion of the role of global environment agreements, the growth in community concern for the environment, and changes in business attitudes and practices in environmental matters.

Discussion concludes with 'The Way Forward', in which an argument is developed that business, with help from government, scientists and other experts, can become an increasingly positive force for the preservation of the natural world, particularly at the meso level, but ultimately at the macro level too.

Chapter four examines biodiversity, used as an example of the complexity of the natural world with which organisations striving to become more eco-sensitive must deal. The broad conclusion here is that biodiversity, whilst a fundamental aspect of the natural world, is little researched, poorly understood and perhaps unknowable.

Chapter One

MODERNISATION, ORGANISATIONS, AND THE NATURAL WORLD

Processes of Modernisation

Western societies began to modernise with the onset of the industrial revolution, which dates from the end of the eighteenth century. The processes that make up modernisation are best described with reference to the writings of classic sociology, itself a discipline born out of a struggle to understand the social and economic effects of the industrial revolution. Using major sociological traditions, Crook, Pakulski and Waters (1992) identify three dynamic principles underlying modernisation: differentiation, which they locate in the Durkheim tradition but is fundamental to all analyses of modern change; commodification, which is best understood in terms of the Marxist tradition; and rationalisation, analysis of which is central to Weber's work.

Differentiation is conventionally seen as fundamental to the modern experience, not only in Durkheim's work, but in functionalist theories of social change (see Parsons, Bales and Shils 1953; Smelser 1968), a range of Marxist writings (Braverman 1974), and new organisation theory (see Clegg 1992). The concept focuses attention on the way that units of social structure, including institutions, groups of people, occupations, positions and tasks, become ever more specialised and therefore inter-dependent with industrialisation and related processes of modernisation. The

sociological tradition also draws attention to the various units specialising in the resultant processes of social integration; for example state agencies and trade unions which, Smelser (1968) points out, are necessary to ensure that functions essential for the maintenance of society such as socialisation are performed. The social fabric is also drawn together by values and ideologies that legitimate this social structure. Related to differentiation is a tendency to use language to divide the world into many categories, since a differentiated world requires precise tools for conceptual analysis and communication.

Division of labour is a key differentiating process and, as Clegg (1992) argues, it has been presented in the sociological tradition as a core element of the modern experience, and also as the key moral question which prompted Marx's analysis of the inhumanity of industrial labour, and Durkheim's account of the difficulties of retaining a coherent identity in a world which requires ever more and ever narrower social relationships.

In Marxist theory the process of commodification is one in which the products of human labour and that labour itself are turned into commodities that are sold in the market for profit. Ultimately they receive a significance previously given to aspects of religion and Marx therefore suggested that modern culture was subject to 'commodity fetishism'. The process is powerful and new 'use values' are created via manipulation of demand in advertising and the mass media, so that elements of cultural and personal life previously qualitatively different to exchange commodities are turned into goods that can be traded in the markets. Art, music and the natural world are packaged for the market and sold; previously mundane objects are turned into objects for the art market (for example

Georgian shoe buckles became a solid investment) unusual trees are fenced, paths cut, and tourists charged for a view; and ideas become powerful objects for trade.

The essence of modern (capitalist) society, according to Weber, is rationality, through which market transactions take place, unconstrained by tradition or sentiment or by 'obligations of brotherliness or reverence' (Brubaker 1984:10). The concept was multi-faceted in Weber's analysis, so each major component of Western social order had its own specific mode of rationality, and each of industrial capitalism, law, and bureaucratic administration reflect rationality differently. Brubaker's (1984) analysis of the thematic strands that 'weave together the various aspects of Weber's conception of the unique rationality of modern society' serves to indicate some lines of thought that are extremely useful for this discussion.

The first of these is knowledge. To act rationally is to act on the basis of knowledge. This is true for all societies to a large extent, but in modern western society the rise of science and technology gives knowledge a new significance, and the development and complexity of technology and bureaucracy lead to ever increasing demands for specialised knowledge. This is related to a displacement of magical and religious world views, and induces the idea that all things can be mastered by calculation (Brubaker 1984:31). In this knowledge society the specialised expert displaces the cultivated man, everyday life has a rational feel, and the natural and social world are subjects of a continual search for means of quantification, perhaps best seen in econometrics, the branch of economics in which the world is reduced to numbers conducive to calculation.

The second is impersonality, in which personal sources of power are replaced by objectified and depersonalised power and authority. Market transactions are impersonal, and transgressions of the impersonal laws of the market place entails economic failure and, in the long run, economic ruin (Brubaker 1984:32). Political authority also becomes impersonal and legal authority and bureaucracy operate via formal rules which are enforced without regard for individual differences. The world of work is also affected; in Weber's vision man works 'sheerly in accordance with the impersonal duty imposed by his calling and not as a result of any concrete personal relationship' (Weber, quoted in Brubaker 1984:37).

The third is control. Rational knowledge, regulations specifying the actions of people working in capitalist firms and bureaucratic administrative organisations, and the embedding of scientific knowledge within practical activities, dramatically extend the degree to which man and nature can be controlled. Social relationships become part of the processes of administration as individuals are reduced to the function they perform, and their world is subject to calculation. Weber's modern industrial capitalism 'depends upon the possibility of correct calculations. This is true the more capital-intensive industrial capitalism is, and especially the more saturated it is with fixed capital. Industrial capitalism must be able to count on the continuity, trustworthiness and objectivity of the legal order, and on the rational, predictable functioning of legal and administrative agencies' (Weber 1961:1095).

These themes draw together Weber's analysis of the transformation of social institutions. Capitalism in ideal typical form is based on the rational calculation of the market and operates from deliberate and calculating self-interest free from any traditional constraints or the influence of feeling, as bureaucratically organised enterprises exercise precise control over human and non-human means of

production. The legal system is also formal and uses legal rules to solve disputes, to set up the structure within which the contract system essential for market operation can co-operate, and to protect property. Administration is increasingly and inevitably bureaucratic and mechanically efficient and given to codified technical rules to make decisions. The labour force operates with rationality stemming from the 'worldly asceticism' generated in the Reformation, which renders it hard-working and self-controlled and committed to the duty of work.

In his analysis Weber also makes use of a contrast between formal and substantive rationality, where the former is a matter of fact and applies to the calculability of means and procedures, and the latter is inherently evaluative and compares ends or results with some standard rather than with actions. The rationality at the core of capitalism and bureaucracy and in puritan asceticism is purely formal but the results may be substantively irrational; the two exist in tension. The legal system is formally rational but does not produce substantive justice (Weber 1961:229-220), the formally rational commitment to duty and self-control by labour does not produce the substantive rationality of happiness, and in Weber's most quoted statement, formally rational bureaucracy becomes an 'iron cage'.

Differentiation, commodification and rationalisation are closely related in their impacts on society, and intertwine as they transform relatively disorganised pre-modern into systematically organised modern society. In the next section some major outcomes of the process are described. They include the establishment of the capitalist modes of production which are associated with 'globalisation' and with growth of a world market; the emergence of the modern state; and the triumph of 'big science', which assists in the technological advances that facilitate domination over nature.

The role of organisations and organisation theory in the modern world, the general impact of modernisation on the natural environment, and the modern mind (modern patterns of thought) are then briefly considered, since all three are of special interest to the current project.

Capitalist Production

The feudal system which dominated the western world before the Industrial Revolution was based on obedience to established authority, intimate personal relationships, and a powerful religious tradition. This was a system which had a relatively benign effect on the natural world and in which people used simple technologies to produce food and products for personal consumption and mainly local trade while living to schedules set by the sun and seasons. Knowledge, though in some ways profound, was limited in scope, and it was possible for an individual to be up to date with almost all of the important intellectual developments of the time, as for example, Francis Bacon was in his day. It is easy to overstate the steadiness of feudal society; like all systems it was subject to constant changes in technology (Gimpel 1979) and culture. The pattern was, however, basically that of a stable society.

A major contribution to the Industrial Revolution came with mercantilism, a system of the sixteenth and seventeenth centuries which featured merchant traders from Britain and the Low Countries establishing flourishing overseas trading empires. The early 'commercial capitalism' which succeeded mercantilism featured simple industrial technologies and an increasingly sophisticated market. These technologies enabled small factories and mechanised craft industries to become established, and the markets

allowed products to be readily traded. Adam Smith's *Wealth of Nations*, published in 1776, the same year as the American Revolution and Watts' perfected steam engine, describes this system in considerable detail. By this time society had moved towards one in which individuals strove for material gain and materially located status, in direct contrast to the basic pattern of earlier society. Smith suggested an entire society could be co-ordinated via the market, whose 'invisable hand' would ensure optimal allocation of goods, and thereby started an argument which has continued for more than two centuries.

The next stage, one of 'industrial capitalism', was associated with the impact of a range of new technologies which increased output dramatically. For example in the British cotton industry the spinning jenny (1770), the water frame (1773), the mule (1779), the power loom (1785), and the use of steam power (1785) meant output increased a hundred fold (Jones 1968:24). New technologies also implied major changes in the size of the work force in manufacturing operations; Smith's famous pin factory had only 10 workers, but by the middle of the nineteenth century the standard textile mill had several hundred, steel mills several thousand, and Brunel's railway gangs tens of thousands. In the coming decades of industrial capitalism these workers tended to be poorly paid, and they also worked in poor conditions for long hours and lived in degraded social conditions in fast growing urban areas. They were increasingly under the control of a management class which directed operations on behalf of the owners of capital. In this phase, too, the capacity to exploit the natural environment increased with technological efficiency and huge increases in productivity and total output, and a market logic of constant expansion of output was firmly established.

In its essential features this model of capitalism continued to operate at least until the early 1970's, by which time it could aptly be called 'organised capitalism'. Its initial flowering came with the introduction of electricity-based technology in the nineteenth and early twentieth century, which massively increased production capacity and revolutionised social life generally and the pattern of domestic life in particular, and was associated with the efficiency of 'Fordism'. Henry Ford achieved dramatic gains in industrial output by automating production using a combination of existing technologies and 'scientific management'. This was the system of management theorist Frederick Taylor and included scientific selection of workers and application of knowledge to work in order to develop the 'one best way' to complete a task. Assuming close supervision of workers, this system (allied to new technology) ensured major increases in productivity so that the potential supply of industrial commodities could expand far beyond previous limits. Ford believed in a corporate led society, one in which major businesses regulated the economy as a whole, and also in the eight-hour five day week for a disciplined work force whose income rose as productivity increased, thus allowing them to consume in the expanding market.

This form of capitalist society was never established in its pure form, though the mass production/high output and scientific management aspects of his system were quickly pushed into industrial life as industrialised nations organised themselves to meet the mass production requirements of the First World War. State power also developed then, as it did in the Great Depression of the 1930s when governments expanded capacity for economic control through implementation of Keynesian ideas of economic manipulation. It was developed further still in the Second World War, which was ultimately won by the USA dominated allies

because of the relative efficiency of their state co-ordinated factories. In the first half of the twentieth century, then, the links between industry, state (and broader political system), science, technology, culture and labour became ever more complex. Harvey suggests that this multi-linked system was not brought 'to maturity as a fully fledged and distinctive regime of accumulation' until 1945, but that it then formed the basis for a long post-war boom that lasted until 1973 (Harvey 1989:128). Habermas' (1971) analysis extends beyond the outside lineaments of these complex linkages between institutions, and in an influential critique he suggests that the life world (everyday life) is 'colonised' by state administration, and that communication and possibilities for 'communicative action' are eliminated. The linkages between the state, capitalism and organised labour that concerned Habermas yield the term 'organised capitalism', a term suggestive of both its inherent order, and its ability to control individuals living within capitalist states.

There are many variations on this model of organised (or mature) industrial capitalism, particularly given its global spread in the late nineteenth century and twentieth century, but all share a number of basic features.

Firstly, they are all expansionary. Industrial economies must grow in order to accumulate the surplus necessary for development of infrastructure, distribution of wages and benefits to workers, and purchases of the new technology which ensure further success in a competitive business environment. This final point implies the very logic of industrial capitalism. Firms and states must compete in order to survive, and the only way to ensure that competitive advantage is maintained is to be growth oriented. Such expansion can be geographical (with local, national or international expansion); social, as new markets are opened up with associated processes of

commodification (for example selling care for the aged, or collectors' edition bottle tops); or technological, as businesses harness knowledge to develop entirely new products (Wallace 1990:2).

Expansion is supported by an ideology which suggests that growth is good. In conventional economics (the discipline which seeks to explain, and is legitimated by, industrial capitalism) a 'recession' in an economy is defined in terms of lack of growth, a 'depression' in terms of a consistent pattern of lack of growth, and both are related to rising unemployment and under-employment in the economy as businesses strive to maintain profitability by laying off or not employing new workers. In the common representative democracy form of mature capitalism this creates political problems and further fuels policies designed to encourage growth. As Harvey (1989:180) notes: 'This implies capitalism has to prepare the ground for, and actually achieve an expansional output and a growth in real values, no matter what the social, political, geopolitical or ecological consequences'.

The second related feature is that industrial capitalism is technologically dynamic. The logic of competition requires constant changes to technology which lead to increased productivity in order to retain competitive advantage, which provides impetus for links to scientific institutions, which provides a motive for the funding of Research and Development, and which therefore relies on accumulating economic surpluses that facilitate this expensive process.

The third feature is that the system requires control over labour which must be co-ordinated in order that production can take place. In Marxist terms this means exploitation of labour and a separation between labour and capital, with all the dynamics of class struggle. In the language of new rationalists it means co-operative arrangements

between managers and workers, many of whom will be part owners of capital, but in either case some labour co-ordination is required. The terms used to describe the fundamental functions of managers and which are used to organise almost all basic management texts (see for example Bateman and Zeithaml 1993) are evocative. Based on Fayol's (1949) work (stemming from his working life as a mining engineer in France), they are 'planning', 'organising and staffing', 'leading', and 'controlling'. All are predicated on the assumption of control of labour by management.

The fourth feature is that capitalist growth is uneven, in both a geographical and temporal sense. Geographical unevenness refers to different levels of economic development in different areas, both within states and between them. Temporal unevenness refers to the cycles of growth and recession which characterise capitalism and are a major focus of economics and economic history. Until the 1930s neo-classical economists believed that the economy would naturally right itself from periodic declines but that the overall tendency was towards growth. The world-wide Great Depression of the 1930s shook this belief and led Keynes (1936) to his general theory which suggests how governments can even out the impact of the cycles by manipulation of their economies, and as already discussed, this indirectly led to an increase in state control in free enterprise nations. Kondratieff's theory of 'long waves', which is an influential attempt to plot the overall pattern of these cycles, suggests that such cycles are inevitable, although there is still fierce debate about the factors determining them.

Globalisation

By 1973, the time of the global depression which is commonly taken as the final flowering of mature capitalism, the world was already an interdependent system. People have always traded, societies have always been interdependent to a certain extent, but for most of recorded history almost all people were engaged in subsistence agriculture in relatively self-sufficient communities. Economies *based* on production and trade however, only emerged with industrial capitalism.

A useful modern attempt to understand the process is Wallerstein's world systems theory (1976). He starts by initially distinguishing between localised and self-sufficient or 'traditional' societies which are not part of a geographically extensive system, and world systems 'defined by the fact their self-containment as an economic-material entity is based on extensive division of labour and that they contain within them a multiplicity of cultures' (1976:230). There are two types of world systems. The first controls politically the entire area within its boundaries, as was the case, for example, with the Roman Empire, which was a 'world empire'. The second is a 'world economy' which operates in an area larger than a political entity can control, for example the capitalist economic system within which capitalist economic organisations such as trans-national corporations (TNCs) have relative freedom to manoeuvre (1976:230). Within the capitalist world economy there are 'core states' which have dominance, and these include the countries which first industrialised, with some semi-peripheral states which are linked to the core by trade, but in a dependent way, and a 'periphery' trading in simple goods. That part of the world that was not part of this system was 'external', and before industrialisation it included most of what is now the less developed world, which was drawn into the periphery via colonialism and the activities of TNCs,

carrying with it the trappings of modernist thinking, organisation structure, market oriented culture, and an instrumental attitude towards the natural world.

Capitalist-led globalisation started with mercantilism, which was a system based on trade, or rather upon the massive plunder of new-world valuables and the development of a slave labour system, processes which allowed the West to establish dominance. Business organisations were of critical importance in these processes. Acting with the protection of nation-states they were the agents of change which carried modernist culture to the periphery and actually gave effect to colonialist economic policy, as early critics of the process such as Hobson (1902, reprinted 1965) and Lenin (see Giddens 1989:530) recognised. The integration of the world economy was well developed by the time of the First World War, most of Africa and South America and large sections of Asia having been drawn into the periphery or semi-periphery, either by colonisation or the setting up of trade patterns which favoured the industrialised nations. World War II saw another surge of integration as much of the world was linked in the effort of war, and even more so in the national economic restructuring that followed.

Trans-national corporations were always important in the globalisation process but became particularly so after World War II when the reconstruction of Europe and Japan led to the development of large uni-national companies that then sought overseas markets and sites for their products and production. These added to existing activities by American and British Corporations so that more core nations were involved. This concentration in the core is evident in figures that show that 96.8 per cent of world foreign investment in 1978 came from companies with bases in the eleven most highly developed countries (Ghertman and Allen 1984:14). Much of this investment was in other core nations; in fact

after World War II multi-nationals invested more in each other and less in the developing nations of the periphery, but the pattern of globalisation and the role of companies in its spread, was well set by this time.

This pattern was (and largely remains) one with a rich North of the globe, and a poor South, and whilst it is easy for those living in the North to see this as an inevitable pattern, it was directly the result of the spread of capitalism. Richard Peet's summary of the process makes this clear :

> Capitalism was made possible by the raiding of stored wealth, the reorientation of trade routes, the imposition of unequal exchange, the forceful movement of millions of people in world space, and the conversion of the people and territories of whole continents into colonies where all aspects of existence were subject to the purposes of the Europeans. The term 'Third World' thus came to signify a spatial sequence of societies characterised by monoculture where previously diversity had prevailed, economies declining through disinvestment because indigenous surplus was captured by the European centre, and low productivity where craft skills had previously been common. The poverty of the Third World is not natural, inevitable or even historically typical. Instead the dependency school's thesis of the development of under-development proves a highly generalised yet accurate appraisal of the effects of the expansion of Euro-American capitalism on the rest of the world's societies (Peet 1991:145).

The State

The development of capitalism was partly preceded by and then associated with the development of the modern industrial state. Crook *et al.* summarise the related processes involved:

> The emergence of the modern industrial state in the late nineteenth century involved a set of related processes: the unification and centralisation of power centres which overcame the resistance of formerly independent corporate bodies; the autonomisation of State power, so that it rested on an internal principle of sovereignty rather than being derived from tradition or from 'external' sources; a broadening of the political community and popular support, achieved by an extension of suffrage and constitutional reform; the development of state-national symbols (flags, anthems, a national language, etc.)

> which increased the popular legitimacy of the state; and the
> activisation of the state, so that the domain of its legitimate
> intervention extended beyond military and the law and order
> functions, especially to fiscal reform. (Crook *et al.* 1992:19)

These changes were associated with the development of business organisations and a tremendous growth in the size of the formally rational central bureaucracies that co-ordinated an interventionist and active modern state which, among many other activities, controlled the economy and the legal system, administered the collection of taxes and redistribution of income, and funded the operation of major institutions such as education, law and order and scientific research.

By the middle of the twentieth century three main types of state were evident. In ideal typical form these were the Western European corporatist state, the relatively free enterprise pattern of the USA, and the centralised pattern of the Soviet Bloc.

Corporatism developed gradually, pushed on by such things as the two World Wars, which required that all states involved be at least briefly corporatist, and the Great Depression. As we have already seen, this led to the insights of Keynesian economics that suggested that there must be significant government intervention in the economy if period crises are to be avoided. The corporatist state features a concentration of power in a large bureaucracy which plans and co-ordinates almost all economic and social activities. It also regulates private business, operates major government businesses, operates a comprehensive welfare program, and the state has arrangements with organised labour that lead to wage control, all of which is legitimated by carefully organised and orderly representative bodies.

The relatively free enterprise model of the USA involves less organisation; a smaller bureaucracy, insignificant bodies of organised labour, few government businesses, less central planning than in a corporatist state, a more powerful business sector, and a legislature more obviously subject to lobbying by interest groups.

The industrial states of the Soviet Bloc featured centrally planned, largely government-owned economies, large bureaucracies, and the theoretically total control of labour by the state. The state was effectively controlled by an elite of top party officials, bureaucrats and military officers.

Science

Modern science is the product of 250 years of change. From 1627 when Francis Bacon's model of a scientific community *New Atlantis* was published, science changed from the dabbling of talented and genteel amateurs into an autonomous institutionalised system with close links to commercial and state interests. Modern science is the very model of a formally rational process featuring orderly abstraction and structured research which builds ever more sophisticated explanations to existing research questions.

Science institutionalised gradually as various scientific vocations developed and organised research systems grew, based in universities and in government and military establishments. Modern 'big science', to use de Solla Price's (1963) popular term, is large-scale, wide in its interests and employs thousands of people; de Solla Price calculated that 90 per cent of scientists who had ever lived were alive in the 1960s and that 90 per cent of all knowledge was the product of the previous 50 years.

In the modern era science also became highly differentiated, with continually multiplying disciplines and sub-disciplines pursuing their own increasingly differentiated research questions, often using specialised language inaccessible to the generally well-educated.

Habermas (1971) argues that modern science, commodified and linked to industry interests, is a 'leading productive force', and this rather anti-science point of view was and remains relatively common, since it picks up on the established fact that scientific research is a very expensive process that is almost all funded by government and business. The ideology of science suggests that it is ultimately independent of such interests, but by the mid 1970s in particular and the massive funding of science by the US military-industrial complex this autonomy was obviously under threat.

The modern scientific view of the natural world is largely instrumental. It is there to be studied and its secrets unlocked (see Leiss 1974). Modern scientific truth is based on 'the ideas of deduction, induction, observation and experimentation welded together by the symbolic formalism of mathematics' (Casti 1989:21). It also takes an almost purely anthropocentric view of the world that legitimates what would normally be regarded as pathological cruelty towards animals in the name of scientific progress.

Business Organisations and Organisation Theory in the Modern World

In pre-modernity organisations existed but occupations themselves provided most of the structure that was needed to control production, and the products themselves were continuous with the occupations; for example a career as an apprentice, then journeyman, then master was continuous and limited as were the products of this sequence of tasks grouped within the occupation of mason. In modern society, however, organisations have became central features of social structure. They provide important links between increasingly differentiated components of labour and are therefore the crucible for supervision and control of labour in both the public and private sectors.

Industrialised capitalism favoured larger firms which could complete effectively using economies of scale, swallowing up competitors as they grew. As capitalism became more organised the trend to large companies accelerated, but with different patterns in each of the industrialised nations. In the United Kingdom the pattern has been well summarised by Hugh Thomas: 'This history of [Armstrong Vickers] ...one of Britain's largest firms is characteristic of the modern enterprise generally: an inspired founder, mergers, growth – and in the end, a government subsidy when the firm had become so big as to be of national importance' (Thomas 1981:403). In the USA the growth in corporation size was quick; 24 per cent of business was done by corporations in 1900, 52 per cent in 1939 (Thomas 1981:464). In Japan the links between business were closer (the Keiretsu system in which firms work together for long periods on the basis of mutual trust) as were links between business and the government, but the results were the same. Mitsui, Mitsubishi and many others had become major firms by the late nineteenth century, and after World War II the breakup of the 'zaibatsu' conglomerates

which had been closely associated with the Japanese war effort actually assisted the growth of firms, as individual organisations, with assistance in re-organisation from the United States of America, quickly became corporate giants by efficiently exploiting developing technologies.

Large corporations, organised bureaucratically and operating with modernist formal planning processes that assumed a relatively stable resource base, product and markets, prospered in the first sixty years of the twentieth century. Their assumptions were, in fact, a model of rational modernist thinking, and conventional organisation theory that seeks to describe them is accordingly 'in many respects a modernist discipline par excellence' (Clegg 1992:4), with the fundamental contribution coming from Weber's pessimistic vision of bureaucratic organisations and many other theories which represent organisations in various terms (Morgan 1986 presents a good coverage of theories). Modernist analyses of organisations share a vision of organisations as socially bounded units with 'internal' and external environments and which have highly specific impacts on the world. In Fordist form the modern organisation is classically bureaucratic, featuring unity of command in a hierarchal pyramid of control and clear lines of communication between clearly distinguished 'divisions'. Employment is based on credentials gained through special training and promotion based on these credentials – which in the USA tradition may involve formal training in the 'science of management' – and performance on the job is usually measured against specified objectives. The modern organisation also features and formalises the greatest degree of job differentiation possible in the particular area of work. Decision making in such an organisation is formally rational featuring, as introductory management texts describe, about seven separate steps from problem identification through to implementation of a

selected alternative (see for example Robbins 1994:ch.6; Bateman and Zeithaml 1993:ch.4; Schermerhorn 1995:ch.5). Basic beliefs of this tradition are that larger organisations must be bureaucratically organised and that organisation progress is assured with linear patterns of thinking and decision making. Such progress can be measured in terms of accounting numbers developed using accredited accounting conventions, and even impacts of organisations on the natural world can be measured using techniques developed within conventional neo-classical economics such as the travel-cost method and contingent valuation approach.

This is a limited vision even within the formally rational modern tradition, as newer perspectives such as open systems theory and organisation patterns such as matrix configurations make clear, but it carries a core of truth for organisational arrangements in modern society. Assuming stable growth, relatively stable organisation environments and a cultural context which legitimates use of rational decision making and bureaucracy, the model described predominates in modern industrial society; there are boundaries around such organisations, it is possible to use formally rational decision making processes, there are identifiable impacts in the social and natural world, and it is possible to measure impact (and progress) relatively easily using available quantification. The substantive rationality of such processes is open to debate, but given an ideological position that legitimates growth as 'progress' such debate is still rare. Subsequent discussion of the organisation structure suitable for survival in a late or post-modern world will indicate further limitations and indicate areas of substantive irrationality, but for now it stands as an ideal typical representation of the modern organisation, one effective in a modern society and, given the continuing spread of modernisation world-wide, it continues to be an important model.

The Natural Environment

All the processes of modernisation that have been discussed so far have contributed to environmental problems; indeed, the basic features of the capitalist system suggest environmental problems. Expansion requires natural resources, and is legitimated by a 'growth is good and necessary' ideology. Technological dynamism results in more efficient ways of exploiting the natural world – it can also lead to better ways of protecting it, but this is not part of the modernist project. The logics of competition and growth lead to short-term patterns in planning that result in reckless exploitation of resources by business organisations in pursuit of short-term profits. The links between the state, industry and science mean that science too is harnessed to further exploit the natural world. In sum, the process of modernisation is also a process of environmental exploitation.

By 1970 the result was a perception, particularly in core nations, that the biosphere was in a state of crisis. It became apparent to many that for the first time the world's use of non-renewable as well as renewable resources had reached a point where the future of the human race was under question. This was not, of course, the first 'eco-crisis'. For example, in the Mesopotamian basin a great civilisation had collapsed two thousand years ago because of mismanagement of irrigation systems (Rzoska 1980); Easter Island society collapsed through misuse of a bounded and inflexible ecology (Ponting 1992:ch.1); and Europe had been altered by humankind for several thousand years, assuming its basic pattern of landscape by AD1000 (Stevenson and Newsom 1992). It was however the first global eco-crisis and, given the instruments of modern media, the first such crisis to be globally discussed and the first to be globally produced.

By the early 1930s the core countries were all comprehensively industrialised and required large quantities of energy and raw materials to operate, and after World War II a range of other nations industrialised and adopted export oriented policies in order to develop: Japan in the middle 1950s, Korea, Singapore and Taiwan in the early 1960s, and the Latin American countries in the late 1960s (Peet 1991:ch.9). The Soviet Bloc nations were already pursuing policies that established environmentally unconstrained heavy industries, as was China.

The highest profile 'doom scenario' that pointed out the problems of this approach was the business sponsored computer generated world model of Meadows, Meadows and Forester (1972) which used flawed assumptions about exponential growth in world production, energy usage, pollution, food production and resource depletion to predict that the limits to growth would be reached between 2050 and 2100. There was a range of other pessimistic predictions at about the same time (for example Ehrlich 1975) and also a quick technocratic response which derided Meadows and his supporters. Herman Kahn typifies this : '...200 years ago almost everywhere human beings were comparatively few, poor and at the mercy of the forces of nature, and 200 years from now, we expect, almost everywhere they will be numerous, rich and in control of the forces of nature' (Kahn, Brown and Martel 1976:1).

The Modernist Approach

The processes of modernisation and the institutional structure of the modernist world produce, legitimate, and in central institutions in modern society are operated in advance with a specifically modernist approach, typified by the Kahn statement just quoted.

It includes a rational approach to the world in all of the three Weberian senses. Knowledge should be the basis of action, and rational calculation is both possible and useful. The impersonality of the market place is accepted, as is the fact that the state, the economy, and other major social institutions should be seen to act rationally and predictably.

The modern approach is ultimately optimistic. Economic growth is not only good and necessary but with the application of rational thought any problems created by growth can be solved. Part of this is a belief in managerial efficiency, another is faith in technology which will ultimately triumph if problems arise. The peak of the modern technocentric approach (to borrow O'Riordan's 1991 term) was the successful pursuit of space flight, symbolic of humankind's conquest of nature. Another element of the approach is faith in both the possibility and utility of objectivity; modern science was self-consciously value free and believed that progress could be gained via systematic pursuit of knowledge through the use of the experimental method. In planning, the modern program was basically short-term, and used reductionist thinking to build complex models that were designed to reflect the world. Even at its height (the early 1970s Meadows world-model for example) this had what now seem obvious limitations, but these were consumed by the power of the modernist 'can-do' approach.

Concluding Comments

Processes of modernisation and industrialisation transformed the globe between the seventeenth century and the middle of the twentieth century. They produced a world order centred on the core states of Europe, then the USA and later Japan, which together spread modernisation throughout the globe. They led to various arrangements of a powerful state apparatus and to complex and powerful 'big science'. They formed the context for, and were simultaneously the product of, major business organisations that were the agents of change, carrying the message of industrial capitalism to most of the globe, while the most centralised (Soviet) states also industrialised but under direct state control. The modern approach was rational, anthropocentric and technocratic, and the approach taken to the natural world instrumental. Consequently modernisation produced major environmental changes, many of which were obvious at the time, but also with other major environmental problems in a period of latency, to become evident a generation hence.

Despite the use of the past tense in description of modernisation for the majority of this chapter, it retains its strength. The advanced or core nations which have, as the next chapter will demonstrate, entered a new period of 're-organised capitalism', are still heavily influenced by central elements of the modern approach, and the export of modernist thinking to other parts of the globe continues. Capitalism remains essentially modernist; expansionism, technological dynamism, control of labour and geographical and temporal instability remain a feature of industrial societies. Modernist thinking; rational, calculative, reductionist and technologically optimistic, remains the dominant world paradigm, unsurprisingly given that it is the product of and operates effectively

within basically capitalist enterprises. It is also, of course, highly suitable for formal credentialist education systems, because sequentially organised objective knowledge and rational calculation are readily teachable and examinable, and therefore continue to predominate in world education systems.

Modernism and the style of industrialisation with which it is associated offer no hope for the natural world. Industrialisation is not only built on environmental exploitation, but is associated with modernist patterns of thought which are inflexible, formally rational and backed up by experts using limited forms of reference born of tight disciplinary boundaries working within institutional links that typify 'big science'.

Changes to this system are required if the pattern of environmental destruction is to be revised; some of these are present in the moves to re-organised capitalism described in the next chapter.

CHAPTER TWO

RE-ORGANISED CAPITALISM: CHANGE IN THE MODERN WORLD

Theories of Change to Industrial Capitalism
Drucker and Bell

Peter Drucker is a prophet almost unknown outside business and management circles who suggested in *The Age of Discontinuity* (1969) that there was a transition under way from a society characterised by relatively orderly change to one which changed quickly. His theories have remained consistent in a range of publications (1954, 1964, 1969, 1973, 1989) and are summarised in his most recent work (1993). Drucker suggests that knowledge is the axial principle on which change turns. Capitalism transformed the world so quickly, he believes, because, instead of being applied to 'being', knowledge was applied to 'doing'; to tools, products, processes. This produced the Industrial Revolution and capitalism; speedy technical change, searches for new sources of energy, large scale production, and in the early phase, immiseration of workers. Application of knowledge to work and in particular the ideas of F.W. Taylor led to a 'productivity revolution' from 1880 to the end of 1945 which improved the lives of workers through redistribution of surpluses in terms of money and leisure, and now the final application of knowledge is creating the 'management revolution'. This is the application of 'knowledge to itself', in order to find out how existing knowledge can be used to produce results: 'in post-

capitalist society knowledge is the only meaningful resource ...'
(Drucker 1993:38). Drucker also points out trends towards the decline
of the corporatist state (in his terms 'the megastate'), trans-
nationalism and tribalism (ideas we will again turn to in later
discussion) and suggests that we currently live in a 'society of
organisations', managed entities which put knowledge to work and
which are organised for the constant change which characterises post
capitalist society (Drucker 1993:54).

Daniel Bell's (1973) idea of a post-industrial society resonates with
Drucker's view of knowledge as an axial principle. It also reflects the
thinking current in the late 1960's in the USA, where for the first
time workers in the tertiary sector outnumbered those in the
combined primary and secondary sectors. The Bell thesis is that post-
industrial societies predominantly produce human and technical
services, and services employment therefore expands to meet the
increasing demand for knowledge to solve technical and social
problems. The most professional of these service workers are
knowledge workers who have better access to and control over
theoretical knowledge and are better able to use the new
information storage and retrieval technology. They therefore
become an elite.

The Bell ideas were attacked after publication. Kumar (1978) for
example, pointed out that all the elements of Bell's post-industrial
service sector are also present in industrial society. It is probable that
the evolutionary tinge to the writing offended against the spirit of
the times (see Block's comments 1992:6-7) and, as Crook *et al.*
suggest, the criticisms have 'more or less stuck' (1993:31). Despite
this, his key term is often used in public debate, and the trend to
increasing numbers of service workers that Bell identified in the
USA of the 1960s is now evident in all OECD nations, and within

the category of service workers the proportion of 'knowledge workers', those who work with ideas or information rather than supplying a routine service, is also growing. Bell, and Drucker before him, may overstate their case when they suggest that knowledge is the axial principle around which society changes, but their understanding of the power of knowledge in post-industrial society (and hence of the importance of knowledge workers and technologies that gather and store this knowledge) remains instructive.

Changes to modern society go much further than Drucker and Bell suggest, and as the popularity of Toffler (1980) and Naisbitt (1982) in the early 1980s suggests, the direction of change was very much a focus of public concern at that time. Naisbitt's *Megatrends* (1982) is an interesting mix of borrowed theory and speculation, packaged for the mass market, but provides an early, and as it has turned out, generally accurate summary of major lines of change. He suggested that we are changing:

- from an industrial society to 'an economy based on the creation and distribution of information' (Drucker revisited);

- to a society in which technology is matched to humanity (high tech/high touch);

- from a national to a global economy;

- away from short-term and towards use of long-term time frames;

- from centralisation to decentralisation (in tension with moves to globalisation);

- from institutional reliance to self-help;

- from representative democracy to participatory democracy, via use of 'initiatives and referenda';

- from reliance on hierarchal structures to use of personal networks, 'people talking to each other, sharing ideas, information, and resources' (1982:192);

- in the USA, because of globalisation and international trade and the move to service workers, from the ageing industry of the North to the -South; and

- from either/or thinking, to consideration of multiple options.

Lash and Urry

Naisbitt's major lines of analysis are part of the Lash and Urry argument (1987). They, too, point to globalisation and decentralisation, but they go further in arguing for a move from 'organised' to 'disorganised capitalism'. Their basic arguments are presented early in the book (1987:5-7) where they bring together a range of ideas current in the late 1980s about the shape of change into a fourteen point summary which has been re-organised here into five points summarising themes important to the present argument:

- Continuing expansion of the service class, a decline in the core working class.

- The dismantling of the corporatist welfare state, emergence of powerful social movements, decline in the class character of political parties.

- A growth in the world market, decline in tariffs, and spread of capitalism into Third World Countries. Large monopolies increasingly independent from state control.

- Flexible work organisation, a decline in average plant size, substantial labour saving capital investment, a decline in importance of national level collective bargaining and a rise in plant level bargaining.

- The spread of cultural post-modernism, and an increase in cultural fragmentation and pluralism.

Whilst they refer to this as 'disorganised capitalism' it could more accurately be referred to as 're-organised' since the fundamental principles of the capitalist system continue to operate. Effectively

they present a vision of a more flexible capitalism which is more globally dispersed, more dominated by services, and more complicated because of the dismantling and loss of power of nation-states and other elements of the 'steered society'. This system is certainly more complex, and requires new theories to explain its operation, for example new organisation theory which takes account of the smaller and more varied industrial units, but it is capitalism that is even more expansionary, technologically dynamic, and globally significant than before.

The various elements of re-organised capitalism they outline have, as subsequent discussion will indicate, proved to be broadly accurate. Services have expanded, the state is dismantling, the world market growing, flexible manufacturing is growing in importance in core nations. Read in conjunction with Naisbitt's ideas in fact, they present a useful description of directions of change that have continued into the 1990s.

Harvey

Lash and Urry's work is, however, more a description of major lines of change than an attempt to explain the reasons behind them. David Harvey's work (1989) goes further and presents a useful synthesis of important lines of thought. He connects the breakdown of what he calls the 'Fordist system of accumulation' after 1973 to a basic problem of the capitalist system, that of the handling of over-accumulation of goods, one that Marx was first to identify as of fundamental importance.

His analysis begins with a description of Fordism's creation, starting in 1914 and finally resolving the issues of how much state intervention was required to stabilise the inevitable swings of

capitalist production and to control labour by 1945. The general results have already been described, and include in western nations Keynesian economic policies and a 'general if often tacit social contract' (Harvey 1989:134) in which labour was assured welfare benefits and controlled wage rises in exchange for disciplined work performance. Together with increased application of technology to work, these contributed to steadily rising productivity and living standards.

In Harvey's account problems with Fordism were evident by the mid 1960s, and by the early 1970s there were major difficulties overcoming 'a number of important rigidities in the system' which relate to the problem of over-accumulation: '... long term and large scale investments in mass production systems that ... presumed stable growth in consumer markets' had resulted in a saturated market. Early solutions to this which fed the expansion of capitalism included cultivation of new domestic markets for existing products and expansion into new product markets. This pattern of development (often called neo-Fordism, see for example Piore and Sabel 1984) had probably reached a state of crisis by the early 1970s. Harvey's 'rigidities' outline the crisis; attempts to render the labour market more flexible and lower production led to a wave of strikes in the early 1970s; state welfare programs struggled to retain legitimacy in the face of restriction on the further expansion of the financial basis for state expenditure; large industrial concerns generally found it difficult to drop production levels. Harvey suggests that the loose monetary policies that resulted as major capitalist states strove to overcome these problems by expanding demand led in turn to inflation. This resulted in the recession of 1973 which was produced by the Keynesian inspired policies to reduce aggregate demand, hence the inflation which proved to be so politically destabilising.

For Harvey, this led to economic and social restructuring which 'may represent the early stirrings of the passage to an entirely new regime of accumulation'. This new system of 'flexible accumulation' features 'flexible labour processes, labour markets, products and patterns of consumption' (Harvey 1989:145-147). These changes are paralleled by the shifts in industrial organisation that have been described, but also include new opportunities for small business and also revivals for older forms of work organisation such as the artisnal and familial, both of which are well able to respond flexibly to new niche markets pursued by capitalist organisations anxious to take advantage of production capacity. In this system Harvey suggests that product innovation is accelerated ('the half life of products is itself halved'), and fashions change more quickly as yet more market niches are explored, and in this process marketing becomes vitally important. All this implies that entrepreneurs must be both more innovative and more efficient. Harvey suggests that the business environment features a tension between the well organised big corporation which is able to make quick decisions in the face of uncertainty, and the small and flexible business that also prospers in times of change. Contrary to Lash and Urry, Harvey suggests that capitalism has become 'more tightly organised *through* (his emphasis) dispersal, geographical mobility and flexible responses in labour markets, labour processes, and consumer markets, all accompanied by hefty doses of institutional, product and technological innovation' (Harvey 1989:159). This is an issue that will be considered again in the conclusion to this chapter.

The Harvey argument further suggests that this tension between centralisation and dispersal is related to two other developments that are argued to be of prime importance by writers from across the ideological spectrum; increases in the power of information and developments in the international money market. He suggests a

conventionally powerful role for information in regimes of flexible accumulation, and analyses the re-organised, more complicated and more powerful international financial system that has accompanied the growth of the global capitalism.

Harvey's analysis draws together many earlier accounts of the transition from industrial capitalism to a new form of capitalism and his general 'crises of accumulation' explanation of it is compelling and widely accepted, as Crook *et al.* suggest: 'There is widespread agreement across the ideological spectrum that even neo-Fordism met the limits of a saturated global market around 1970' (1992:173). There are differences in the detail of explanations of this crisis, but broad agreement as to its significance.

One further general account of the change to post-modernism or late capitalism can be usefully considered, since it incorporates but also extends the analysis described to this point.

Crook, Pakulski and Waters

The Crook *et al.* 1992 account of the transition is even wider ranging than those described so far, a 'grand narrative' which argues that there has indeed been a shift to a post-modern situation. The authors are sociologists, and in explaining their system we return to the concepts that introduced a description of the modernisation process in this chapter. They suggest that 'advanced capitalism' is the product of two main groups of processes. It is a highly differentiated society exhibiting high levels of specialisation and complexity which provide problems of integration; and it is also a highly organised society exhibiting high levels of rationalisation and commodification, processes which provide for centralised

management mediated through bureaucratic power and money (Crook *et al.* 1992:32). Post-modernisation is the result of tensions between these two processes as differentiation extends to become hyper-differentiation so that the differentiation of function typical of modernisation extends to differentiation of structure (for example mass production units are now found beside market-niche producers, co-operatives, and home makers), and increased levels of centralised organisation which amount, in direct justification of Habermas' later work (Habermas 1985), to a 'virtual completion' of the colonisation of the life world.

This presents a critical contradiction. The two processes, they argue, are not mutually sustainable. Hyper-differentiation produces a theoretically limitless range of social units and media of exchange (not just power and money) and 'there is no longer an oligopolistic set of sources for money and power and thus they lose their effectivity as sources of social control' (Crook *et al.* 1992:34-35). The complexities this situation produces also mean that the consequences of a given item of bureaucratic manipulation cannot be foreseen. Finally, there are so many different types of social unit, and such a mix in the steered society between the public and domestic that the boundaries collapse. The general results are well described in a central passage:

> Post-modernisation is characterised by an unprecedented level of unpredictability and apparent chaos. Action is divorced from underlying material constraints (or rather these constraints disappear) and enters the voluntaristic realm of taste, choice and preference. As it does so the boundaries between determined social groups disappear. So class, gender and ethnicity decline in social significance and so also do some of their characteristic forms of expression, including class-based political action and the distinction between high and popular culture. On a more abstract level the progressive differentiation of culture, society and personality characteristic of modernity involutes so that the very idea of an independent, purely social structural realm no longer makes sense. Rather 'society' must be understood in terms of 'culture' as patterns of signs and symbols penetrate and erode structural boundaries. (Crook *et al.* 1992:35)

For the state this means an unravelling of power and redistribution of it to society and to corporations (via privatisation), and to international bodies. Bureaucratic hierarchies dissolve, and 'dispersed, diverse and small-scale economic organisations disallow radically different distributions of economic power', whilst the power of owners is constrained by the possibility of workers withdrawing their skills and knowledge and transferring them to other organisations (Crook *et al*. 1992:38). Politically traditional class based parties are displaced by variously constituted 'peoples parties' and a range of social movements representing global as well as ephemeral concerns. Crook's *et al*. vision for work and production refers to Harvey's ideas in suggesting that large industrial organisations will give way to a range of alternatives, in which flexible manufacturing is associated with flexible technologies (especially those using computers), flexible organisations (here Crook *et al*. refer to the Japanese patterns) and flexible patterns of organisation in the labour market (Crook *et al*. 1992:ch.6). Post-modern science, they argue, is the product of tensions as the differentiation characterising modern science 'threatens to become fragmentation, control through technology threatens to become control by technology, co-operation with government and industry threatens to become colonisation by them' (Crook *et al*. 1992:206). A new 'post-science' is therefore displacing organised differentiated modern science, and it is trans-national and decentred and one in which disciplinary structures are eroded and communication between disciplines – and between the technical and social dimensions of a particular issue – becomes more important than communication within a discipline. This does not, they suggest, in an echo of one of Beck's lines of thought, 'imply a decline in expert knowledge; quite the reverse' (Crook *et al*. 1992:217), because of the

importance of scientific contributions to important debates such as 'the damage control of the unforeseen consequences of the [societal] project for the control of nature' (Crook *et al.* 1992:211).

This account is the most complete of those considered so far, and neatly draws together the points that analysis of the range of theories of the transition has so far revealed. It also makes significant mention of the position of the natural world in the transformed world, an issue that occupies centre stage in the work of Beck (1992a, 1992b) and Giddens (1990, 1991).

Beck and Giddens and Environmental Crisis

Beck refers to the same patterns of change as discussed earlier, but in his analysis globalisation, flexible manufacturing and employment patterns and the associated increases in consumption and production, become part of a basically pessimistic analysis of the transition from 'industrial society' to 'risk society'. His major work in this area was intended primarily for a German audience and was first published in 1986, in the wake of the shock of the Chernobyl disaster and concern about acid rain and the pollution problems endemic to Middle Europe. *Risk Society* (1992b) reflects the German dialectical style in which ideas are teased out of contradiction, and thesis and antithesis lead to synthesis. Partly because of this and partly because he presents a wide ranging discussion in what Lash and Urry's introduction to the English translation refer to as a 'personal and essayistic' style (Beck 1992b:1), there is support for a number of positions on issues in the book. Even Beck's basic stance is arguable; his specific intention is to suggest ideas and theories that will allow humanity to 'conceive the new which is rolling over us in a new way, and allow us to live and act within it' (Beck 1992b:12),

that is to say become a reflexively modern society, but the tone of the book is consistently pessimistic and a medieval notion of fate pervades discussion. Categorising Beck is already a focus of analysis (see for example Mol and Spaargaren 1993) and no doubt will continue to be so, but for the present discussion his work provides an opportunity to describe a significant attempt to consider the ecological dimensions of global change. For Beck the change from industrial society (modern society) to risk society means a transition from the logic of wealth distribution to risk distribution. In attempts to deal with risk 'modernisation becomes its own theme' and in this state of reflexive modernity the problem is: 'how can the risks and hazards systematically produced as part of modernisation be prevented, minimised, dramatised or channelled?' (Beck 1992b:19). This does not mean the end of capitalist development but the raising of it 'to a new stage', (Beck 1992b:23), one that, Beck argues (along with others we have discussed), began developing in the early 1970s.

In reflexively modern society risks are the product of modernisation itself. They are pervasive; they multiply and despite some overlaps with existing socio-economic patterns they ultimately overcome class boundaries, as well as regional and national boundaries. The circulation of pollutants, for example, has the characteristics of 'universality and supra-nationality .... risk society is in this sense a global society' (Beck 1992b:23). 'The latency period' of risks has passed and they are, Beck argues, now evident, 'but as distinct from earlier times when risks were detectable by the sense, the new risks evade human perceptive abilities [and] induce systematic and often irreversible harm' (Beck 1992b:22-23).

In risk society individuals are ever more liberated from the established social bases of modern society – social class, work, the family – and biography becomes self produced. In this process the

individual is faced with constant decisions about such things as education, profession, job, numbers and even characteristics of children, and in the process biography becomes self-reflexive. Part of this is the globalisation of identity, as individual decisions, for example, the decision to drink coffee in the morning, make one complicit, Beck suggests, in the exploitation of plantation workers in South America.

Science and technology are given a major role in the analysis of reflexive modernisation. Beck discusses the techniques of risk analysis used in environmental policy to develop a savage critique of science, arguing for 'the failure of techno-scientific rationality in the face of growing risks and threat from civilisation'. Science is incapable of answering the new questions posed by risks, and limps behind the social critique of industrial society. It is 'prominently involved in the origin and growth of risks', and the sciences actually 'become legitimating patrons of a global industrial pollution and contamination of air, water, foodstuffs etc.' (Beck 1992b:59).

The relationship between science and risk is presented as more complex than this too, in that as well as creating risks by contributing to industrial development it is required by the critics of growth to diagnose the problems it has helped create (Beck 1992b:162-163). This criticism of science echoes in tone the pessimism about the scientific establishment produced in the early 1970s, at the height of the modernist program (Habermas 1971, Leiss 1974), but goes further in that it attacks the basic authority of science, the sciences monopoly on rationality is broken. In Weberian terms the instrumental rationality of its methods are questioned and claims for substantive rationality characteristic of modern science discredited. This has direct social importance because of the fact that therisks he identifies are pervasive and multiply (they are 'over-produced'), and because the risks of this new form of capitalism

cannot be identified by the senses, the lay person requires an expert's assistance. Science, in short, has become more necessary but less adequate (Beck 1992b:156).

Beck takes an ahistorical view of 'nature' arguing, with McKibben (1990) and Giddens (1991), that there is now an 'end of nature' in the sense that there is no part of the natural world left untouched by humanity (Beck 1992b:81). He goes further though, arguing for a second end in that almost all nature has been actually subjected to human control; in his analysis this has produced many of the risks of industrial society. In discussion of bio-technology, he also argues a third end, a 'mastery of nature' in the sense of the biological nature of humankind (Beck 1992b:204-212). Taken together these three 'ends of nature' amount to a complete incorporation of 'nature' into 'society', and for workers in the environmental sciences this means they are working in 'a branch office of politics, ethics, business and judicial practice in the garb of numbers' (Beck 1992b:82).

Following his discussion of risks, complete with a catalogue of environmental disasters – Chernobyl, holes in the ozone layer, greenhouse, many types of pollution, medicine and science producing substantively irrational results, science unable to cope, toxins in the food chain, and more – Beck's positive thinking appears under-powered. Having referred to the breakdown of the (corporatist) welfare state and the waves of large-scale technological innovation with as yet unknown future hazards' (Beck 1992b:185) he suggests that there has been an 'unbinding of politics', and a rise in the importance of a range of 'sub-political spheres'.

The list of sub-politics he offers widens as discussion continues but fundamentally includes business, science and technology. The realm of sub-politics includes all the powerhouses of change that lead to risk creation, and he suggests that 'they cannot continue to pretend

that they do not make policy by their own means ... the age of excuses is over' (Beck 1992b:233-234). They must become reflexive, as must politics, which should overcome 'fictitious power constructives' and regulate the possibilities for sub-politics to exert influence. Beck finishes by repeating his call for the institutionalisation of self-reflection within the important sub-political spheres, a notion that sits poorly with his earlier analysis which suggests that important sub-political areas are structured to produce yet more risks.

The notion of the power and increased responsibility of sub-political spheres is in keeping with earlier thinkers, and makes an extremely useful contribution to this discussion. The dismantling of corporatism, the increasing flexibility and spread of capitalist production, the rise of work place bargaining, and the increasing pace and power of technological change all point to a growth in influence of important (usually institutional) elements of the global system. Beck's optimism is at least partly misplaced in that there is little likelihood of states voluntarily abandoning the power they still have (which Beck arguably understates, given their power of coercion by police, armies and regulatory bodies) and merely acting as regulators of the sub-political. Nevertheless, there are indeed strong indications of the power of the sub-political elements of society, particularly that of business. There are also indications that business corporations are thinking reflexively and behaving with greater social and environmental responsibility.

Giddens' works on changes to modern society (1990, 1991) were written not long after Beck, and he offers a very similar set of insights, but a more extensive analysis of the development of individual identity in what he calls late modern society (he denies

'post-modern' is a reasonable category) and a more specific analysis of globalisation, which he takes to be fundamental to the transformation taking place.

Like Beck, Giddens suggests that identity has to be reflexively created 'amid a puzzling diversity of options and possibilities' (1991:3), up to choices involving the body itself (Giddens 1991:8). Late modernity is also a risk society. Although risks have reduced in some areas (for example in medical procedures) 'yet at the same time [it] introduces new risk parameters largely or completely unknown to previous eras. These parameters include high consequence risks deriving from the globalised character of the social systems of modernity' (Giddens 1991:4). Amongst high consequence risks he discusses nuclear weaponry and the possibility of nuclear war, and a range of global environmental problems related to our treatment of already 'socialised nature' (Giddens refers to McKibben's work, just as Beck does).

The suggestion, in summary, is that individuals are capable and knowledgeable, but that there are great stresses placed on them by life in a risk society, and by the fact that this society is dynamic. Giddens in fact refers to it as a 'runaway world' (Giddens 1991:16) characterised by the fact that people must place trust in a range of 'expert systems' (for example domestic water systems) which intrude into everyday life and expropriate individual autonomy. Individuals survive in such a world through building up a protective cocoon which insulates them from the anxiety that would otherwise prevail. The cocoon is punctuated by fateful moments, such as the Chernobyl disaster (echoing Beck's 'anthropological shock' related to Chernobyl) and expert knowledge becomes more important at such times because individuals use it in their risk assessment.

The Giddens' view of knowledge is basic to his notion of reflexive modernity. Knowledge is no longer certain, it is always susceptible to revision as new information is developed. As a social scientist he refers mainly to knowledge in that area, but also to science: '...the reflexivity of modernity actually undermines the certainty of knowledge, even in the core domains of natural science' (Giddens 1991:21). This view of knowledge is similar to Beck's, as is his point that the individual relies on knowledge in important situations, fateful moments. It reflects a widespread attitude to scientific knowledge in current society, one fed by the quickly changing nature of the stack of knowledge and by the fact that new information technologies mean that greater numbers of people and organisations have access to such knowledge – even though in conditions of hyper-differentiated areas of knowledge narrowly specialised experts may be required to interpret it. (These points will be developed in the next chapter.)

Giddens' overall view is pessimistic. He refers to reflexively modern society as 'juggernaut society' (comparing the driving of a careering juggernaut to a 'well-driven motor car' (Giddens 1990:53). The idea that the world is no longer subject to prediction and control is related to a number of factors. The first is design faults, where expert systems are designed incorrectly, and these can be remedied. The second is operator failure, where a well designed system is poorly used, and this is ineradicable because it relates to human nature. The third and fourth reasons are more significant. The third is the broad category of 'unintended consequences' of system use which is related to the complexity of the social world, and to the fourth, the reflexivity or circularity of social knowledge which means that the social world is never stable; that it is altered as new knowledge not only renders it 'more transparent, but alters its nature, spinning it off in novel directions' (Giddens 1991:153). This is an extension of

the frequently discussed problem in the social sciences of double hermeneutics in which the object of enquiry is influenced by the results of investigation, and to that extent is hardly revolutionary, but it does serve as a good way of indicating the impossibility of coming to grips with certainties of knowledge in a world which is not only quickly changing, but is altered by the advance of knowledge.

Beck and Giddens provide the most eco-centric analyses of change of the theorists considered. In both cases the intentions of the writer were wider, but for both most of the examples used to demonstrate 'risk society' and 'reflexive modernity' come from humankind's treatment of the natural world, and for both writers the eco-crisis is critically important.

Re-organised Capitalism in the 1990s

The basic line of argument in this section is that capitalism is continuing to re-organise, broadly along the lines that the theorists already discussed have suggested, but with some important changes becoming evident in the 1990s.

Knowledge and Services

The analyses of Drucker and Bell have continued to prove accurate. The post-industrial society (to use Bell's term) is certainly here, and is spreading. Changes since the mid-1970s have, if anything, strengthened the significance of knowledge in society. The USA has the biggest services sector of all, in 1992 employing 76 per cent of

workers and accounting for 72 per cent of Gross Domestic Product (GDP), with consistently similar patterns of change in other countries extending through to the mid 1990s.

Table 1: Growth in Services Employment
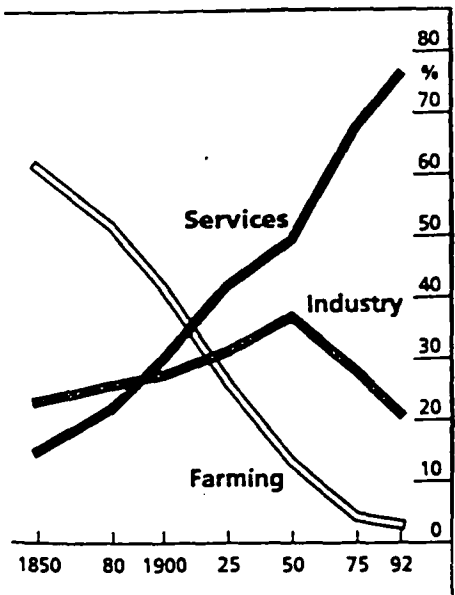
Services are also the fastest growing element of international trade, making up 20 per cent of the total not including services delivered by subsidiaries of MNC's in foreign markets. In core nations the percentage of total exports made up of services is also increasing. In the USA for example it was under 20 per cent in 1980, but just over 30 per cent in 1990 (*The Economist* 20 February 1993:62).

These figures – and others produced world-wide – probably understate the importance of the services sector, since many activities and much of the employment in manufacturing is really services. For example, workers at *The Economist* magazine are included in the manufacturing category even though few manufacture anything. Services and manufacturing are increasingly inter-connected, with services predominating. General Motors

(USA) for example, is a major manufacturer, but its biggest single supplier is a service provider (Blue-Cross Shield) and one of its biggest products in dollar terms is financial and insurance services.

As Drucker and Bell suggested too, within the general category of services the greatest growth is in 'knowledge work'. This can again be demonstrated with reference to the USA, the most service oriented economy in the world, using US labour statistics presented in the following table:

Table 2: Growth in Employment within Services

US private-sector services, 1980-91, %

	0	20	40	60	80	100
Legal services						
Business services						
Health						
Recreation						
Hotels						
Education						
Retail trade						
Financial services						
Wholesale trade						
Transport and communications						

(Source: *The Economist* 20 February 1993:63)

Significant in this table is the growth in legal and business services, almost all of which would be knowledge based, far outstripping growth in non-knowledge based services. Growing employment in the computing and telecommunications industries, widely predicted to be the chief source of growth in the world economy in the 1990s, will extend this trend (see *The Economist* 11 February 1995:20).

Growth in services is significant – there are indications, as Bell predicted, of knowledge workers becoming an elite. In an increasingly complex world they are the interpreters of complexity and change and their general position is analogous to that which Beck describes for scientists: more required than ever before, but less adequate.

In a world increasingly run by knowledge workers, and with most such workers produced in core countries, it is more obvious now than before that the growth in size and power of knowledge workers is a key (along with others such as control over technology) to control by the core of peripheral nations. This growth in services employment is significant too, because it suggests that the nature of work, and the capacity for managers to control work is changing. Offe suggests that services labour is different to industrial labour for two reasons. Firstly, because of the 'heterogeneity of the cases that are processed in service work' it is difficult to set standards that define adequate performance. Secondly, 'service work differs from productive work in the lack of a clear and uncontroversial criterion of economic efficiency'. This means that the 'non-standardisation [of service work] must to a great degree be accepted and replaced by qualities like interactive competence, consciousness of responsibility, empathy and acquired practical experience' (Offe 1985:138). This 'acceptance' has not yet been established however. In the 1990s there were numerous moves to develop numerical measures of performance in services employment, particularly in attempts to apply Total Quality Management (TQM) to services. TQM is a Japanese/American management practice based on statistical analysis of quality measures and 'control of quality' in the entire production and sales process and has been the most widely discussed management technique of the mid 1990s. The success of these attempts is arguable and in any case future attempts to impose

formal (and in this case numerical) rationality on services/knowledge employment will be hampered by the ever increasing complexity of this employment, continuing growth in numbers employed and opposition from the workers themselves. Offe's basic insights into the difficulties of measuring and controlling services work therefore remains valid. They have been further developed by Waters (1989) who suggests a collegial organisation structure for knowledge workers characterised by, among other things, formal egalitarianism, formal autonomy, peer review of products, collective decision-making and a professional career.

A Global Finance System

As Harvey suggested, the global financial system is very complicated, but within this complexity some developments stand out. In the 1980s, and flowing through into the 1990s, many of the regulatory boundaries that inhibited the flow of capital and of foreign direct investment (FDI) collapsed and by the end of the 1980s what could fairly be called a global capital market had emerged. It is difficult to accurately measure the size of such capital flows; for example what forms of money exactly count as cross-border transactions? How do we measure the reinvestment of funds abroad by a wholly owned TNC? Should one include changes that are merely the product of exchange rate variations? The number of financial products that must be measured is also bewildering to statisticians; you should include all forms of bank lending, trades in all sorts of bonds (including those actually issued offshore), all forms of foreign direct investment, trade in options and futures, and trade in financial services such as insurance (in all its forms). The list could continue. The increasing complexity of the system (which ironically defies the

modernist rational approach which has produced it) is the point, and the difficulty regulators would have controlling the system, should they choose to do so, is an obvious corollary.

Nevertheless, some measure of the increasing size of the system can be gained from broad statistical categories. Between 1980 and 1991 the size of international bank lending moved from $US324 billion to $US7.5 trillion, over a twenty-fold increase. To put that in perspective the combined GDP of OECD countries increased by a factor of about 2.5 (from $US7.6 trillion to $US17.1 trillion) and bank lending therefore rose from 4 per cent of the OECD GDP to 44 per cent (*The Economist* 19 September 1992:8-9). In 1986 the global measure of what are technically called 'principal derivatives' (options, futures and transactions involving interest rates and/or currencies) was $US1.1 trillion, in 1991 $US6.9 trillion. The outflow of FDI, which is 'increasingly the driving force of international economic transactions' (UN 1992:6) also changed dramatically. Using some core nations as a measure, between 1986 and 1990 the value for the USA, Japan, West Germany, Britain and France climbed from $US61 billion a year to $US150 billion, and the 1992 global estimate is $US1.7 trillion (*The Economist* 19 September 1992:4). The U.N. global estimate for 1990 is substantially lower at $225 billion, but they also suggest that it is growing at 'unprecedented rates' and is of critical importance in the world economy (UN 1992:1). Turnover of foreign exchange in 1992 was about $US900 billion, grown from about $US650 billion in mid 1989 and $US325 billion in 1986 (*The Economist* 19 September 1992:9).

This growth trend will probably continue, despite cyclical downturns (for example, the world recession led to a drop in FDI in 1991) for a number of reasons. Firstly, it is related to the expansionary nature of the capitalist system. Secondly, it is fed by and feeds the international trade that now characterises the integrated world economy. Thirdly,

it was driven in the 1980s and continues to be driven by continuing deregulation of the global economy as well as by continuing innovation in 'financial products' (such as portfolio insurance) which give traders better access to money. Fourthly, new information technologies facilitate faster and more effective communication and have made possible the practice of 24-hour trading world-wide. This does not mean the world economy is fully integrated (the labour market certainly is not, nor is direct investment), but it does indicate that general finance flows are closer to being fully deregulated than ever before.

Mass Marketing

Within the 1990s world economy the patterns of mass consumption and mass marketing that Harvey analysed have become even more significant. A larger and less constrained market assisted by modern telecommunications technology means marketeers can cover the world with images and sales plans almost instantly. New products for consumption are developed for new world markets daily; major clothing manufacturers, for example, can change their styles in factories world-wide using the flexible technologies of computers and modem links, and using 'just-in-time' systems (no inventories) and highly trained staff who report on changes in consumer taste on a daily basis, have few problems in reacting to changing demand with new products within a matter of days. Benetton, a major world brand name in clothing, has taken the process one stage further. It is in reality a marketing and sales organisation that co-ordinates manufacturers using modern technology. The power of telecommunications effectively draws the world together, so major brand names, for example Coca-Cola, Sony, and Nike, are recognised world-wide, and advertising is so successful that the models used in

their images become the most widely known humans alive; Michael Jordan, for example, an American basketball player who advertises shoes was the most popular sportsman amongst Australian youth in 1993 (*The Age* 15 May 1994:26), and Michael Jackson, an American song and dance man, may well have been the best known human being ever in late 1993 because of his central role in Pepsi Cola advertisements, broadcast and discussed world wide.

Increased Power of Information

Changes in the importance of services employment, a deregulated world finance system and changes to mass consumption and marketing all suggest increases in the power of information in the 1990s. The corpus of scientific information continues to grow, the rate of change of technological knowledge, particularly in electronics and communication, is increasing as more workers enter the field, and in business the capacity to change and adapt to quickly changing markets depends on instantaneously available information. Other factors contribute to the increased value of knowledge: a more complicated world market, a bigger and faster world financial system, the growing complexity of the network of international obligations and treaties, and more efficient, more widely used and more affordable technologies to handle information. A direct consequence of this is that the growing class of knowledge workers also becomes more important.

The increased importance of information has been associated with changes in information technology, especially the growing links between computing and telecommunications technology. This can

be illustrated with two brief discussions, the first of the vision of Microsoft, the world's biggest producer of software, the second of coming changes to the hitherto technically-simple television set.

Microsoft got its initial success by supplying the Microsoft Disk Operating System (MS-DOS) to IBM, and then to other computer suppliers, with such success that MS-DOS and 'Windows' (its more user-friendly successor) became the standard operating system for personal computers (PCs). Microsoft sold over 100 million copies of DOS alone. Bill Gates, chairman of Microsoft, also made deals with a wide range of other software suppliers, so that his systems were associated with most world PC usage. This made the company extremely profitable in the early 1990s. For example in nine months to March 31, 1993, the company made profits of $US688 million on sales of $US2.7 billion. In mid 1992 it had no debt and two billion in the bank (*The Economist* 22 May 1993:22). Profit making became difficult about mid 1992 as the lowered prices obtained for PCs in a saturated world market also forced prices of software down. One answer was to arrange co-operative arrangements with other companies in the field of computers (these will be described in later discussion), another was to enter into extensions of computer use, particular in the information area. Compact Disk Read Only Memory (CD-ROM) facilities were added to PCs, and information packages developed and sold; encyclopaedias, games, films, music. The head of Microsoft's advanced technology unit expects a future in which information is spread via fibre-optical and wireless networks to a new breed of small computers which could be in telephones, facsimile machines and television sets. The problem then becomes one of selecting the right information to package and sell, a further role for Microsoft (*The Economist* 22 May 1993:23).

The background to this bold vision deserves further discussion. The technology of TV, relatively stable from the 1930s to 1992, changed quickly in 1993. High definition television (HDTV) became a commercial reality after twenty years development; it yields much sharper images and facilitates information transmission, particularly of graphs and figures. There is likely also to be a transition from analog signals to the digital signals that are used for computers, which yield sharper pictures and allow compression of images so that far more data can be transferred in a given period. Once PCs are allied to television, viewers can also use the digitally based system and associated technologies to edit the material as it is viewed. A third change is in the method of delivery of signals; in mid 1994 most signals world-wide still came by air (traditionally), but increasingly they will also come from digital direct broadcast satellites, from microwave transmitters or, in a significant change, via fibre-optic cables that can transmit far more information than the copper cables that were previously used. These technologies are spreading through the core nations quickly; in the USA perhaps $420 billion will be spent in the next 20 years updating the telephone system, and Telstra Australia expects to provide fibre-optic/co-axial cable (an efficient hybrid system) to 1.1 million households within three years from 1994, competing with Optus for clients. The 'information super highway' (to use the media's own term) is being built rapidly (see Meredith 1994).

As Microsoft employees suggest, these innovations will effectively change the potential of television, both for entertainment (for example with video-on-demand, which means that viewers can look at any film or video release whenever they like) and for information dissemination. This, added to existing electronic mail

(e-mail) which is now spreading from business and academia to households, and electronic banking and shopping, suggests that the 'information society' is more a reality in the mid 1990s than ever before.

Computers and Flexible Manufacturing

The process of flexible manufacturing which is discussed by Lash and Urry, Harvey, and also Crook *et al.* has also been further developed in the 1990s. The term encompasses a variety of computer assisted planning, design, drafting, and manufacturing processes (including robot controlled production), and had already changed the industrial map by the late 1980s. It facilitates small scale industrial units, flexible work practices and technological solutions to problems.

Developments in the 1990s which have further advanced the capacity of small and medium sized firms to compete in national and international markets have centred on computers. Mainframes were routinely used until the late 1970s in big business and research establishments, and there were relatively few producers of these machines, with International Business Machines (IBM) the dominant force. Personal computers were developed in the late 1970s and sold to individuals and small business. This was also associated with the entry of a range of new manufacturers and sellers into the industry. In the mid 1980s these were increasingly networked, so users of individual machines could communicate without using a mainframe. IBM lost much of dominance by being slow to respond to this market. In the late 1980s, and with increasing rapidity in the 1990s, personal computers became far more powerful, smaller and more portable, and networking became more sophisticated with use of 'client-server' networks in which a large

number of personal computers are connected to a central and more powerful mini-computer which can do most of the things that a mainframe could do. This has meant that a medium sized organisation in the mid 1990s can, without great cost, operate with what have become powerful personal computers in an even more powerful network, and using modems and other telecommunications technology link with national and international affiliates and collaborators at little cost. In sum, the moves to flexible manufacturing identified and discussed by researchers using the mid to late 1980s as a measure, have continued but with ever increasing flexibility. The basic computer technology is becoming even more powerful and affordable since the cost of 'computing power' drops by year. Given the rapidly decreasing size of components it is also more portable.

There are a range of other important implications of the changes to information and telecommunications technology:

- International and geographically dispersed business can be readily co-ordinated (this point will be further developed shortly).

- Business is harder for the state to control, but more effective (a reiteration of Beck's point about the growing importance of the sub-political sphere).

- There is however a *general* increase in the capacity for state control because it is easier and cheaper to collect, store, centralise, process and access information on citizens. This trend is, of course, balanced by the countervailing tendency for a decline in the economic importance (and absolute size) of most states, and the increasing influence of social movements, and other sub-political spheres (including business).

- Sharing of scientific information is cheap and easy. The world's professional intellectual community was, by 1992, already linked by computers and e-mail. The American Academy of Management for example, an association of several thousand academics and management practitioners in over forty countries, is one 'tribe' linked by e-mail, and

has more than twenty separate special interest groups linked by e-mail. These links are difficult if not impossible for the state, and for academic or business interests, to control, if only because they provide such a wide range of options for virtually instant cross-border communication. Such tribalisation is increasing world-wide, a point Drucker stresses in his analysis.

- Whilst individual items of new technology are cheap relative to average weekly earnings in core nations (and as the price drops for PCs and software demonstrate, this affordability is ever more evident), a number of important inequities are also appearing. There will be a class of 'information-poor' in core nations, by virtue of lack of finance and lack of (educated) capacity to understand the new information. There will also be inequities internationally because the infrastructure that supports changes in telecommunication is expensive and the more complex aspects will be established in rich core nations well before their widespread adoption by the periphery. This will strengthen the already strong position of the core.

The Nation State, Trade Blocs, and Renaissance of Market Philosophy

The world political map has changed dramatically in the 1990s. Much, but not all of this, is related to the breakdown of the USSR into smaller units. There are 88 republics and semi-autonomous regions in Russia, and other already independent new nations, including three Baltic states and Georgia (Stalin's birthplace) completely outside Russian control. Georgia makes a good example of the world trend. The total population is only 5.5 million, but includes two regions, Abkhazia and South Ossetia, each of which is already striving to become independent. Elsewhere, Yugoslavia has split (at great human cost) into at least five autonomous nations; Yemen (united only three years ago) is likely to split; and ethnic quarrels in Rwanda suggested that the already shaky nature of many non-tribally based national boundaries in Africa will come under

pressure within five years. The quest for autonomy is also reflected in core nations. In 1993 moves to split the State of California into three states gathered force; the Governor of Hawaii asked for recognition of the 'Hawaiian nation'; and even in Japan a 1993 best seller by the former secretary general of the Liberal Democratic party, *Plans to Re-build Japan*, suggested breaking up the country into 300 autonomous regions. Naisbitt (1994) suggests the world is moving towards a situation in which there will be around 1000 nations. The details of these moves to autonomy are unimportant to the argument at this point, but support the proposition that there are already significantly more nations in 1994 than there were in the late 1980s and that the trend is likely to continue. Whilst most of these changes are initiated by national feeling and shared languages and culture, the moves are also pushed along by advances in telecommunications technology, which enable ideas of change to disseminate much more quickly and effectively. Increasing public awareness of the value of resources within regions is also a significant factor, and the media help foster a desire to control them (the Ukraine, and Yeltsin's home republic of Yakuti provide examples of this). There is also a growing understanding that the world economy is more important for economic survival than the old 'parent country'. This last point is of particular significance. It implies the 'global paradox' that Naisbitt (1994) argues for: the moves to political independence are accompanied by the formation of economic alliances. They are also associated with (but not caused by) improvements in technology that assist world integration, and by a variety of international treaties that extend beyond the purely economic into environment and social matters.

Economic alliances not only facilitate the survival of smaller states – and therefore the increased influence of the world economic and financial system – but also they facilitate entry of small and medium businesses into other nations, and generally provide additional options for business expansion. The 1990s have featured a range of economic alliances of major importance. The 1994 North Atlantic Free Trade Association (NAFTA) sets up what is in world terms an enormous trade bloc covering Mexico, Canada and the USA; the European Community (EC) has gradually refined its economic alliance and has moved towards a common currency and common transport structures; the Association of South East Asian Nations (ASEAN) has set up an ASEAN Free Trade Area (AFTA) which covers Asia, the region in which many multi-nationals plan to concentrate investment in the next decade (see Hitt, Ireland and Hoskisson 1995:ch.8; Chai, Campbell and Spain 1993); the General Agreement on Tariffs and Trade (GATT) which covers almost all significant nations in the world economy and was designed to stimulate growth by eliminating barriers to trade, was signed after more than a decade of negotiation in late 1993.

This list does not imply that nation states have lost all power, but added to the already increasing importance of the world economy, it suggests that they are, in economic terms and in terms of business opportunities, losing importance relative to a growing network of grand alliances. Protectionism is, however, still a factor in the world economy. It was a prominent feature of the 1980s, as the USA, the EC and Japan negotiated to protect industries they regarded as essential, and within the scope of GATT there remains significant scope for protection of industries, and there will no doubt be protectionist policies between trading blocs. Significantly, too, there is potential for important social and environmental agreements that overlap

major economic agreements and control business behaviour, as the Biological Diversity Convention (which will be discussed along with other 'environment treaties' in the next chapter) demonstrates.

As well as increasing the number of world nations, the breakdown of the Soviet Bloc serves as a signal of another major world trend; a move towards less regulated market economics. The dismantling of the corporate state that Crook *et al.* (1992) emphasised has proceeded apace in the late 1980s through to the mid 1990s and is globally evident. The old Soviet states are now attempting to re-organise in order to operate as free market economies, the corporatist states of the EC and Northern Europe have dismantled significant sections of their corporatist centres, China is slowly entering the world economy, and Latin American states are attempting market oriented economic reforms. The majority of African states have not begun significant privatisation.

An important element of this process is the privatisation of state owned assets, which serves as a signal of state intentions and turns important services over to market control, thereby providing significant opportunities for world business. Privatisation serves both to shrink the state and raise finance, and the surge in Third World privatisation in the early 1990s may have been related to a slowdown in the world economy, hence problems attracting FDI. Whatever the justification, the trend is strong. The EC has largely privatised, or is in the process of doing so. Germany, Spain, Sweden, Finland, Austria, Belgium, Ireland, Greece, Norway, Portugal and Turkey all have privatisation programs. In the early 1980s Latin America was the region with the highest level of privatisation, succeeding Asia, which had occupied that role in the late 1980s (though India has not significantly privatised assets). An ironic

feature of this pattern is that the US, the home of free enterprise, now has a larger set of public assets than most of the active privatisers of the EC and sections of Asia.

Privatisation is likely to continue, and to further spread both within states (as the progress of privatisation in the Victorian Government within the Commonwealth of Australia illustrates) and to other states. Within states it has already spread from infrastructure which was always commercial or semi-commercial, for example France's sale of its share in Renault, and shares in oil companies that have been sold world-wide, to sale of public services, for example privatisation of health and prison services. States with saleable assets are now under pressure from conservative sections of the community to privatise, as for example in Italy and the USA. The trend will therefore continue. It is legitimated in the short term by the fact that it results in large sums of money being raised (Nippon Telegraph for example was sold for $12.4 billion in 1986), and in the long term by the promise of more responsive and efficient service delivery. It fits in with moves to more flexible organisations world-wide, which in turn are associated with developments in information and computer technologies. For business this means opportunity and increased influence.

Changes to the Pattern of Core Nations

There has been a gradual shift in the relative economic power of core nations. In Wallerstein's (1976) terms the USA, Japan and the EC are now in the centre of the core, whilst the growing importance of such 'Pacific Rim' nations as Korea, Taiwan, Singapore and the other 'Asian Tigers' has arguably moved them closer to the core. On the edge of this and now entering the world economy more fully is China, which has the biggest market in the world, the largest work

force, and despite a low per capita income (and depending on which currency is used to calculate it) one of the three largest GDPs in the world, trailing only the USA and Japan (Naisbitt 1994:ch.5). As it enters the world economy more fully, the shape of the core will alter further. Southern China is already entering the world economy quickly, assisted by a range of co-operative agreements with businesses based in core nations, for example Imperial Chemical Industries (ICI). This opening of China, following the opening of the Soviet Bloc, presents further opportunities for international business, which will chase new markets and resources, and spread technologies and cultures.

Business Alliances and Smaller Firms

The pattern of world capitalism has also changed in the 1990s because of the trend towards co-operative ventures of various kinds between firms which may nevertheless remain competitors in other areas. Alliances are not new - they have always been a feature of industrial life - but whilst no nation state or international body collects complete statistics on alliances in the 1990s it is clear that they have become a standard feature of re-organised capitalism. The form of alliance is extremely varied; joint ventures are common, as is sharing of research costs. Funding agreements between suppliers and producers are also increasingly common, as are licensing agreements between businesses.

Change at IBM provides a good example of the new pattern. In its time of complete dominance, up until the 1980s, everything was done without co-operation from other firms, but in attempting to catch up with the PC market IBM developed alliances with Microsoft, Intel and Lotus. It also has an agreement with Apple

computers to develop new operating software, while at the same time competing with Apple for a share of the PC market. The car industry provides another example. There are no longer any completely independent car manufacturers, and most cars are therefore a result of complex agreements between manufacturers, and between manufacturers and suppliers who enter into long term agreements that ensure prompt supply of goods and thus allow a just-in-time system to become established. This is self consciously an imitation of the Japanese Kieretsu arrangement which for decades provided Japan with a competitive edge over other core nations. The crankshaft used in the American Honda car demonstrates this point, whilst at the same time demonstrating the difficulties of determining what is a foreign product and what is not in the global economy. The crankshaft is manufactured in the USA from a steel bar produced by Copperweld Steel Company (63.4 per cent Japanese owned). The bar goes to TFO Corporation (100 per cent Japanese) to be forged, then to a 100 per cent US owned plant for heat treatment, then back to TFO, and is then sent to Honda, which can say it is 100 per cent American because all fabrication takes place on US soil (Emmott 1993:58).

Alliances will continue because they offer advantages to firms. A survey of 4,182 technological alliances by the University of Leninburg concluded that they were concentrated in bio-technology and information technology and found that the three most common reasons given for forming alliances were to exploit complementary technologies, to gain access to a market, and to reduce the time taken to innovate something, basic to survival in the quickly changing world market (*The Economist* 27 March 1993:16). This is admittedly a survey of a specialist area, but the same reasons also apply more generally. The pace of change and the technological dynamism of modern capitalism suggest that this trend will continue, and the

pattern of developments in high technology industries further
demonstrate this. As earlier discussion has indicated, there is a
growing convergence between different elements of the industry,
and this is already leading to alliances of various kinds between
firms with major interests in one of the areas. The following
product map, drawn by Apple computers on the basis of work done
at Harvard University, indicates the possible complexity of such
alliances in future. It represents the vision for the 'information
industry' in the year 2001 of Mr Scully, then head of Apple. The
horizontal axis moves from products which act as carriers of
information on the left, to products whose value lies in the
information they contain on the right. The vertical axis has tangible
products on the bottom, ranging to intangibles on the top. The
implication is that alliances on the bases of shared technologies are
likely:

Table 3: The information industry in 2001
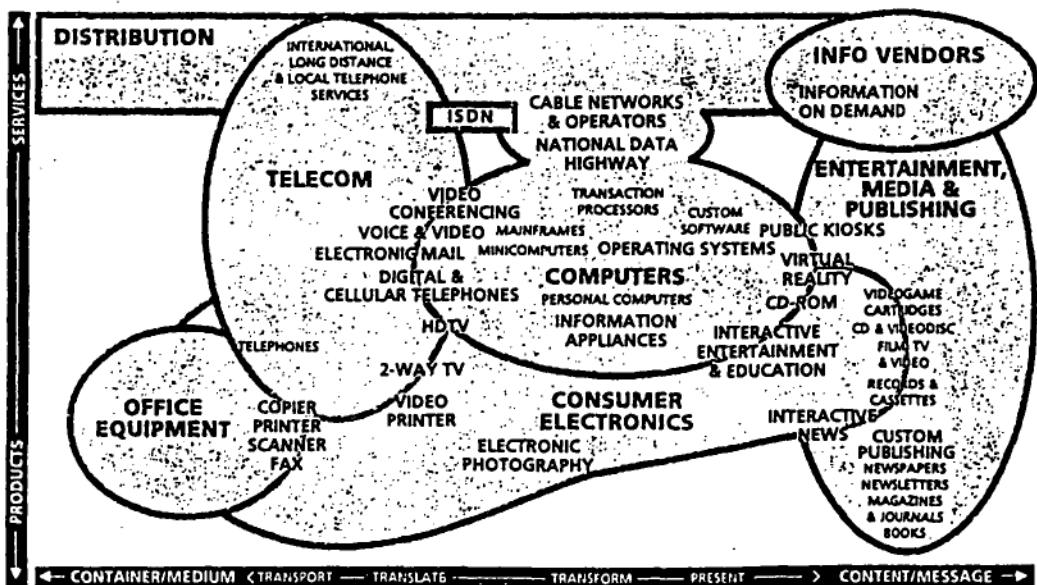
(Source: *The Economist* February 27, 1993:14)

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A related trend that is superimposed on alliances is that of the decline in the unit size of the giant corporations. In a world economy that demands fast changes to product lines in order to meet the quickly moving market, and in which technology changes rapidly, a key to success, as we have seen, is the capacity to adapt quickly. This is difficult for a large corporation, especially one with a many tiered bureaucracy. The answer for big corporations that wish to remain competitive with small and medium organisations is to dismantle (or deconstruct), creating a new organisation structure with a number of smaller independent or semi-independent units. Some figures from the US indicate the dimensions of the problem for big organisations. Already 50 per cent of exports are the product of companies with 19 or fewer employees, and only 7 per cent of US exports come from organisations with more than 500 employees. The Fortune 500, the biggest 500 corporations in the US, now account for 10 per cent of the American economy, compared to 20 per cent in 1970 (Naisbitt 1994:13). Some examples demonstrate the pattern at the level of individual businesses. IBM (US) in December 1991 re-organised into 13 autonomous businesses, and in 1993 IBM (UK) re-organised into 30 separate businesses. Xerox, General Electric, Coca-Cola, Honda, and Alcoa are all deconstructing. Paul Allaise of Xerox: 'We are trying to get the small company benefits of quickness in time to market, decision-making and the elimination of bureaucratic activities' (Naisbitt 1994:14). Jack Welch, the Chief Executive Officer of General Electric, one of the top 20 world companies in aggregate assets and sales, suggests that the corporate message for the 1990s is 'think small. What we are trying relentlessly to do is to get that small company soul – and small company speed – inside our big company body' (Naisbitt 1994:14).

This process has been accompanied by a reduction in staff numbers, particularly of numbers in the central administration of large companies, thereby rendering the organisation 'lean'. This too, is designed to increase flexibility and reduce response time, since it means that fewer people will be involved in the decision making process. IBM (US) reduced total staff numbers by 25 per cent (to 300,000) between 1986 and 1993 (*The Economist* February 27, 1995:14). Asea Brown Boveri (ABB), the world's largest power engineering group, is now made up of 1200 companies (with $30 billion revenue overall) and a headquarters staff in Switzerland reduced from 4000 to about 200 (Naisbitt 1994:14). IBM (UK) has reduced its headquarters staff from 2500 to 100. These are examples of a world-wide trend, made necessary by the need for quick responses, and made possible by new technology which enhances the information handling capacity of management.

In addition to entering alliances of various kinds and reducing central office, staff business organisations have also developed and implemented new organisation structures that facilitate flexible operations in a dynamic environment. The direction, as already suggested, is toward 'lean' organisations with few steps in the management hierarchy, and a minimisation of bureaucratic process. Additionally it is towards network style organisations in which individuals are empowered to take decisions, collaborating with their peers in small units which are loosely coupled. The new structure is backed up with a management mindset that is more willing to look at the advantages of alliances, to alter planning techniques to include (as far as is possible) discontinuities, and to cope with chaotic business environments.

Trans-National Corporations

Major elements of the context within which TNCs operate in the 1990s have already been discussed. There has been an unprecedented growth in FDI in the late 1980s and early 1990s, and this has both spread the impact of TNCs and meant that for many developing countries FDI makes up the principal source of foreign capital (UN 1992:1). Rapidly changing technologies mean that it is easier to co-ordinate TNCs, and easier to establish and maintain co-operative relationships. This is the only way to gain access to innovations since there is simply not enough time for developing (periphery) nations in particular to gain access with 'arms-length' arrangements (UN 1992:3). The globalised finance system and increasingly de-regulated world economy means that it is easier to obtain finance for, and to set up, international operations, and the fact that flexible technologies are available means that small and medium sized firms can not only establish themselves as TNCs, but given their capacity for flexible response to quickly changing markets they can also prosper relative to the larger firms. The world trend towards market based economic organisation, reflected in the wave of privatisation that is global in scope, has also contributed to a rise in the importance of TNCs since they are now in keeping with world thinking that favours capitalist operation.

TNCs, to quote the 1992 UN report's first sentence, 'have become central organisers of economic activity in an increasingly integrated world economy' (UN 1992:1). Now favoured by the patterns of world change, in 1992 there were 35,000 identified parent TNCs and 147,200 foreign affiliates. Most TNCs were small or medium sized, but the largest control the majority of total TNC assets. The top 100 – excluding banking and finance – control $US.3.1 trillion, including $US.1.2 trillion held outside home countries. This pattern also

applies to FDI. For example, in what was then the Federal Republic of Germany, in 1992 the 50 largest TNCs which make up less than 1 per cent of the total number accounted for nearly 60 per cent of FDI.

Whilst the spread of TNCs is global, neither their activities nor the spread of FDI is evenly distributed. About 75 per cent of world investment takes place within and between the most developed countries, and as the 1992 UN World Investment Report pointed out, it is concentrated in what they call the 'Triad'; the USA, the EC and Japan. Additionally almost two-thirds of investment into developing countries comes from ten advanced nations (UN 1992). TNC investment, generally speaking, is based on Triad regions, reflecting business opportunities and familiarity with culture and customer demands. Companies in the EC currently tend to invest in Europe, US companies in the North American continent and Japanese in Asia (*The Economist* 27 March 1993:12).

Analysis of currency flows, sales and investment however, underestimate the importance of TNCs in the world economy of the 1990s. Capital inflow may be significant in itself, for example, it made up more than 10 per cent of gross domestic capital formation between 1986-89 in countries as varied as Guatemala, Hong Kong, Belgium, Singapore and the United Kingdom (UN 1992:61), but also because of other less tangible benefits. These include flows of technology from parent to affiliate, which the UN suggested 'make up a good part of international technology flows' (UN 1992:1). They include flows of information, particularly about research and development, made more significant by the scale of TNC research; the combined research and development expenditure of the ten biggest US TNCs exceeds that of the whole of France or the United Kingdom (UN 1992:18). More general knowledge is also transferred - about organisations, about management about how to train people, about the entire range of matters with which a business is involved.

These intangibles amount to the demonstration and at least partial transmission of the organisational culture of the parent company, itself the product of its home country culture. In this sense TNCs spread a world culture that reflects the culture of core nations, in particular the Triad (which makes up what has hitherto been called 'the core' in this discussion).

The Individual in Re-organised Capitalism

All the theorists examined suggested that major changes have taken place to the world since the 1970s, and for Beck and Giddens in particular these have had severe repercussions on identity formation. The changes of the 1990s present two broad aspects that can be examined.

The first is positive; technological change has effectively empowered many individuals. For those with access to the range of telecommunications and computer equipment it can be emancipatory, allowing access to knowledge previously unavailable and access to other people previously either non-contactable or available only after delays that may prove significant, and via means that could be readily censored. This empowerment extends to individuals virtually irrespective of geographical location (and in a wireless computer future this will be even more the case), but is tempered by demographic and socio-economic factors that limit the availability and capacity for effective use of the technologies.

The rise of free market ideology is also potentially empowering for individuals, as is the deconstruction of the corporatist and (Soviet) centralised state. A free market system potentially offers greater opportunities for relatively unconstrained advance by interested and appropriately skilled people, and in what Naisbitt and Aburdene

(1990:278) call 'the era of the individual' an entrepreneur-driven system arguably spreads a range of market driven opportunities more widely than ever before.

There is also an argument that rising levels of education and expectations in workers are forcing organisations to allow them greater freedom. This is associated, as Offe (1985) suggests, with the difficulties of supervising services work, and also with the requirements of operating organisations based on collaborative networks (see Boudette 1989, Kanter 1985).

The cultural pluralism that is part of post-modern culture is also empowering for individuals in sections of advanced societies. The overall suggestion of much post-modern theory is of a deconstructed society in which meaning is multi-layered and reality constructed by individuals free from structural constraints. This may be seen in a pessimistic light. Foucault for example, suggests: 'Nothing in man – not even his body – is sufficiently stable to serve as a basis for self-recognition, or even for understanding other men.' (1977:153) The overall emphasis however, is freedom from constraint.

The second broad aspect of individual life in the 1990s is pessimistic. For Beck and Giddens, the uncertainty of reflexively modern society creates important ontological insecurities. Giddens argues that '...systematic knowledge about social organisations cannot be obtained' (1990:2), and extends this with frequent discussions of the hazards of globalisation. Beck, as earlier discussion indicated, is also basically pessimistic in his overall line of argument and choice of examples. This idea of insecurity stemming from change is hardly new, and appears to strike a chord with readers in the mass market; Toffler (1980), for example, sold several million copies of his analysis

of 'future shock', which he argued stems from difficulties of coping with the fast pace of change in what was even then, 15 years ago, perceived to be a dynamic society.

Assuming a basic truth in these lines of analysis, the position of individuals in the 1990s would be worse than in the 1980s, given that the pace of technological change has quickened, global environmental problems worsened, and the structure of nation states become far more complex.

Positives and negatives are therefore easy to find in assessments of the position of the individual in the 1990s. A balanced conclusion may well be one that recognises that there are potentials for emancipation in the changes discussed, and potentials for anxieties of various kinds that contribute to personal destabilisation. These potentials co-exist, are multi-layered, and are structured, as with all impacts of change, according to demographic and socio-economic variables.

Concluding Comments

The foregoing discussion of change in the 1990s has suggested the broad accuracy of Lash and Urry's analysis, but with a twist: for them it was 'disorganised capitalism', in this discussion it is 're-organised capitalism'. The distinction is more than semantic, since any consideration of the role of business in the new world economy and the impact of business organisation on the natural world must start with the basic understanding that a new and more flexible form of capitalism with a greater global impact and greater influence than ever before is emerging. It is, as will be argued in the next chapter, a

force that can work positively as part of a process of change that will lead to at least partial resolution of world environment problems, even as it continues to operate in the short term as a force for environmental destruction.

At this point the basic dimensions of the current transformation can be summarised, and key contributions of the theories of change considered earlier assessed.

The basic insights of Drucker and Bell that services employment and knowledge will become increasingly important have been borne out by a continuation of the trends into the 1990s. The proportion of workers employed in services is increasing in all nations and they now make up the biggest sectoral category of employment in all advanced nations. Within the service workers sector 'knowledge workers' are also increasing in numbers and influence, and this can be expected to continue since the world as a whole is, as Beck and other theorists point out, becoming more complex and difficult to 'operate', and people as well as institutions are increasingly in need of expert advice.

The increasing availability and power of telecommunications and computer technologies, which both create more opportunities for 'knowledge employment' and increase the power and flexibility of such work, is a significant part of this pattern. Offe's insight that services work is more difficult to control within the modernist frame of reference will therefore become more significant with time, despite attempts through use of systems such as TQM to impose modernist thought. This tension between an emerging general trend and the modernist reaction is reflected in many of the changes that have been discussed, and demonstrates the continuing power of modernism within advanced societies.

Globalisation, propelled by a variety of influences, continues to be the most powerful process evident in the world of the 1990s. A decline in the power of nation states, increases in the power of telecommunications technology, rises in the power of TNCs, increases in the scope and number of international agreements, and a growing integration of the world economy led by financial deregulation have all contributed to an increasingly integrated globe. This process has impacts varying from reductions in the ability of the state to control business, to increased influence of international agreements on local cultures, and to direct influence on the makeup of the individual identity of citizens (echoing the Beck and Giddens analyses).

The structure of production in re-organised capitalism is one that merely extends the trends evident in the analysis presented by the theorists considered in Section One. The power of flexible consumption that Harvey suggests as a driving force has remained evident. The world market changes even more quickly, as six monthly changes to the size, power and software associated with personal computers amply demonstrates. (This industry is, in fact, the very model that illustrates Harvey's central point about 'flexible manufacturing'.) The technologically sophisticated processes that are associated with the dynamic nature of change in the pattern of mass consumption have also spread further, impacting in new areas, such as the manufacture of clothing in China. This has been associated with developments in telecommunications and personal computer technologies, which have increased the speed with which separate businesses and the various divisions of individual businesses can communicate information, and design and manufacture new products. The technology is such that orders can be communicated from individual markets to an international base which re-designs

the range – of clothing for example – and then, via modem, communicates the re-design immediately to factories located in yet another country.

In such a dynamic market the trend is to smaller firms, towards deconstruction of larger firms, and away from stolid bureaucracies. The advantages offered by small organisation structures have proved compelling to the established giants of industry; fewer management levels consider decisions, communication is faster throughout the organisation, and they are facilitated by and work effectively with the new technologies.

The impact on workers of these patterns of change has been dramatic, as Harvey and Crook *et al.* emphasise. Flexible employment patterns are now even more evident, and challenges to organised labour are obvious. In Australia, for example, the trend to work-place 'enterprise agreements' is a natural outcome of the overall patterns of change within capitalist production, and it is therefore not surprising that the rate and total number of agreements formally entered into has increased since they became legally possible in the previously highly regulated Australian labour market.Harvey's argument that capitalism has become more tightly organised through these changes (1989:159) has proved simplistic. The position of individual business and capitalist production generally has been enhanced because of a number of trends that open up their environment. There are more opportunities because of the opening of international markets and the availability of international finance; because of new technologies that are increasingly affordable and facilitate flexible production; because of the popularity of market philosophies world-wide; and because the capacity (and willingness) of nation states to control their activities has lessened.

This last element should not be left without further clarification. In earlier discussion it was suggested that the state is also better equipped by new technology for control of individuals and that business is also more constrained by regulations (such as environmental controls) that reflect the concerns of powerful interest groups. This suggests tighter organisation, but the forces that favour a less organised capitalistic system in which business opportunities are greater than ever are clearly of greater significance. Ultimately the basic process of the decline of the corporatist state ensures a less organised capitalism than Harvey's argument suggests.

Individuals in re-organised capitalism are, as Beck and Giddens indicated, faced with a far more complex and obviously more globalised social world within which identity is formed and individual decisions are taken. The 'risk society' is everywhere apparent. Technological change in the 1990s however, has empowered many individuals. More people than ever before have access to complex information and can communicate globally.

The elements of re-organised capitalism considered in this chapter suggest a more significant role for business organisations in a more globalised world economy. Successful business organisations will make use of sophisticated and flexible technologies, will themselves be flexible and able to respond to the quickly changing demands of an increasingly complex world market and whilst still constrained by the state, be freer to operate than ever before, empowered not only by technology but by now dominant market philosophies that legitimate their operations and by the availability of finance and opportunity in the world market.

Successful firms will continue to be those that fit in with the already evident trend to small organisation structures; either small or medium sized firms or deconstructed large firms. Whilst there will continue to be a diversity of organisation structures evident in the world economy, those firms operating in dynamic markets will tend towards organisation structures that allow for flexibility, so they will not only be relatively small but will use network systems that maximise opportunities for quick response as well as increasing the ease with which alliances can be formed with other organisations.

Despite the significance of the trends that have been discussed, re-organised capitalism is not unchallenged as a form of industrial and social organisation. Flexible technologies and organisation structures, knowledge workers, and all the other trappings of this emerging system, overlap with modern forms, even in advanced economies, whilst in the less developed world modernist forms are probably dominant. The point is that change is taking place, complete with tensions and reactions from powerful and in many cases highly efficient modernist institutions and mind-sets, and this change favours re-organised capitalism.In both situations, modernism and re-organised capitalism, business is a significant agent of change, and a highly significant factor in the creation of environmental problems. The Beck analysis which suggests the rising importance of sub-political spheres, including (amongst others) business, technology and social movements, is borne out by the directions of change in the 1990s. In the next chapter this point will be expanded, and a positive role for business in its relationships with the natural world will be suggested.

CHAPTER THREE

THE NATURAL WORLD, BUSINESS AND RE-ORGANISED CAPITALISM: A WAY FORWARD

The Negatives

I have shown that the systems of organised and re-organised capitalism are part of a continuum; they operate with the same basic assumptions and share fundamentally the same ideological positions. Capitalism is anthropocentric, expansionary, technologically dynamic and cyclical, and as it has spread globally these characteristics have structured activities which are environmentally damaging at global, regional and local levels. This spread becomes more profound as the influence of market philosophies becomes more significant and TNCs gain access to more markets. Resultant economic growth requires natural resources and continual growth has therefore meant continual exploitation; it is tempting to agree with Giddens when he suggests this is a 'juggernaut society', or with Jacobs when he suggests that 'market forces generate an overall result which no one has determined' (1991:25).

Jacobs argues that the resulting environmental destruction is a combination of actions that are deliberately nature-averse and also the result of the totality of millions of individual decisions that lead to global problems such as the greenhouse effect. For him, the world economy is 'environmentally unconstrained'. The size of expected economies is difficult to gauge precisely, but is likely to continue at

above 5 per cent annually, a figure which will see a doubling within 10 years. Brown (1994:5) suggest a quintupling of 'global economic output since mid-century', and points out that as much was produced in the first two and a half months of 1990 as in the entirety of 1950 (Brown 1994:6). The impact of this on the environment will vary according to the economic condition of the countries where growth is greatest and on the extent and power of constraints placed on environmentally damaging activity. This will become more significant in coming years.

Related to this is the fundamental problem of population increase. Estimates vary, as the following figure indicates, but given that a simple way to calculate total impact is to multiply population by current resource usage per capita, any rise is likely to be significant; even in the best case world population will double.

Figure 1: World population projections under different population trends, 1985 - 2160

Billions of people
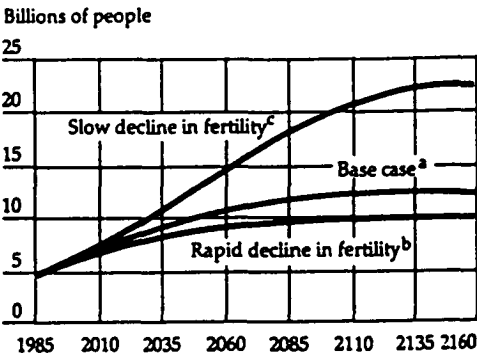
a. Countries with high and nondeclining fertility levels begin the transition toward lower fertility by the year 2005 and undergo a substantial decline - by more than half in many cases - over the next forty years. All countries reach replacement fertility levels by 2060.
b. Countries not yet in transition toward lower fertility begin the transition immediately. For countries already in transition, total fertility declines at twice the rate for the base case.
c. Transition toward lower fertility (triggered when life expectancy reaches 53 years) begins after 2020 in most low-income countries. For countries in transition, declines are half the rate for the base case.

(Source: World Bank, 1992:26)

The final fundamental that deserves mention is the gap between rich and poor nations which, I have argued, has its roots in the early period of colonialism, and which has increased since World War II. Re-organised capitalism has seen a continuation of a trend which was summarised by the United Nations. They suggest that in 1960 the richest 20 per cent of the world's people absorbed 70.2 per cent of global income, and that this had risen to 82.7 per cent in 1989. The poorest 20 per cent absorbed 2.3 per cent in 1960 and 1.4 per cent in 1989, and the ratio of richest-to-poorest has therefore changed from 30:1 to 59:1 (Brown 1994:5). Problems for the environment occur because those at either end of the economic continuum are the likeliest to damage the earth; the rich because of high consumption of energy and raw materials, the poor because they harvest natural resources to raise money and pay debts, thus enabling the rich to externalise the true environmental cost of their activities.

The results of these processes are environmentally destructive at every level, but can usefully be summarised with reference to a distinction between macro (global) and meso (national or regional) levels. Additionally, impacts are well described using the distinction between the 'stock and sink' functions of the globe. Stock include all the resources required for life, divisible into renewable and non-renewable resources. The sink function is the capacity of the globe to absorb wastes.

The Macro Level

At the macro level it is possible to argue a new case that the natural world has reached its limits. The earlier (Meadows, Meadows and Forester 1972) scenario was based on exhaustion of non-renewable resources, and has proven incorrect because market adjustment and technological change rendered their assumptions invalid. Spread of industrialisation and associated increases in total resources and energy usage, and the end of 'the latency period' of many pollution problems, have led to a new crisis, different in scale and type. There are now clear indications that the globe's renewable resources - topsoil, forests, water, fish - are being used at faster than replacement rate (Jacobs 1991, Brown 1989, Ehlich and Ehlich 1990). This process is pushed on by the continual growth in the world economy and world population.

The sink function also provides evidence of crisis. Production of wastes is well above the recycling capacity of the biosphere, and the resulting pollution (where waste reaches levels that harm living organisms) is, as Beck and Giddens argue, now a feature of life in the global 'risk society'. With the growing size of the world economy (and its pattern of operation) it is now commonly argued that this sink crisis is of greater importance than the source crisis (Goodland 1992:6).

With this as background, a 1990s eco-crisis scenario is easily and frequently developed. Goodland (1992), chosen from a number of influential works (see for example Brown 1994, Gore 1993, Daly and Cobb 1989, Ehlich and Ehlich 1990), provides a useful summary of the current shape of this argument by putting forward five 'evidences' that suggest the world has reached its sink and stock limits.

The first is that the level of human appropriation of the net primary product of terrestrial photosynthesis, estimated by Vitousek *et al.* (1986) to be 40 per cent (or 25 per cent if oceans are included), will be unsustainable with little more than a doubling of population. The argument is that the world will quite simply be too full. The second is global 'greenhouse' warming caused by burning of fossil fuels and release of other pollutants such as methane, CFCs and nitrous oxide into the atmosphere. The effects, if this is indeed taking place, will include partial melting of polar icecaps and flooding of low lying areas - where most world population lives. The third evidence is holes in the ozone shield caused by release of CFCs, first detected over Antarctica in 1985. These allow harmful ultraviolet B radiation to leak through the atmosphere, damaging animal health. The fourth evidence is land degradation. Goodland suggests that '35 per cent of the earth's land already is degraded, and is largely irreversible in any time scale of concern to society. Such degradation is a sign that we have exceeded the regenerative capacity of the earth's soil source' (1992:13). The fifth is the decrease in biological diversity; the scale of this is, he suggests, largely unknown, but ranges between 5000 to 150,000 species extinctions annually. Additional macro problems which deserve mention include air pollution, which the World Bank suggests affects 400-700 million people worldwide (1992:4); deforestation, which has negative impacts on biodiversity and the oxygen cycle and which is accelerating (Goodland 1992:6); and water scarcity, which is now impacting throughout the Wallersteinian periphery.

This cursory analysis is sufficient to suggest that there are indeed major problems for the environment at the macro level. This is not to suggest that there is a complete understanding of the relevant processes, indeed there is considerable debate about the first and second evidences in the list, and generally speaking global

environmental change, as O'Riordan and Rayner suggest, 'remains a shadowy and elusive phenomenon whose indistinctness poses challenges to [risk] management response' (O'Riordan and Rayner 1991:91).

The implications for the future of these macro-scale problems is therefore unpredictable, even if they are analysed in terms of modernist (data collection/analysis of cause and effect/extrapolation/modelling) terms. They become even more problematical in a Gaian (Lovelock 1979) or Vernadskeyite (Vernadskey 1945) framework, both of which suggest that even these profound changes have a connection to a homeostatic world state. For Vernadskeyists the biosphere (his term) would adapt via complex feedback loops that would restore (a new) equilibrium. For Gaians the earth would protect itself, though it is possible the new world could be without humans.

These reservations do not alter the immediate extent of global environmental problems and certainly do not deter those who, like Goodland, suggest that it deserves the description of a global 'eco-crisis'. It is, however, too soon to suggest that the crisis is beyond control. Institutional change and expansion of knowledge may well resolve elements of the current eco-crisis. Nevertheless this remains a 'decisive decade' for the natural environment (see Hinrichson 1991:5). The spread of re-organised capitalism and the continuing influence of industrial capitalism create major problems for the natural world. Decisions taken now by governments and industry, given the size of the world population and the world economy, are of enormous significance for the future.

Meso-Level Analysis

At the meso level, these global environmental problems have obvious impacts; globalised risk translates to localised risk. The extent and type of risk changes according to a number of factors however. Values placed on the environment by government and business - particularly in the early stages of modernisation - are of critical importance. In the old Soviet Bloc minimal values were provided, hence the extent of environmental degradation is greater than in the neighbouring E.C. For example, in Poland and what was Czechoslovakia sulphur dioxide deposits in 1990 averaged 12,000 micrograms/m2 every month, from four to eight times that of Western European countries. Lead, arsenic and other toxic elements released from the burning of high sulphur content coal in power stations have also accumulated in the soil and as a result one-third of children have bone growth retarded by ten months or more (Chandler, Makarov and Zhou 1990:76). In China economic loss caused by all forms of pollution rob GDP of about 2 per cent of value, and in Northern China the suspended particulates from coal combustion in all cities average 740 micrograms/m3, compared to averages in most of the USA of about 50 micrograms/m3 (Chandler *et al.* 1990:76).

Community attitudes to the natural world and willingness to support stringent environmental regulations also affect the extent of environmental problems. The general tendency is for those countries with higher per capita income to have the tightest regulations, but as the following figure, which compares expenditure per capita on environmental waste management equipment, systems and services (EWMESS) with real GDP per capita, demonstrates, this relationship is not uniform.

Figure 2: Income levels and EWMESS expenditure, selected OECD
countries, 1990.
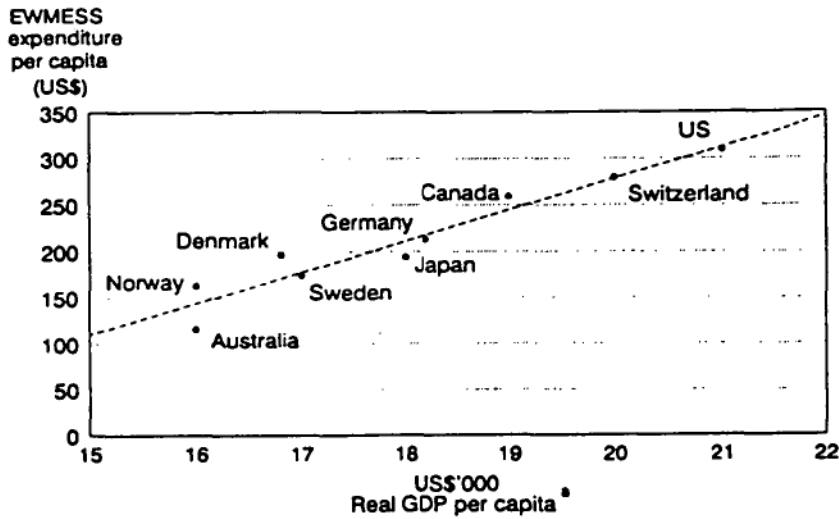
a In purchasing power parities.

(Source: Industry Commission, 1993:24)

The table only represents an indication of the situation since it does
not reflect total environmental impact, but it is nevertheless an
indication of the impact of different legislative and cultural
networks on environmental crisis at the meso level.

A more complete picture would include analysis of the extent of the
environmental problems that EWMESS seeks to resolve (though it
is safe to assume that these are well beyond the scope of current
expenditure in all the countries included in the table). It should also
include the extent to which these countries externalise their
environmental damage, by imports of rare timbers and woodchips
for paper and chopstick manufacture for example, or by the extent
and form of harvest they extract from the largest of the global
commons, the ocean. GDP per capita and the distribution of power
both globally and within particular nation states has a more direct
impact on the environment that should be specified. As Beck
indicates, the poorer countries, poorer regions within countries, and

the poorest people suffer most from environmental exploitation and risk creation. Countries of the periphery export their resource to the core, usually for meagre gain. The oil rich Arab states remain a notable exception to this pattern, having asserted their resource-based power in the early 1970s, but the experience of Brazil which exports rainforest timber to core nations is more usual, as is the export of woodchips from Tasmania to Japan for prices well below true value. Regions within wealthy countries dependent on global trade to a significant extent and with little of value to trade except for natural resources (which have demonstrated lower rises in price than value-added commodities over the past two decades) are almost as likely to have their remaining stocks of natural resources exploited as regions or countries with low GDP per capita. Differences come with the extent of control over this exploitation, and with the degree of environmental damage that is tolerated by the community.

The poorest people in all societies end up suffering most from externalities produced by industry, particularly so in countries with unequal distribution of power and low GDP per capita. As Jacobs points out: 'It is almost universally true that poor people live in the worst environments [and] in many parts of the world degraded environments practically define poverty'(1991:17).

The importance of the rate of national economic growth has already been mentioned in discussion of macro level impacts. The more specific meso level problems at different levels of GDP per capita are interestingly varied, as Table 3 demonstrates.

Figure 3: Environmental indicators at different country income levels

Population without safe water

Urban population without adequate sanitation

Urban concentrations of particulate matter

Urban concentrations of sulfur dioxide

Municipal wastes per capita

Carbon dioxide emissions per capita[a]
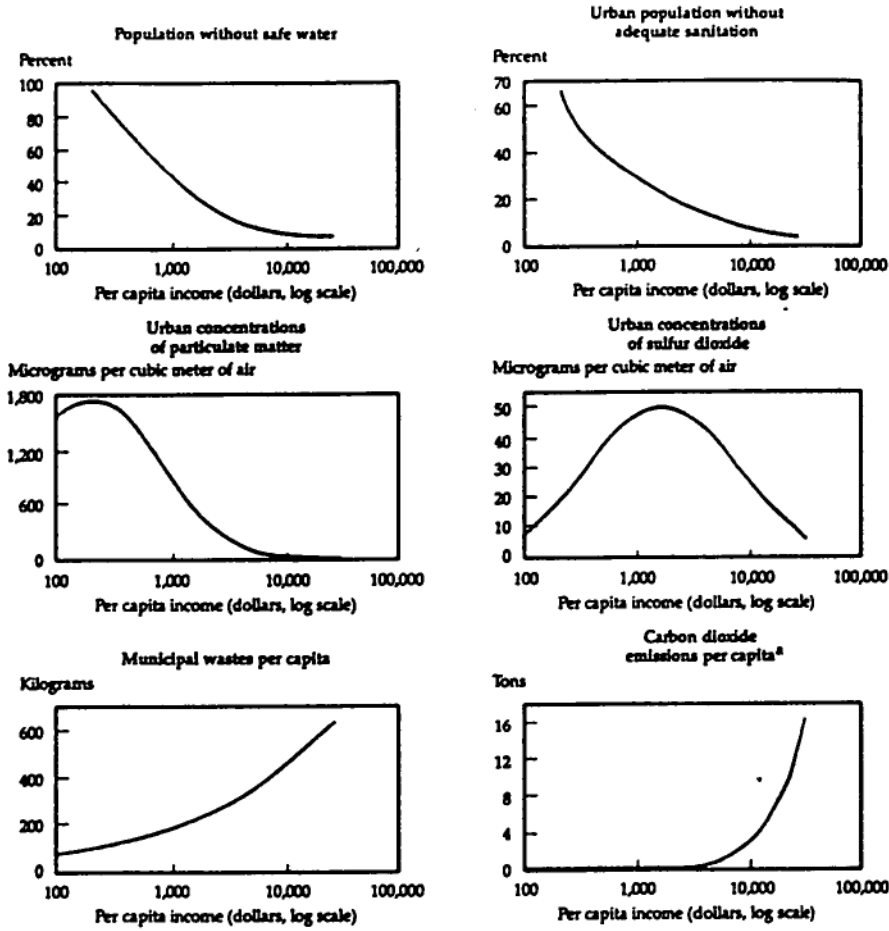
(Source: World Bank, 1992:11)

This supports the contention that meso level analysis reveals differing degrees of environmental damage at the national level. The same conclusion applies to analysis at regional level. Different regions within states have their own profile of environmental damage and challenge: for example, Mexico City, which represents possibly the world's most heavily polluted area, and economic regions such as the Australian state of Tasmania. Similarly, identifiable geographical regions may have distinctive profiles of damage. The Aral basin in West Asia, which currently includes all

of, or major sections of, the newly established states of Uzbekistan, Turkistan and Kazakstan, is now suffering from disastrously inept government development policies centred on the Aral Sea.

The broad conclusion from this macro/meso analysis is that industrialisation continues in many parts of the rapidly globalising world, while populations rise and with this the total use of both renewable and non-renewable resources. The basic elements of the capitalist approach to the natural world continue, and the sophisticated world economy of re-organised capitalism facilitates both exploitation of natural resources and creation of global risks. At the meso level, discussion indicates however, that such exploitation and risks are unequally distributed throughout the world. The picture is not entirely bleak though. There are positive changes in the global economy and society, and some characteristics of re-organised capitalism offer real hope for the natural world. These ideas are explored in the next section.

The Positives

Global Agreements

As globalisation of social and business life in the late 1980s and 1990s has spread the impact of various forms of capitalism, it has also raised the importance of international agreements. Nation states are now bound in complex networks of bilateral and multilateral cultural, trade, defence and, significantly for the natural world, environment agreements. GATT talks recognised 127 such environment agreements, 17 of which contained specific trade provisions (*The Economist* 30 May 1992:10). The trend towards

them can be gauged by the number of multilateral treaties signed by the USA which handle trans-border issues. Two came into force between 1940 and 1959, ten in the twenty years between 1960 and 1979, and eleven in the decade of the 1980s (see Brenton, 1994, for a full coverage of this issue).

Their usefulness for environmental protection varies, dependent as it is on the level of real agreement between nations involved and on limitations in the actual wording of the document involved, but they are nevertheless a powerful tool for environmental protection, and the most direct route towards resolution of the macro problems that have been discussed. Because of the encompassing nature of the global economy they are the obvious way to tackle the problems of the global commons (atmosphere, the polar regions, outer-space and the seas). This opinion, however, requires qualification which can be provided through examination of one agreement.

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer provides the best example of the complexities involved in developing a major international agreement. In the words of Richard Benedeck who played an important role in its development when USA Ambassador:

> On September 16, 1987, a treaty was signed that was unique in the annals of international diplomacy. Knowledgable observers had long believed that this particular agreement would be impossible to achieve because the issues were so complex and arcane and the initial positions of the negotiating parties so widely divergent. Those present at the signing shared a sense that this was not just the conclusion of another important negotiation, but a rather historic occasion. (Benedeck 1991:1)

The agreement required a reversal of the trend towards emission of ozone depleting CFCs, and therefore major re-adjustments and job losses in larger chemical companies. The agreement is also instructive for the lessons it provides on what turned out to be workable structures for development of the protocol, and problems

of its implementation. The former included the failure of the traditional model of development for international agreements and later success of a cross-disciplinary trans-national, networking-based process. The latter provides a cautionary message about the power of existing institutional arrangements which cannot be overcome by more agreements at international level. In this case DuPont, ICI and other major CFC producers had planned to fit in with the treaty by phasing out CFCs over the next few years, stopping altogether by 1996. Unfortunately, major CFC users, transport companies, building firms and the refrigeration and air-conditioning industries have not co-operated, and demand has not slackened sufficiently to cease production. In Britain the refrigeration industry has begun to lobby the Government for extensions to the deadline, and in the USA, DuPont, which intended to cease production this year, has actually been asked by the Environment Protection Agency to continue production in 1995 because of concerns about the nation's 140 million CFC-using air-conditioned vehicles (*The Economist* 24 January 1994:67-68). For the companies concerned the moving target of industrial demands has proved difficult to hit and they therefore must factor a degree of industrial uncertainty into already complex planning processes (ideas further discussed in chapter eight).

This is not a unique situation. International arrangements are powerful but certainly not the sole or even perhaps the best answer to the problem of global environmental degradation. Individual nations must also take action to preserve their own environments, as must individuals and business. Macro answers must be integrated with those at meso and micro levels.

A Worldwide Growth in Community Concern for the Natural World

Brenton's comprehensive survey of the history of the last 20 years of international environmental negotiations (1994) suggests that there are strong indications of the emergence throughout the world of a powerful constituency that believes the natural world is of critical importance. Naisbitt's broad summary of global change also concludes on this point, 'that protecting and preserving the earth is now seen everywhere as both politically correct and economically expedient' (1994:158). Such support for the natural world is solid. In Australia, for example, a credible Saulwick/Age Poll in May 1994, taken at a time of 11 per cent unemployment, found that 57 per cent of the 1000 surveyed suggested that Australians should concentrate on protecting the environment even if this means that economic growth will suffer, whilst only 33 per cent believed that there should be economic growth even if it means some damage to the environment. The percentages for a time of better economic conditions four years earlier on these questions were 62 per cent for the environment and 26 per cent for economic growth above all else (Richards 1994).

This pattern of support for the environment is also evident in the global rise of environment groups, which operate with increasingly sophisticated networks to influence business and government. They represent a powerful indication to established institutional structures of the feelings of people confronted with a growing body of information that suggests that there are major environmental problems. Such groups vary in the scope of operations: some such as Greenpeace, are global in scope; others, such as the Australian Surfrider Foundation, cover a nation; still others, such as the Save Our Coast group of the North West Coast of Tasmania, operate in a relatively small region (see Hanson 1992, 1994b for context

descriptions). They vary with respect to tactics: some, such as the Australian Conservation Foundation (ACF) employ professional lobbyists; others, such as Save Our Coast, lobby government informally; some, such as Earth First!, espouse radical or violent tactics; others, such as the Worldwide Fund for Nature (WWF), operate as part of existing structures. Some have led to, are influenced by, or influence, one of the Green Parties formed in the late 1970s and 1980s worldwide (see Eckersley 1992, Pybus and Flanagan 1993, Porritt 1992, Eckersley and Hay 1992).

The impact of such organisations is hard to judge precisely, but with every major environmental issue that can be identified they have had some influence. On whaling, Greenpeace has been influential for twenty years; in Australia green voters and groups have been an electoral prize that ensured the Commonwealth Government remained in Labor Party hands for the first two elections of the 1990s; environment groups in Tasmania, together with Green parliamentarians, have been a significant voice in that state's environment policy for the whole of the 1990s; the most vocal objection to exploitation of Brazilian rainforest (and related exploitation of workers and indigenous inhabitants of the forest) has come from local environment groups.

In the USA groups have been powerful for decades. Ralph Nader, for example, was able to mobilise the consumer movement behind environment issues: 'Public Citizen; the combined interest group that he put together, was able to launch an attack on GATT featuring environmental issues that was signed by over 300 groups, including such varied bedfellows as the International Garment Workers' Union, the American Cetacean Society and the Sierra Club' (*The Economist* February 27, 1993:19).

Such groups are more powerful in core nations than in the periphery, but are nevertheless evident worldwide. The changing membership of the International Organisation of Consumers Unions (IOCU), which fights aspects of TNC activity, including environmental matters, provides an indication. It was founded in 1960 with early membership from the USA, Australia, Belgium, the Netherlands and the United Kingdom. These were joined by Asian organisations in the early 1970s, and subsequently by Latin American organisations. The main office for the IOCU is The Hague, but it has been supplemented by regional offices in Penang (Malaysia) in 1974, and Montevideo (Uruguay) in 1986 (Bollier 1989:91).

The strength of consumer organisations, according to Anwar Fazal, the IOCU President from 1978 to 1988, lies in a non partisan approach: 'Governments can deal with sectarian party politics by saying, "these people are saying it because they oppose us and they are trying to score political points." But the consumer movement, dealing with gut, concrete issues, can build campaigns in a way that other movements cannot. It is a power that can frighten governments because it can draw so much interest' (Bollier 1989:94).

This, in Beckian terms, is effectively a comment on the power of a major sub-political sphere, as is the range of other discussion that demonstrates the power of environmental groups. Increases in the power of such organised social groups are a major feature of the deconstruction of the corporatist state and the development of re-organised capitalism, and analysis of their power suggests the truth of Beck's assertion that the state has become progressively less powerful in the face of the challenges presented by such sub-political spheres. They will continue to push governments and businesses to behave in a more environmentally friendly manner.

Business and the Environment

The negative impact on the natural world of global business has already been described. In the 1990s, however, there is also a significant body of business opinion and activity that represents an increasingly powerful shift towards environmental consciousness in the world business sector. This has developed in response to public opinion, to government regulations (which reflect both public and expert scientific opinion), and to a growing realisation within business of the negative social, environmental and economic impacts of many business activities. A number of aspects of this 'greening of business' are worthy of special mention:

- a greening of the market place;
- the regulation-led waste management industry;
- environmentally friendly business rhetoric and activity in the 1990s, business and sustainable development, and business operating in advance of likely regulations;
- the significance of a growing environmental consciousness in large corporations and TNCs; and
- the fact that, taking all these trends together (and they are intertwined), the move towards environmentally responsible activity is growing in power.

A general greening of the market place is an obvious business response to public concern for the natural world. Green consumers and green marketing are now a significant part of suburban supermarkets throughout core nations, and since the late 1980s business and marketing texts and journals have grappled with issues such as labelling of environmentally friendly products (as do regulators, attempting to overcome cynical manipulation of the market by misuse of already vague notions such as 'recyclable' and 'bio-degradable') and the development of environmentally friendly packaging systems which nevertheless also satisfy the market's

concern for 'attractiveness' and 'hygiene' (see Bennet 1991, Carson and Mouldon 1991, McKinsey and Company 1991 for a coverage of these activities).

Much of the early response by business to consumer concerns was pure marketing, with no change to the products, although it also included attempts to develop green products such as plastic bags and batteries made from recycled products, and cosmetics made with minimal processing and pure ingredients which are minimally packaged. There are now many successful business organisations that have prospered largely because of their appeal to green consumers, possibly the best known being the 'Bodyshop' organisation, which sells environmentally friendly cosmetics, employs staff on the basis of their espoused social and environment consciousness, and attempts to source products from local communities without exploiting them. It started in the early 1970s and now has 1000 stores in 44 countries (see Roddick 1993).

The power of environmentally ethical processes in the modern market place can also be gauged from the growing impact of ethical investment funds in western nations. In the US ethical investment is financially significant, with per capita investments in such funds standing at US$ 2,200 (Ball 1995). Much of this comes from major superannuation funds which are increasingly significant players in the world investment market, and which can readily redirect funds according to their perceptions of stake-holder expectations. They can be expected, world wide, to increasingly reflect environmental concerns in investment strategies, thus prompting business to become more environmentally aware.

Reference has already been made to the regulatory response of government to consumer (citizen) demand. This response is also related to the advice of experts within bureaucracy (often the

controllers of Beck's 'expert systems') and to the advice of the scientific establishment, as for example in the greenhouse effect and ozone hole debates in which national and international governments relied on scientific advice. In combination these forces have led to regulations which are major contributors to growth in the global waste management industry, also called 'environmental services', or, to use the OECD classification, Environmental Waste Management Equipment Systems and Services (EWMESS). The basically positive but nevertheless varied correlation between rising GDP per capita and rises in demand for such services has already been referred to, and worldwide the market is significant. The 1990 OECD estimate for the world market was $US200 billion, with a projected annual growth at 5 per cent leading to a prediction of $US300 billion by the year 2000 (Industry Commission 1993:27). This may well be an under-estimate since it does not adequately reflect demand in 'large developing nations' such as Brazil, China and India, and the market may well be worth $US290 billion in 1990, and around double that in the year 2000 (see Hanson 1993).

This scale of investment is obviously significant but is only part of major business investment in environment-related areas. The force of the various influences that have been discussed on management and workers is profound, and the fact that the staff of corporations are also part of the concerned public that drive and share such concerns is also of major significance. The precise extent of sincere environmental concern amongst corporate executives is difficult to judge, but it is apparent in both actions and words. *Business Ethics* has, for example, called the Chief Executive Officer (CEO) of Monsanto, a major corporation, 'an unlikely revolutionary' because of his repeated statements of commitment to the goal of sustainable development (Naisbitt 1994:160).

The DuPont CEO has also made himself its chief environment officer because he believes that this will ensure progress towards a series of environmental goals. Such statements of environmental concern are now common in business. It may be mere rhetoric in many instances, but the list of business actions which provide more concrete evidence of an environmental concern in excess of that required by regulation is also lengthy. A few examples provide an indication of the pattern: IBM has cut the use of CFCs by 38 per cent; ICI has a globally enforced minimum or no pollution policy and has shut down factories in Sydney when they could not comply with company policy; Proctor and Gamble (which sells 160 brands in 140 countries) have significantly cut solid waste by reducing packaging; Volkswagen and other German car manufacturers are now working in advance of government recycling legislation (Schmidheiney 1992 includes a list of such initiatives, as do Knight and Hailes 1992 and Fischer and Schott 1993).

Such initiatives have been associated with a significant number of firms espousing support for 'sustainable development' (SD). Schmidheiney's book, for example, is the product of the Business Council for Sustainable Development (BCSD) which includes representatives from some 50 firms, all large organisations in the global economy. They do not claim to represent business generally, but nevertheless provide a solid indication that global business concern for the environment is already of significant proportions. The flexibility of the notion of SD provides problems when making general statements about business support for the environment based on adherence to its principles (the Pearce *et al.* 1990 'gallery of definitions' indicates the size of the problem), but at the least the BCSD initiatives indicate that sections of business are including the natural world as a significant factor in planning.

In part, support for the environment and for the 'balanced growth' that SD represents is an indication of the fact that many businesses now find it pragmatic to operate in advance of expected changes to environment laws. This ensures that costs of adherence to regulations are incorporated into long term plans, and assists entry of firms into sections of the global market place: environmental responsibility is one of the most visible marks of being a good global citizen. This is short of eco-sensitivity which operates in advance of pragmatism, but is nevertheless a useful transition from conscious exploitation.

TNCs are significant players in this growing concern for the natural world. They are obviously more geographically mobile than domestic firms, and historically have been able to exercise greater leverage than domestic firms in negotiating financially favourable terms for entry to host nations. This is changing as the processes of globalisation provide a contradictory pressure to maintain a good image worldwide in order to ensure entry to new nations. The best corporate citizens (including the environmentally concerned), have an advantage over others when negotiating with foreign governments for access to new markets and rich resources.

This is particularly important given that TNCs are 'extensively involved in environmentally significant activities' (UN 1992:226). For example, the largest 20 pesticide manufacturers accounted for 94 per cent of world petro-chemical sales in 1990, whilst DuPont, a single company, accounts for about 25 per cent of world CFC production. TNCs also have managerial, technological and financial resources superior to most domestic firms and better access to knowledge. This raises government expectations about their environmental performance within host countries, just as their

global visibility and the speed of global information exchange in the 1990s ensures that their performance is scrutinised by a global public and hence by efficient and active pressure groups.

This does not mean that TNCs are purely agents for good in the world environment. They remain the agents for the spread of resource-exploiting industrialisation (either directly or through collaborative arrangements with domestic firms or government organisations) and continue to own a range of pollution intensive industries (although according to the 1992 UN report on TNCs there is no systematic trend towards such a practice; UN 1992:232). These factors do not change the basic line of argument offered here; TNCs are ready vehicles for the global transfer of new ideas, they are under pressure to demonstrate environmental responsibility, they have the skills, knowledge and technologies to do so, and they are engaged in environmentally significant activities.

The processes examined so far demonstrate an environmentally positive pattern of change. Business is, for a variety of inter-related reasons, becoming more environmentally conscious. Business people generally now tend to consider the natural environment as a significant factor in planning, and for a growing number of powerful business people and organisations it has become a major consideration in planning. Reference has already been made to important results of this in terms of business investment in pollution control equipment, in recycling programs, in changes to packaging and in changes to marketing. An additional and important point is that these initiatives have, since the early 1980s, and particularly since the early 1990s, become increasingly common, and both the depth of response from individual organisations (the significance of individual initiatives and their impact on the organisation) and the breadth (the range of such initiatives) have increased.

The current approach to environmental management by business can be seen in terms of three eras, though Fischer and Schott (1993) suggest only two eras, beginning in the 1970s. The first went from 1970 to almost 1985, and in this era Fischer and Schott (who refer to mainly American material) suggest that companies adapted unwillingly to the environmental challenge, and were happier to see the natural environment as a separate issue, hence their term 'resistant adaptation'. In the mid to late 1980s the regulatory context for business became more restrictive, the appreciation of environmental issues more profound, and environmental strategy common in business. Major improvements in environmental performance were instituted. Texaco, a major US corporation, for example, was able to obtain an 8 per cent reduction in toxic emissions through use of new technologies and tighter monitoring and control between 1989 and 1991. Fischer and Schott (1993) called this 'embracing environmental issues without innovating'. The improvements to environmental performance were nevertheless highly significant, and because of the relative ease with which they have taken place, a number of prominent business writers have suggested that this means business activity and environmental protection are solutions to the pressure to become ecologically responsible.

Michael Porter, perhaps the world's best known writer on business strategy, has suggested that strict environmental regulations actually enhance business competitive advantage because they lead to a re-engineering of technology (Porter 1991, Porter and Van der Linde 1995). Al Gore, now Vice President of the USA, has argued similarly (Gore 1993) and in making his argument about the need for government involvement in environmental issues suggests a variety of ways that corporations can benefit directly from the world trend towards more restrictive regulations.

This position does not, however, stand up to close scrutiny. It is true for major operators in the EWMESS area, and it is true if 'benefit' is defined in terms of the environmentalist's long term holistic vision, but for most corporations the impact of tighter regulations and the need to operate in accordance with established community pro-environment thinking creates major problems and yields significant short term costs. The breadth and depth of environmental initiatives demonstrates this point. The 'depth' is relatively obvious: as regulations tighten worldwide the standards for control over pollution and techniques used in resource exploitation (for example in timber extraction) become more difficult to meet.

The 'breadth' is more subtle. It includes scrutiny of suppliers so that environmental problems are not 'imported' into the organisation. Scott Paper in the USA, for example, produced an inventory of suppliers ranked according to environmental performance and then dropped the worst 10 per cent (Elkington 1994:94). It may also include new training programs for staff (and suppliers), corporate environmental reporting and new organisation structures which include environmental roles at all levels. The financial implications of these activities suggest the possible difficulties created by these changes.

In the USA the total annualised cost of environmental protection tripled as a percentage of GDP between 1972 and 1992, and on current trends is expected to increase still further towards the year 2000 (Wally and Whitehead 1994:47). The likely emergence of new environmental problems, further raises in community awareness, and yet more legislation and tighter regulations will, if anything, increase the trend for business environment costs in advanced nations, and for TNCs in every nation of operation.

A 'third era' can therefore be suggested with roots in the changes to world business that have become evident in the 1990s, and in the increased costs of business compliance with environment-oriented thinking. In this era, characterised by improvements in communication technology, collaborative alliances, flexible manufacturing, ever-faster changes in markets, and greater costs of compliance with environmental regulations, business organisations will be required to extend environmental expenditure well beyond the obvious 'win-win' levels that have been achieved to date, and further extend both the depth and breadth of business compliance with regulations and public perception.

This is a difficult task in which business organisations will need to take decisions that have little short term commercial benefit and obvious costs, and which provide no guarantees of long term benefits either. Such benefits may flow, for example, there may be improved public regard for the organisation and ready access to good people in recruiting campaigns, but this cannot be guaranteed.

The third era therefore requires far greater commitment to protection of the natural world than that required in early times. It represents a sort of enlightened pragmatism that will be difficult for a business community, based on exploitative, expansionary assumptions of capitalism, to achieve.

A Way Forward

At this point central elements of the business/environment arguments offered to date can be summarised before suggesting a way forward for business in its role in the environment crisis. It has been argued that there is major cause for concern about the impact of business on the natural environment in both the system of organised (modernist) capitalism and re-organised (late modern) capitalism. The system of capitalism featuring market philosophies and a fundamental role for business is currently oriented towards the continuing destruction of the natural world.

The systems of modernist capitalism and late modern re-organised capitalism will continue to co-exist, so that the styles of thinking and organisation patterns characterising them may even be present in the same organisation. The pattern of change however, is towards re-organised capitalism. This favours organisations which are flexible (hence better able to adapt to a quickly changing market); able to make the best use of new information technology (itself a major pressure directing organisation forms towards flexible structures); compatible with the needs of late-modern service, and more especially knowledge, workers (who are harder to control than the traditional modernist workers); and more able to cope with the needs of the collaborative alliances that form an important feature of re-organised capitalism.

Market and hence business-centred thinking has become more globally significant in the 1990s, and this suggests that changes to business attitudes and actions with respect to the environment will become even more important in the next decade than was previously the case. Business, working within the market system, is responsible for much environmental destruction, but it can also be a vehicle for positive change.

Such change is already evident in world business operations, and business concern for the environment will continue to increase because it is driven by broad and well established community concern, by powerful and well organised environment groups, and by government regulations that set increasingly vigorous standards for environmental protection. This is particularly significant in an increasingly globalised world which favours TNC's which are both numerous and operate in environmentally sensitive areas, and which need to operate in an 'environmentally friendly' fashion in order to ensure entry to foreign markets. TNCs also have the potential to operate as role models for business in host nations. In Wallersteinian terms, they are able to carry the environmental message from the core (where almost all are based) to the periphery of the world economy.

As has already been suggested, we are now entering a third phase of business response to the environment which will require greater commitment from many firms than was required in early phases.

Business organisations, in sum, are a powerful cause of environmental damage, but include elements that allow for this to change. The changes required of business are profound, but there are no ultimate 'ends' capable of precise and final definition in what is better seen as a process of continual and positive change made up of many incremental advances in a wide range of areas. Pinning down a valid and precise definition of a desirable end is intellectually impossible because, as Beck and Giddens have pointed out, knowledge is inevitably incomplete, and its worth subject to continual revision as new knowledge becomes available. At any one time the state of knowledge is inadequate.

Another problem is double hermeneutics. The very acts of definition, analysis and modelling distort the character of the phenomenon under consideration. Finally, the human world is infinitely complex and reacts to challenges, often solving them. This forces continual revision of the boundaries of definitions of 'ends' (see O'Riordan and Rayner 1991 for a development of this point).

We do not therefore know the precise dimensions of the environmental problems that we now face and we must feel our way gradually towards solutions, making use of advances in knowledge as they become available. Such progress is based on the reflexive patterns of thought that Beck suggested as basic to late modernity. This does not mean that a guiding vision cannot be expressed - the direction of desirable change is clear even if the precise nature of particular targets is elusive.

For business the vision as it can currently be expressed (bearing in mind that it will be subject to continual revision) is one in which business organisations in the complex global economy operate within ecological limits and seek to preserve the quality and diversity of natural resources. Expressed in terms of a continuum that describes the orientation of business action to the environment, the changes indicate movement between a position of total domination of nature to one which moves towards a position of eco-sensitivity which is beyond even the third era responses that have been discussed.

Figure 4: Business Action Orientation Towards Nature

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                  first era    second era    third era   eco-sensitivity
Domination————|—————————|————————————|—————————————|————————————→
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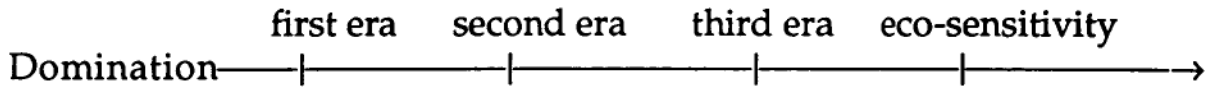
The points along the continuum approximate positions discussed so far. Domination is the capitalist position, anthropocentric, exploitative, expansionary. The first era represents unwilling business response to environmental regulations, the second era win-win responses, the third I have called enlightened pragmatism. The final position is that of eco-sensitivity in which organisations strive to operate in harmony with the natural world, within ecological limits, irrespective of any consideration of commercial pragmatism.

The third era actions, culture and eco-sensitivity are steps along the way towards the goal of ecologically benign organisations. They are distinguishable by the degree to which organisation culture and practices reflect ecological, non-anthropocentric concerns and culture. In 'third era organisations' culture remains fundamentally exploitative. Whilst more enlightened, the key to this approach is a far-sighted pragmatism that defends expansionary ideals. In eco-sensitive organisations the culture is non-exploitative and far less anthropocentric, and the ideal is not ultimate expansion but ultimate ecological benignity. This is far more challenging than third era thinking and indicates a break with the patterns of capitalist and re-organised capitalist action. The way towards this position for most organisations, however, is via third era actions and ideas since they prepare people and re-orient cultures towards eco-centricity.

The process is one of transition rather than a leap forward. The power and success of capitalism is such that any great leap is difficult, if not impossible, for commercial organisations in the complex world economy.

This argument therefore does not rely on any 'great leap forward'; business organisations will rarely be founded on the basis of eco-sensitive values and practices. It is even more unlikely, given the power of established profit oriented organisation cultures, that existing organisations will suddenly become eco-sensitive. An opportunity for transitions towards this ideal is, however, presented by the current system of re-organised capitalism. A range of government and community pressures to adopt gradually more eco-sensitive approaches to the world is confronting global business and as it responds people and culture become steadily more eco-sensitive. A movement through first and towards third era orientation towards nature takes place, accompanied by organisation learning at all points in the transition.

This process of transition is aided by the structure of global business organisations. They are increasingly flexible in structure and therefore able to alter to meet new challenges; they rely on exchange of information to meet the demands of the fast changing global economy; and they are increasingly responsive to consumer and government pressure simply because this facilitates the process of profit making. All these processes, however, also help spread knowledge about eco-sensitive practices and eco-centric ideas. The transitions therefore take place both because of organisation learning that results from an attempt to be competitive, and because of organisation learning that is directly related to the growing ecological awareness of communities and governments.

The transition may not take place quickly, nor will the process be evenly spread, since some organisations and some communities are more responsive than others. It is, however, taking place and can be assisted with new theory that shows the way, or at least generates debate. New ideas about the shape of eco-sensitive visions, new organisation cultures, new techniques for planning, new styles of leadership, new organisation structures, and more help from relevant areas of academic discourse are required. The second part of this thesis aims to provide such help.

Before this, one final element of necessary background is provided in the next chapter, wherein the full magnitude of the task of the eco-sensitive organisation is made clear via a discussion of the complexities of the ecological systems with which they deal.

CHAPTER FOUR

BIODIVERSITY: COMPLEXITY IN THE NATURAL WORLD

Preceding discussion has indicated the deep roots of capitalist exploitation of the natural world and also suggested that while the world of re-organised capitalism continues to exploit nature it also presents an opportunity for positive action by business organisations, which form a powerful sub-political sphere.

The challenge to those that seek to operate eco-sensitively is, however, huge. Eco-sensitivity means both willingness to act so as to protect rather than exploit nature and the capacity to do so. The question of willingness has already been discussed briefly and will be extended in the coming chapters. The question of capacity is, of course, affected by the level of skills and understanding within firms (something which this thesis seeks to address) but also by characteristics of the natural world.

The following discussion aims to establish the extent of this challenge, using the notion of biological diversity as an exemplar of the problems of dealing with the natural environment.

What is Biodiversity?

Biological diversity ('biodiversity') includes the 'total variety of life on earth' (United Nations Environment Program [UNEP] 1994:146). According to Norse (1993:9) the term only appeared in conservation circles about 1980, and even then its originators either did not define it or did so inadequately. Knowledge has since advanced, and the most commonly accepted definition now includes three levels: ecosystem, species and genetic diversity (Norse *et al.*1986), while others suggest a more differentiated system with five levels (Soulé 1991). The three level definition however, provides a useful basis for this discussion.

Species diversity is the easiest level for decision makers and the general public to understand. It simply means the variety of living things on the earth. We do not know the total number of species, as Edward Wilson points out, 'not even to the nearest order of magnitude' (1992:132). The number of species so far identified, including all plants, animals and micro-organisms, is in one estimate about 1.4 million (Wilson 1992) but again from Wilson, 'this figure could easily be off by a hundred thousand, so poorly defined are species in some groups of organisms and so chaotically organised is the literature on diversity in general' (1992:133).

One of the problems in this regard is the lack of trained taxonomists to describe and classify species. Norse (1993) echoes Wilson in suggesting that there are only about 1500 people trained and competent to deal with potentially millions of newly located tropical organisms, and goes on to point out that the training of new taxonomists for work in marine conservation 'has all but ceased, and many of the most expert taxonomists are nearing retirement' (1993:198). The enormous variety of already identified plants, and their global spread, are important factors making classification

difficult. Of the 1.4 million species identified there are 751,000 species of insects known, 281,000 other animals (including 4000 mammals), 30,800 protozoan, 248,400 higher plants, 26,900 algae, 69,000 fungi, 4,800 bacteria and about 1,000 different virus species. The challenge for taxonomists is correspondingly large, and in a field of endeavour which achieves little public recognition and is complex, there is little likelihood it will be answered.

Such variety is indeed impressive but there are certainly even more species on the planet than those already identified. Erwin's (1982) estimate is far higher still than that reported above. He suggests that there are 30 million arthropods in tropical rainforests alone, a calculation based on the number counted in one rainforest tree, a series of assumptions about host specificity, the total number of tropical trees and the proportion of beetles in the total fauna population. Given the significance of these assumptions to the final calculation, and the possibility of them being in error, other estimates from his research suggest between five and ten million anthropoids, but it is also possible that even Erwin's estimate is an underestimate (see Kitching 1993:19).

Micro-biologists also suggest greater diversity than that already identified. A Norwegian group found between 4000 and 5000 bacterial species in a single gram of beech forest soil, and a similar number (with no overlap) in a gram of sediment from shallow water off the coast of Norway. It is also probable that not even all the large and obvious species have been discovered yet. Since 1908 eleven new species of whales and porpoises have been found, approximately 13 per cent of all whales and porpoises now known (Wilson 1992:158).

To add to the problem of recognition and classification species diversity is unevenly distributed throughout the globe, with equatorial regions richer in species than the poles, and a graduated level of richness between. There are less species with increase in altitude, and less with reductions in rainfall. In the sea, there are more known species on continental shelves than in deep sea communities.

It is probable that species closest to or most accessible by humans are best known, while those far from the centres of human population or difficult to access are less likely to be discovered and classified. Marine species biodiversity is particularly hard to determine. For a start there is more sea than land - Norse points out that the Pacific Ocean could contain all the continents even if there were two Australias (1993:42). More significantly though, the difference between the bulk of marine and terrestrial worlds is huge. While the average thickness of the terrestrial portion of the biosphere is about 20 metres, for the sea it is nearly 4000 metres and there is therefore simply more room for species (1993:42). Marine environments are also harder to research because we are terrestrial beings who cannot readily cope with the hostility of the marine environment. Consequently much of our knowledge of the sea has come about randomly, through such indirect means as nets and scoops, and even using scuba equipment divers are basically limited to the uppermost 40 metres of sea.

The second level of biodiversity in the standard classification is ecosystem diversity which 'relates to the diversity and health of the ecological complexes within which species occur' (McNeely 1988:3). Ecosystems provide the natural cycles of nutrients that species require, and efforts to conserve species must therefore also aim to conserve the relevant ecosystems. Ecosystems vary according to type (for example estuarine systems are quite different from deep-water

systems) and, as Soulé (1991) points out, within types (Middle Eastern and Scandinavian estuarine environments differ markedly for example), and any individual ecosystem is, in any case, unique because of differing local conditions. They are complex structures, and as will be argued shortly, incompletely understood. As with species diversity, attempts at understanding are inhibited by a lack of trained professionals, in this case ecologists, as well as by the complexity of the systems and the lack of existing knowledge upon which to build.

For biodiversity management, the ecosystem level is harder to deal with than that of particular species because the boundaries of communities are variable (DASET 1993a:9). One response to this has been to use simpler 'habitat' definitions in order to better focus management effort. The notion of habitat, an environment of a particular kind such as a lake shore, or a particular environment in one place, such as the mountain forest of Tahiti (Wilson 1993:400), avoids the difficulties involved in making technical distinctions between ecosystems. DASET suggests that 'measurement of ecosystem diversity is still in its infancy' (1993a:9) and that further developments in knowledge are required before it can usefully be employed as a focus of environmental management by organisations.

This said, it is also important to point out that a habitat or ecosystem focus is of particular significance to business organisations since for many of them their fundamental impact on biodiversity will be at this level. The falling of a large section of rainforest may result in the loss of a large number of hitherto unknown species (in Erwin's analysis) but will not, in the short term, impact on known species diversity; particularly not on the diversity of charismatic species which enjoy high public regard. The impact on a particular habitat or ecosystem may, however, be profound.

The third level in the biodiversity classification, genetic diversity, incorporates the notion of variability within a species, as measured by different genetic composition. Each species consists of at least one population of individuals, and those within distinct populations are more likely to breed within their local population than outside it. As Norse points out, the populations need not be separated by breeding location, but by timing. For example, Chinook salmon intermingle when feeding but separate for breeding into distinct populations (1993:13). Separate populations tend to differ, as a result of mutation, natural selection and genetic drift (random changes in the gene pool not due to mutation, selection or immigration). Within populations too, some individuals differ, and this is basic to evolution, since such differences may allow them to cope with environmental change. The 1992 World Conservation Monitoring Centre estimate is that there are 10^9 different genes distributed across the world's biota (1992:xiii), while Wilson (1992:161) provides a total of 10^{17} 'nucleotide pairs specifying the full genetic diversity among species', but as with other estimates about biological diversity, these are out by several orders of magnitude: full knowledge is not yet available.

The Values of Biodiversity

Biological diversity (of whatever type) has a number of distinguishable values, and in a protection program many of these values will be involved.

Signifying values is a reductionist analytical process and a more holistic point of view should be set against it. This is well put by Ehrenfeld in his lively contribution to an ongoing debate about the usefulness of identifying specific values:

> Value is an intrinsic part of diversity; it does not depend on the properties of the species in question, the uses to which particular species may or may not be put, or their alleged role in the balance of global eco-systems. For biological diversity, value is. Nothing more and nothing less. No cottage industry of expert evaluators is needed to assess this kind of value (1988:214)

Wilson extends this point, describing why biodiversity is of basic but general importance:

> Biological diversity is the key to the maintenance of the world as we know it. Life on a local site struck down by a passing storm springs back quickly because enough diversity still exists. This is the assembly of life that took a billion years to evolve. It holds the world steady (1992 : 15).

However, as Ehrenfeld himself points out, the 'dominant economic realities of our time' (1988 : 212) encourage analysis of specific values because they compel conservationists to justify efforts on behalf of diversity in economic terms. This is a response to the decision-making environment of management, which is strongly influenced by the profit motive and market values for 'biological resources'. At its simplest this means that, if the 'resource' is to be preserved, the market value of retaining a biological resource in its pristine state must be greater than the profits that are likely to be generated by its exploitation. Such an approach sits squarely within a modernist approach to the natural world. In the more complex world of re-organised capitalism, a more complex approach to valuation is

required. Recent thinking which seeks to answer this challenge is reflected in the following taxonomy of values, which can provide a useful summary, in a diagrammatic form, of major distinctions between human and nature centred values:

Figure 5: A Taxonomy of Biodiversity Values
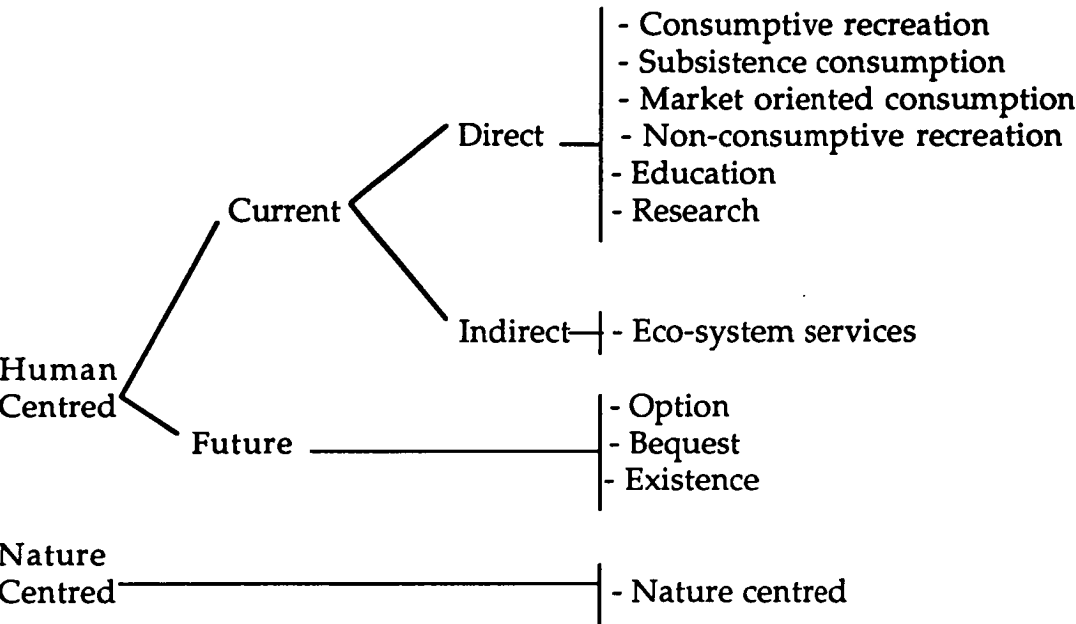
Human centred values include both current and future uses of biological diversity, while nature centred value is the value of nature in and of itself without regard to human use or interest. It is well expressed in the quote from Ehrenfeld offered earlier, by a range of deep ecologists, and even by eco-theologians like Thomas Berry: 'the earth belongs to itself and all the component members of the community' (Berry 1993:48). This is perhaps the most difficult value for business to take into account in decision-making, and is logically impossible to measure because any use lies outside the human sphere.

Human centred values are more comprehensible, but for many of these too, measurement (and, hence, ready inclusion into conventionally rational planning systems) is either extremely difficult or impossible.

Direct current use includes hunting and sport-fishing, which generally result in the death of individual animals, and is the basis for sections of the tourist industry. In Canada the total benefits of wild-life related recreation activities has been estimated at $800m annually (McNeely 1988:22). Direct current use also includes subsistence consumption, which is undertaken by locals in order to support a non market way of life, for example the Amazonian jungle provides forest-dwelling people with food, firewood, construction material and medicines, as well as the capacity to trade for other goods (Prance et al.1987).

Market based consumption values involve direct contact between organisations and the natural world. Resource based industries provide the most obvious examples of the potentially destructive impact on biodiversity of such activities. It is significant to note that the value of this use is the only one of those discussed that is routinely measured in money terms, since this suggests that organisations which confine themselves to such readily available measures of value will tend to develop resources irrespective of impacts on other values of the resources.

Biological diversity is an integral part of non-consumptive recreation; activities such as bird-watching, bushwalking, and wilderness sight-seeing via bus or boat, are based on appreciation of species and eco-systems. In Nepal and Kenya such tourism is the leading foreign exchange earner. McNeely (1988:18) points out that, as a result of tourism, Amboseli National park is about 50 times more productive in money terms than the best possible agricultural

use of the land. In Australia 85 per cent of Japanese visitors and 70 per cent of European and American travellers identified such factors as beautiful scenery and wild-life as key elements of their travel decisions (DASET 1993a:21). Eco-tourism, the industry term that covers this sort of activity is, in the mid 1990s, widely seen as a saviour for struggling regional economies blessed with tourist-friendly natural resources (See Australian Heritage Commission 1994).

Education and research into biodiversity is a separable value, since it is directed at the gaining or dissemination of knowledge. Unaltered eco-systems and wild species are important for such research, which may result in new medicines and new insights.

Indirect uses of biodiversity include the range of 'eco-system services' provided for humans. DASET (1993a) discusses protection of water resources by natural vegetation; sand protection; nutrient storage and recycling of nutrients; break-down and absorption of pollution (for example sewerage or oil-spills); climate stability; and (echoing Wilson) improving the capacity of nature to recover from unpredictable events such as fires or floods. This list summarises a complex array of values, deceptively difficult for organisations to include within conventionally rational planning programs because their money values are, even for an optimistic neo-classical economist, difficult to quantify (see however, Barde and Pearce 1991, for a more confident prediction).

The category of future use values has become more important in the last decade, reflecting world concern with the notion of 'sustainable development', a notion that has been variously defined (see, for example, Pearce, Markandya and Barbier 1989, for a 'gallery of definitions'), but minimally involves use of long term

(generational) time horizons in planning and consideration of inter-generational equity. The notions of option and bequest value are aspects of such a concern.

Option value is that of preserving biodiversity in order to retain the option of developing at some future time (see Bishop 1986). A variation on this idea is Pearsall's (1984) concept of 'serendipity value', which is the value that might arise from preserving eco-systems or species if this results in significant discoveries. The discovery of the maize species *zia diploperennis* illustrates this neatly. A Mexican university student discovered *zia diploperennis* in the west central Mexican state of Jalisco in 1979 (hence 'Jalisco maize') and it was found to be both resistant to disease and a perennial, hence unique amongst maize species. When discovered it occupied only 10ha. of mountain land, and Wilson claims that it was 'only a week away from extinction by machete and fire' (1993:281). McNeely (1988) refers to it as teosinte and puts its potential world value at US$6.8 billion because of the possible contribution of its genetic attributes to domestic maize.

Bequest value has been defined as the personal or social benefit received by the present generation from leaving resources for future generations to enjoy or use (Dixon and Sherman 1990:201). According to Pearsall (1984) it dominates all other benefits for wilderness areas (hence the biological diversity that such areas represent). For managers, however, it is a complex notion, and despite advances in the techniques used by economists to value benefits such as this, and particularly the increasingly refined versions of the contingent valuation technique, it is unrealistic to suggest that the reliable money values that managers would seek to incorporate into conventional planning processes can be readily, inexpensively or reliably obtained.

The existence value of biodiversity relates value to an individual or species unrelated to its actual or potential use. It is the value to people of a species, or an ecosystem and its genetic resources, simply by virtue of the fact that it is. This is separable from the notion (discussed above) of non-anthropocentric nature centred value, the value that is inherent within a subject irrespective of human valuation.

Is Biodiversity Threatened?

Despite the weight of opinion from biologists and ecologists that there are serious problems with biodiversity, and in particular with species extinction, there is an ongoing debate between optimists who suggest minimal rates of extinction (for example, Baily 1993) and pessimists such as Myers (1986, 1992) who suggests a total extinction rate of 30,000 species per year. Any precise figures are highly uncertain though, since the debate hinges on acceptance of the number of species in existence. Myers' estimates, for example, uses Erwin's problematic calculations and may be widly inaccurate as a result.

Adding to this theoretical debate are the admitted facts that there are not enough taxonomists to identify already located species; that the term 'species' is far from standard; and that historical records of animal and plant extinction are unreliable (UNEP 1994:148). This last problem makes accurate extrapolation of rates of extinction difficult, and also makes it even more difficult to identify natural extinctions (those not associated with human impact), adding to difficulties already posed to that project by our uncertain understanding of biological processes.

Despite the difficulties of quantifying species extinctions and the impact on genetic resources and ecosystems, it is still clear that there are many problems for world biological diversity. The World Conservation Monitoring Centre (1992) suggests that species extinctions caused directly or indirectly by human activity are occurring at a rate that far exceeds natural rates of extinction. According to the UNEP: 'Extinction rates, although highly uncertain, tend to predict an accelerated and unprecedented loss of species diversity if current rates of tropical deforestation continue into the future' (UNEP 1994:148). They also suggest serious losses of genetic resources, while Reid (1992) suggests that the current rate of deforestation will lead to the loss of between 2 and 8 per cent of the planet's species over the next quarter of a century. The International Union for the Conservation of Nature's Red List of Threatened Animals broadly supports such pessimism, listing about 4,500 identified species as threatened (IUCN, 1990), and this is certainly an underestimate given that we have not identified all the species, nor do we know the threat-status of all those which we do know. The news on the marine world is similarly bleak. Despite major uncertainties about numbers of sea species and eco-systems identified, Norse records the conclusions of a group of eminent marine biologists meeting at the Smithsonian Institute in 1990: '... the entire marine realm, from estuaries and coastal waters to the open ocean and the deep sea, is at risk' (1993:87).

This general analysis can be given flesh by consideration of Australia, an island continent exploited within global capitalism for only about 200 years. Australia has, by current estimates:

- 20,000 species of higher plants, of which more than 90 per cent occur naturally only in Australia;
- 850 species of birds, of which 70 per cent occur naturally only in Australia;

- 146 (52 per cent) of the world's 280 marsupials, and 2 of the world's 3 monotremes (egg laying mammals);
- 276 native land mammals, some 6 per cent of the world's total, plus 25 that have been introduced in recent times;
- 700 species of reptiles, of which 88 per cent are endemic, the reptile fauna of Australian deserts being the richest in the world;
- 54,000 known species of insects with at least as many still to be identified; many other invertebrates are equally poorly known; and
- 3,600 species of fish and tens of thousands of species of molluscs; the flora and fauna of Australian coastal waters is one of the most diverse in the world.

(Source: ABS 1992:15)

The full impact of human activity on these flora and fauna species is, as with all nations, difficult to judge, because of inadequate knowledge both of the number of species in Australia, and (probably) of extinctions and threats. Michael Kennedy, however, claims that 'Australia has seen more mammal species go extinct in the last 200 years than any other continent or country on Earth' (1990:18). Of vascular plants 97 species are extinct and 3,329 are rare or threatened. Of mammals, 20 species and sub-species are extinct, 26 species and sub-species endangered, and 17 species and sub-species vulnerable. Of fish, 7 species are endangered and 6 vulnerable. Of reptiles 6 species are endangered, and 14 species and one sub-species vulnerable. Of birds, 10 species and 11 sub-species are extinct, 11 species and 13 sub-species endangered, and 15 species and 12 sub-species vulnerable. Of amphibians, 7 are endangered and 2 vulnerable (ABS 1992:49-50).

Australia is obviously a nation facing a considerable challenge to retain current levels of biodiversity. Why is this the case?

Managers who appreciate that a problem exists also need to bear in mind the reasons for possible threat. The macro level analysis of why the pattern of 'life at risk' is evident has been extensively presented in the first three chapters of the thesis. At this point, however, it is more useful to discuss meso-level reasons for the threat. If the macro-level focuses on general trends, then the meso-level concentrates on the more or less direct reasons for problems; the direct threats to biological diversity. A good summary of the relative importance of threats to mammals is presented below in Table 4.

Table 4: Relative importance of different threats to mammals

Percentage of species affected

Habitat loses   Exploitation   Introductions   Others

125
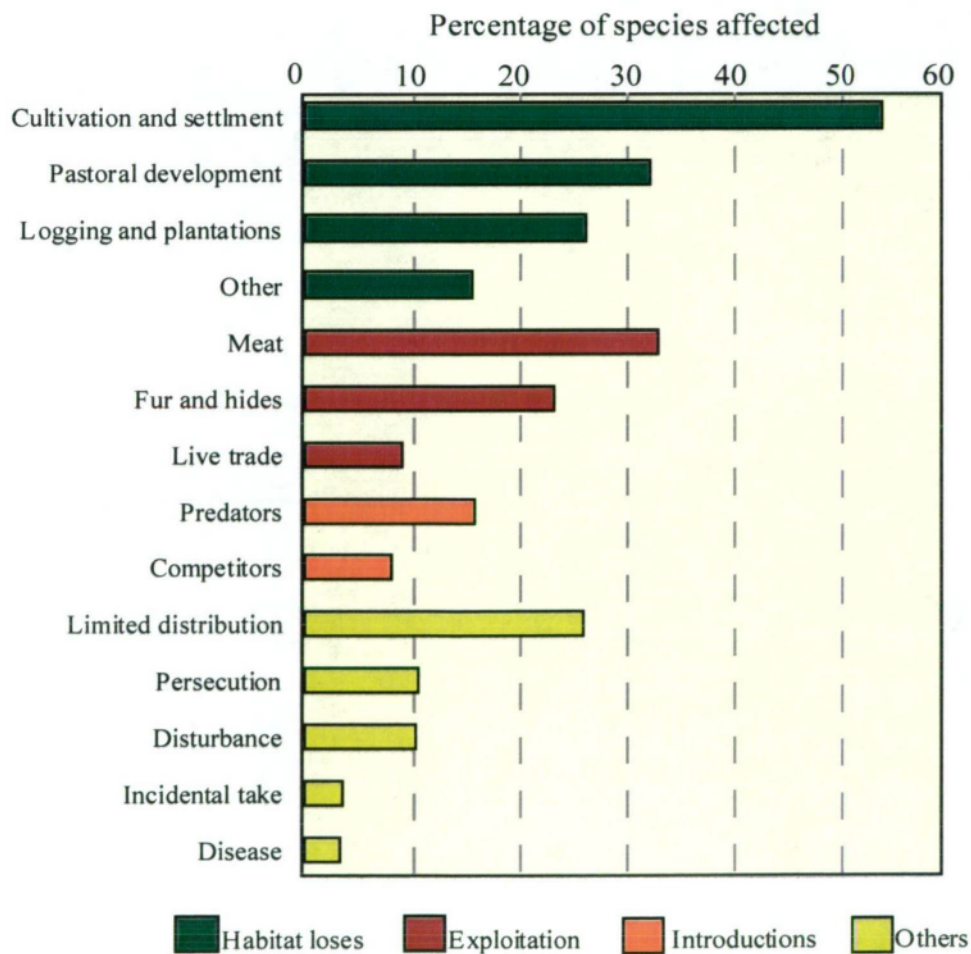
Habitat loss or alteration is the most important cause of loss or threat to species (and, obviously, given that it results in their destruction, to eco-systems). Loss of natural habitat is common worldwide, including loss of wetlands (a major issue now in the USA; see UNEP 1994:140); tropical rainforests (a major problem in Borneo, Indonesia, South America, and Australia; coral reefs (a problem worldwide, see UNEP 1994:150); and mangroves (a major problem in many nations as population clusters on the coast line, as for example in Australia). All such losses, either directly or indirectly, are the result of organisation policy, and in all cases there is a possibility for more eco-friendly activity from such organisations.

Exploitation of species for meat, fur, medicine, and to satisfy demand for pets is also a significant cause of problems, on land and at sea. The list of species rendered extinct or threatened by such activity is too long to list, but for any such species the path to threatened conditions or extinctions will have been the result of a network of many decisions by individuals and organisations, often with those who take the massively injurious and (by then) final decisions being seen as most culpable in an increasingly environmentally conscious world. The complexity of such a progress towards extinction can be demonstrated with respect to current threats to sea turtles.

These marine reptiles are long lived and slow to mature, taking up to 50 years in some cases. There are seven species, six in danger of extinction, having once been abundant in world tropical and temperate seas (Norse 1993:102). They have been hunted by traditional fishers for a number of reasons: food; for leather back oil, used by folk healers in the British Virgin Islands to cure respiratory complaints, or for use as a boat sealer by Asian fisherman; and eggs for use as aphrodisiacs. They are also hunted for thriving markets in

tortoiseshell, meat and turtle-leather (UNEP 1994:151). Such is the demand that they are hunted opportunistically by fishers; for example Honduran spiny lobster fishers kill all turtles they see because they know Japanese dealers will buy the shells (Norse 1993:102).

The impact of this exploitation is obvious from the current situation of Kemp's ridley turtle. In 1947, despite years of hunting and egg collection, more than 42,000 females nested in a single day on what Norse calls 'a remote Mexican beach', while the UNEP asserts more than 40,000 females were nesting there (Tamaulipas beach) in the early 1960s (1993:151). With egg collection, and incidental drowning in shrimp trawls however, numbers dropped dramatically. Norse, (1994:102), suggests that by 1968 the largest nesting aggregation was 5,000 animals, and Lehrer (1990) records only 400 turtles in the late 1980s, with Norse quoting Pritchard's (1990) estimate of 362 (Norse 1993:102).

The life cycle of sea turtles makes them particularly vulnerable to the exploitation that Kemp's ridley has suffered. All sea-turtles spend most of their life at sea, but lay eggs in batches on land in two to four year cycles - they are therefore predicably vulnerable targets who are without natural protection on land; slow moving, non-venomous and basically non-aggressive.

Sea turtles are also affected by pollution. Oil and tar injures the skin of baby turtles, and many die from ingesting oil (UNEP 1993:151). Chemical pollution, plastic waste and shore-litter which alters nesting sites also affect turtle numbers.

The introductions category in the table includes problems with competitor or predator species introduced by humans, often exacerbated by habitat destruction which results in lower numbers of

native species. The impact of this pattern of threat varies globally, but an indicator of the magnitude of the problem can be gained from analysis of the Australian situation.

At least 10 per cent of Australia's flora consists of introduced species, a total number of between 1,500 - 2,000 such species (Humphries, Groves and Mitchell 1992). Not all threaten native eco-systems, but many do; of 825 introduced in Victoria 412 are established among native vegetation, and of these 69 (8 per cent) are classified as a very serious threat and 15 per cent a serious threat (Humphries *et al.* 1992). Native Australian animals are also threatened by introductions, who make up about 10 per cent of land mammal species. They include notable predators such as the fox and domestic cat, which can prey on native species for food; camels and donkeys, which graze on desert trees and render waterholes difficult to use for native animals; and rabbits, which have been a major problem for both the pastoral industry and native animals throughout all but North Australia (See Bureau of Rural Resources 1990, O'Brien 1989, Wilson, Dexter, O'Brien and Bamford 1992). There are also 96 introduced species of birds, including 32 that have become established (Australian Bureau of Statistics 1992:35). Fish have also been introduced. For example, the European Carp presents major problems for the Murray River system and its native species.

The overall pattern in Australia is therefore one in which introduced species have had a major impact on biodiversity, and control measures by Government have been largely unsuccessful; once established introduced species are exceptionally difficult to eradicate. There is no better world example of this than Australian attempts to eradicate the rabbit.

Pollution, persecution, opportunistic harvesting and disease also impact on species, as Table Four (p. 125) indicates and the brief discussion of the career of the sea turtle exemplifies.

The overall lessons in this pattern of world threat to biological diversity are that:

- it is occurring at an increasing rate; and
- there are a variety of reasons for extinction, though, as the turtle example indicates, more than one factor will tend to impact on each threatened species

These conclusions provide the background for discussion of impediments to planning for conservation of biodiversity. A number have already been considered, including difficulties in pinning down definitions of the notion of biodiversity itself, and also of defining the term 'species'; problems in identifying particular species; and problems in developing values in biodiversity. A range of further difficulties for management of biodiversity can now be indicated, in a discussion centred on the current lack of world knowledge about biodiversity, and in particular the sort of site-specific knowledge that is particularly helpful to organisations.

Further Difficulties for Managing Biodiversity

Before identifying the complexities and various aspects of this uncertainty it is useful to note the level of general understanding that we now possess. Small populations and eco-systems that have been almost entirely wiped out are particularly at risk, since they are subject to extinction by chance events, by attacks from predators, by epidemics and by the actions of individual organisations. A single oil spill or serious storm, for example, could wipe out all of a small

population, and small, localised populations are more vulnerable in both the short and long term because they lack genetic variety (see Norse 1993:73-74, and discussion of aspects of this problem by Gilbert 1986 and Soulé 1986). Populations with low recruitment (either because of low fecundity or poor survival rates among the young) are also vulnerable, since they cannot replace lost members. Species with specialised habitats, diet, or other particularly specialised requirement in their ecological niche are also especially vulnerable, as for example Ridley's sea turtle, which has only one major nesting site even though it ranges widely in other aspects of its life. Problems with the relationship of species to the human world also provide basic lessons: species with high value to humans, especially those that satisfy specialised demands with few or no substitutes (as with use of rhinoceros horn as an aphrodisiac) are especially endangered; species living in close proximity to humans are endangered (as with whitebait in the Australian State of Tasmania); and large animals that are readily located and exploited are vulnerable (as the highly endangered Sumatran rhinoceros demonstrates).

Reid and Miller (1989) summarise specifically ecological knowledge of use to managers in a discussion of the value of biodiversity in maintaining ecological processes. In their analysis they use the same definition of biodiversity as the current discussion, and define ecological processes as 'the interactions among species and between species and their environment' (1989:4).

They begin by suggesting that no simple relationship exists, but that in a 'somewhat chaotic view of nature', six ecological relationships of use to managers can be identified.

First: regardless of how static they appear the mix of species making-up communities and eco-systems changes continually (1989:6). Species within communities respond to environmental change differently, so, Reid and Miller argue, the object should not be to maintain the exact composition of 'communities' but to maintain species in such a way that allows eco-system changes to continue. The example provided to support this proposition suggests that it can best be interpreted at a general level as applying to broad climatic changes, rather than specific alterations of eco-systems, as for example with the alteration by BHP of the Fly River system in Papua New Guinea, where pollutants from mining have led to significant changes to the river ecology and adversely affected its use by local people.

Second, 'species diversity increases as environmental heterogeneity - or patchiness of habitat does' (1989:6).

Third, environmental heterogeneity 'affects not only the composition of species in an eco-system, but also the interactions among species' (1989:7).

Fourth, periodic natural disturbances play an important role in creating the patchy environments that foster high species richness. Examples of such disturbances include periodic earthquakes and bushfires, and for organisations this means that it 'is often necessary to allow natural patterns of disturbances to continue, or at least to manage the environment so as to preserve natural patterns of succession' (1989:7). For government instrumentalities in control of national parks this is difficult, just as it is for commercial organisations that regard the wood that may be burned in a 'hazard reduction fire' as a resource.

Fifth, 'both the size and isolation of habitat patches can influence species richness, as can the extent of the transition zones between habitats' (1989:7).

Sixth, 'certain species have disproportionate influences on the characteristics of an eco-system' (1989:7). Such keystone species are therefore of central importance to organisations striving to maximise eco-system integrity. (Of course, for organisations to use the idea there must be adequate knowledge of the eco-system, and of the relevant keystone species).

Behind such generalisations is a wealth of ecological knowledge. We certainly know far more about interactions in the natural world now than ten years ago, and a modern ecology text such as Colinvaux (1993) provides a range of insights.

Despite these accounts of 'useful lessons' we know far less about ecological processes generally and those specific eco-systems affected by organisation activities than we need to, and this lack of knowledge provides a major obstacle to environmentally sensitive organisations. Individual eco-systems are vulnerable and complex, defying all but the very broad, minimally useful, generalisations offered in the previous paragraphs. Consequences cannot therefore be tied to a single cause and for managers the reverse is also unfortunately the case; single events can lead to varied consequences in both the short and the long term.

Swingland's basic conclusions on the relationship between loss of habitat and loss of biodiversity provide a good indication of the extent of understanding. He suggests that '... [it] has never been satisfactorily characterised and there is no predictive model for policy-making and planning' (1993:122). Dietz and van der Straaten's conclusions on the effect of pollution on eco-systems are similar,

and again representative of modern research. They assert that: 'In general processes in nature, and hence, human interventions in the processes, appear to be hardly predictable for at least three reasons' (1992:334). The first reason is that of synergistic effects, when the combined effects of pollution are greater than the sum of the separate effects. The second is the presence of threshold effects in eco-systems, and the fact that the threshold level is unknown. The best example of this broad pattern in operation is acid rain which caused a sudden dying off of forests in Europe in the 1980s, startling scientists. The buffeting capacity of soil had protected trees, but once its hitherto unknown threshold was reached, trees died. The third effect - now widely publicised by Beck (1992a, 1992b) - is that many emissions have delayed effects. A generation after a chemical spill, for example, there may be major impacts.

Concluding Comments

The foregoing discussion suggests fundamental scientific reasons for the current lack of knowledge about biological diversity; it may well be that precise knowledge about individual species and eco-systems is, given current levels of understanding, simply not available irrespective of the level of resourcing for research. Added to this, however, there are a number of socio-political reasons for our lack of knowledge.

The knowledge of traditional users of the land and sea is not generally available, and little valued by the dominant cultures within the world economy. This means that insights gained over many generations are denied policy-makers. Within the scientific community too, problems occur, Norse suggests, because 'most

scientists would rather generate information that is stimulating than information directly pertaining to modern challenges, no matter how much it is needed' (1993:155).

There are also problems gaining sufficient funding for research into biological diversity generally, and into specific sites in particular. Research is expensive, and long term research especially difficult to justify in conventionally legitimated short term planning systems.

The transfer of knowledge already gained is an additional problem. Problems with transfer of traditional knowledge has already been mentioned, but added to this is the fact that much useful information is retained within the scientific establishment, within certain particular government agencies, or contained within nations, rather than made broadly available. This pattern will ultimately change as a result of the developments in world communications technology analysed in chapter two, but it will remain largely as it is for many years yet.

Within the government sector too, overlapping national and regional jurisdictions create further impediments to preservation of biodiversity. Overlapping jurisdictions may create problems for organisations that seek to develop since they suggest many regulatory bodies that must be satisfied. On the other hand they may create a policy vacuum as bureaucrats argue over who has the power to do what. Less ambiguously, gaps create opportunities for unregulated (or at least less regulated) exploitation by organisations. The largest 'gap' in global regulation comes with the fact that about two thirds of the world's seas are not under any national jurisdiction (Norse 1993:174), and this provides some explanation for the problems Norse and others see with this fundamental resource.

In a world economy which remains fundamentally committed to continual growth and which is organised by an anthropocentric money-values driven market, the pattern is for exploitation of biodiversity to continue in the absence of knowledge. This can be demonstrated by a brief examination of the history and current situation of representative species in the Australian south-east fishery.

This is a diverse multi-species trawl fishery catching more than 80 species, including 16 species on which quotas have been placed. The total commercial value of the fishing in 1991 was approximately $64m (Bureau of Resource Sciences 1992a). However, despite the significance of this fishery to the Australian economy, relatively little is known about the stock of the 16 quota (controlled take) fish that are central to the fishery. Adequate information on stock structures is known for only four of these fish, and the *Fishing Status Report* (1992) suggested a need for greater efforts to gather baseline data, whilst admitting that 'lack of knowledge of stock structure and inability to derive yield estimates for most species highlights the uncertainty surrounding the assessment for this fishery'. (Bureau of Resource Sciences 1992a). This lack of knowledge creates obvious problems for policy makers attempting to set quotas, and also for managers of fishing operations dependent on the fishery for a profit. The nature and extent of these problems becomes more obvious with analysis of the Orange Roughy, Giant Crab and Gemfish.

Orange Roughy principally inhabit cold (4-7°C) deep (700m to about 1,400m) waters between Port Stephens in New South Wales and Cape Naturalist in Western Australia. They were first recorded in Australian waters in a 1972 trawl survey, but it was not until the discovery of a large aggregation of them off St Helens in Tasmania that they became a commercial possibility. They are believed to grow

slowly and live to about 150 years. Maturity comes between 30 and 32 years when the fish are 28-32 cm long and weigh between 500-800 grams (Bureau of Resource Sciences 1992b). Because they aggregate tightly they can provide very high catches; trawl 'shots' of 30-40 tonnes were common after a few minutes trawling off St Helens Hill, a major gathering place for the fish.

Incentives to fish are great, and in 1992 the price to fishers for whole fish was A$2.50 per kg, and domestic consumers were paying A$12.00 to A$18.00 per kilogram for white fillets. Using the $2.50 figure, a good trawl 'shot' was worth A$300,000. The financial incentive to over-fish the resource is therefore huge. There are Tasmanian East Coast anecdotes of fishermen 'paying off' modern fishing boats in a single trip to the Orange Roughy fishery.

At its peak in 1990 the fishery yielded 40,000 tonnes, up from a few hundred tonnes in 1984. The 1992 tentative estimate of sustainable yield, however, was a mere 2,900 tonnes. The fishery was clearly over-exploited in the golden years of 1989-1991. In this time scientific knowledge necessary to obtain a good estimate on the total mass of fish, of their growth rate, and their fecundity was lacking, and with it the background necessary to set up a sustainable fishery based on well researched regulations (Hanson 1993, 1994a).

This problem of lack of scientific knowledge was, however, only a problem for experts, not for small business people in a conventional free-enterprise situation. Fishers took the short term profits and worried about the species only when it looked possible that the future of the commercial fishery may have been jeopardised. The scope of responsibility for small business faced with good possibilities of high profits was limited so much in this case that it arguably did not exist. In the absence of regulations and quotas most fishers appear to maximise short term profits. The profits in sections

of the fishing industry are so good and, given the basic characteristic of non-excludability, the likelihood of detection for breach of regulations so remote, that a regulatory approach is often inadequate and poaching and quota evasions in the fishing industry generally are common. The 1993 Professional Fishermen's Association Conference in Tasmania centred on the problems of poaching, and it was claimed that the $95m abalone industry was under threat 'from sophisticated mainland operations using small high speed boats and helicopters' (*The Examiner* 28 September 1993:5).

A similar experience is evident in the even shorter 'career' of the King Crab, a red and white crustacean weighing up to 15 kg which comes from waters usually more than 400m deep. In 1990 the harvest was only a few hundred kilograms a year; in 1992, according to the Tasmanian Department of Primary Industry, it was almost 200 tonnes. The King Crab's lifespan, age at maturity and estimated population remain a mystery, but with up to $200 obtainable from a single large specimen there is a strong financial incentive to fish the resources as quickly as possible (Darby 1993:2). In this case management of the biological resource, reliant as it is on knowledge that it is difficult to obtain, still lags behind the operations of conventionally motivated free enterprise operators.

The south-eastern trawl Gemfish also presents a similar picture. It is found along Continental slopes from Cape Moreton in Queensland to Shark Bay in Western Australia. Annual catches in the fishery before 1970 were less than 280 tonnes, but rose rapidly to 5,000 tonnes of 'eastern' Gemfish in 986 and 360 tonnes of 'western' (Tasmanian) Gemfish in the same year. Quotas were set in 1988 (and exceeded in that year) but by 1989 the quotas could not be filled, and the *Fishery Status Report* said that: 'All available evidence therefore points to a dramatic decline in the recruitment of young fish in recent years. The magnitude of this severe recruitment decline

causes grave concerns about the continued viability of the Gemfish resource' (Bureau of Resource Sciences 1992c) There was, accordingly, a 'nil quota' set for 1990. Scientists are still, some 20 years after the fish was first commercially significant, uncertain about the number, size, and extent of Gemfish stock, and about the causes of 'recruitment failure'.

To this point it has been suggested that biodiversity, and in particular site specific biodiversity, is largely unknown and perhaps unknowable. It is little researched and this situation is likely to continue. For organisations seeking to plan with protection of biodiversity in mind however, the situation is even more complex and uncertain. Any business is already subject to numerous uncertainties with respect to changing markets, competitors, governments, and internal factors such as work force opinion and leadership style and changing technology. In combination the uncertainties and imponderabilities of biodiversity and those of the business environment are truly a complex system 'in the sense that many independent agents are interacting with each other in a great many ways' (Waldrop 1992:12). There is no inherent order in this interaction and no entirely predictable course can be charted.

INTRODUCTION TO PART B

Preceding chapters have discussed important processes in the 'external world' facing organisations. They can be categorised using the distinction between 'remote environment' and 'competitive environment'. The former includes influences outside any particular industry, the latter (adapting Porter 1980) includes firms within a particular industry, their suppliers, substitute products, potential new entrants, and (going beyond Porter's model), firms with which they exchange or obtain staff and ideas. The remote environment - the major focus of the discussion so far - provides a pervasive influence on organisations, affecting fundamental values and providing basic guidance for organisation activity, while the competitive environment is of more immediate influence on strategies within a particular industry. This 'external world' of organisations is presented on the next page in a figure which shows the remote world in detail, but in order to simplify matters, it offers only the general descriptor for the competitive environment. All influences, however, can be assumed to be systemicaly connected to all others.

Figure 6: The External World of Organisations

REMOTE WORLD

Technological Change

COMPETITIVE ENVIRONMENT

Regulations: National and International

Change in Expert Knowledge, Academic Discourse

THE ORGANISATION

Political Change

Lobby Groups

Broad Social Change
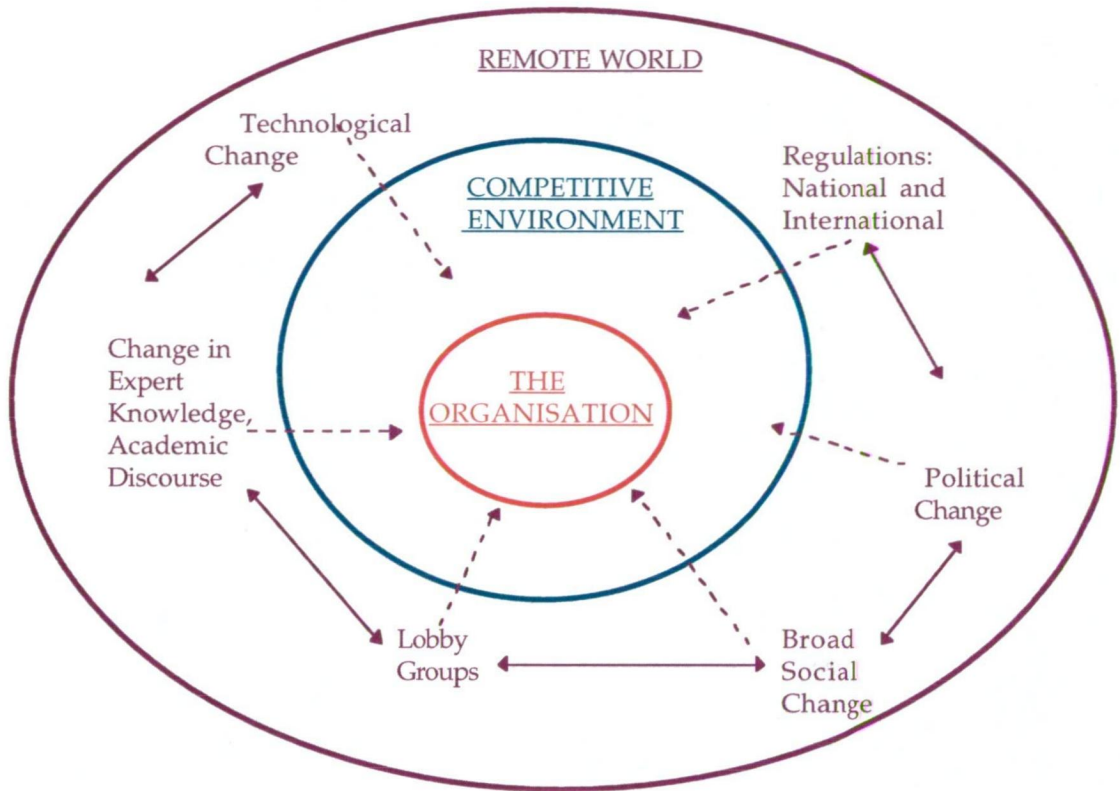
This is a simplified picture of a generic organisational environment, offered here for heuristic purposes rather than as the picture facing any particular organisation. It provides necessary background for a discussion of organisation (meso) level matters because it makes clear the 'whole' within which organisations are placed, and as Senge (1992:42) suggests, the capacity to see patterns within a whole is essential to understanding. In this case the complexity of the whole is a fundamental message as is the realisation of the rate of change in the system.

The importance of inter-relationships is also clear in the diagram; change in one element of the remote system affects others. For example, environmental lobby groups influence governments to change environmental regulations in a process facilitated by developments in global technology. As well, any remote element

can influence any element of the competitive environment with consequent impact on individual organisations. Finally, any element of the remote environment may (ultimately) influence organisations directly. As more detailed discussion in chapter five will make clear, this does not mean that organisations are here viewed as open systems (as for example in Kast and Rosenzweig 1979, and Lawrence and Lorch 1967) but, consistent with an autopoietic view, as basically self-referential. Their relationship with the broad environment is largely self determined, mediated by organisation culture and the perception of staff (see Morgan 1986:237-238).

Organisations are therefore slow to change, even though forever in a state of flux as the components within the system that make up any organisation respond (in their own terms) to challenges from the broad environment. Such organisations are best conceived of as non-linear feedback systems in which components are connected by feedback loops. So, for example, the relationship between 'planning' and 'world view' (components which will be further defined shortly) is one in which a change in, say, planning, because of an altered world view, may be either more or less proportional to the 'force' of that change. A minor change in world view may therefore create a major change in planning processes. In other words, components are connected in a network of indeterminate mutual causality.

Relations between internal components of any organisation and between the organisation and the broad environment are therefore in a continual state of flux. There is unending change, but, given the autopoietic (self-referential) orientation of such systems, this change is of an incremental rather than significant nature. Nevertheless, as Morgan (1986:254) points out: 'An understanding of mutual causality in complex systems shows it is extremely difficult to halt

change, to eliminate all positive feedback, or to preserve a given mode of organisation indeterminably'. Organisations do change slowly in order to fit in with changes in the broad environment, but on their own terms (this process is further explored in chapter five).

To further complicate matters, as the separate discussions in chapters one and two have suggested, the external world facing organisations is affected by the multi-layered pattern of change in sections of the world's periphery towards industrial capitalism, and in these and other sections of the Wallersteinian periphery and core, towards reorganised capitalism. Whatever the position of individual organisations on the capitalism/reorganised capitalism transition, however, the world economy in which they operate remains growth oriented and anthropocentric. Nevertheless, as discussion in chapter three suggested, the pattern of re-organised capitalism offers an opportunity for organisations to move towards greater eco-sensitivity. They are pressured by governments and a concerned public, and as the following discussion will make clear, many of the organisational practices that facilitate eco-sensitive activity are already taking place for a variety of other reasons as well. For example, moves towards more flexible and responsive organisation structures are indeed part of eco-centric management but are also required if manufacturing organisations are to compete in the volatile world economy.

Such change towards eco-sensitivity by business will, however, be slow and unevenly spread, since not all organisations will respond equally to the pressure from elements of the remote environment to become ecologically aware. Those working to meet tight regulations or in particularly sensitive social environments are likely to be more responsive than others. TNC's which need to be responsive to many different nations are likely to be sensitive if even one of those nations requires them to be so because they have need of a good

trans-national reputation. On the other hand, small organisations that have relatively little obvious impact on the environment, local cheese makers, for example, are likely to be less reactive to broad changes in social and political sensitivity - ultimately they too must react, but their position is less vulnerable than TNC's or more identifiable targets such as polluters or forestry operators publicly cutting 'charismatic' rain forest.

Some organisations, irrespective of position in the world or production process, may be more sensitive than others because of the experience and values of individual managers within the competitive environment. For example, a bicycle manufacturer with few apparent problems may have a leadership team that both believes in preserving the natural environment and has some knowledge of how to do this, and as managers shift around within the world economy this becomes more likely. A Malaysian bicycle manufacture leadership team may be very alert to pollution problems, to biodiversity in the company grounds, and to recycling operations, because they worked with environmentally aware managers in Holland where managers were already sensitive to such issues.

In order to encompass such variety in a discussion of organisation level change and also as a reflection of the idea that change within organisations will be gradual, discussion in Part B focuses on 'transitions' required in fundamental internal components of business organisations if managers are to operate with greater sensitivity towards the natural world.

Four components (each in itself a non-linear feedback system of inter-related elements), will be discussed: organisation world view; planning and information development; organisation structure; and leadership.

The notion of 'world view' is used here to describe 'the conception of reality that a person or group uses to explain how the pieces of their experience fit together' (Cavaleri and Obloj 1993:82). This group of elements most obviously reflects the impact of change in the external world, and the characteristics of the broad culture that moulds organisation culture and ideas.It is also of central importance to any transition towards gradually less anthropocentric, expansionary and exploitative positions with request to nature because it 'colours' all thinking and practice. Discussion is divided into two chapters. Chapter five considers broadly conceived elements of world view of fundamental importance to organisational orientation towards the natural world. Chapter six discusses important areas of change in external academic discourse and expert opinion that have an important impact on organisation's world views.

In chapter five, therefore, transitions in elements such as these are considered:

unrestrained anthropocentricism	----------▶	amiable anthropocentrism
resource exploitative organisation self	----------▶	eco-self
limited (anthropocentric) risk stance	----------▶	use of notion of risk-for-nature

Chapter six discusses transitions from:

normal science	----------▶	new science
conventional economics	----------▶	ecological economics

Chapter seven discusses the model of strategic planning most suitable for ecologically sensitive planning including discussion of transitions such as these:

strategic planning	- - - - - - - - - - - ▸	eco-learning based strategic management
primary use of single discipline knowledge	- - - - - - - - - - - ▸	primary use of multi-disciplinary knowledge
bias towards single focus solutions	- - - - - - - - - - - ▸	bias towards multi-focus solutions

Chapter eight develops this idea further, discussing the planning and information handling systems that are related to eco-learning:

emphasis on short term expectation	- - - - - - - - - - - ▸	emphasis on long term expectation
linear language considering detail	- - - - - - - - - - - ▸	feedback language considering dynamic
complexity	- - - - - - - - - - - ▸	complexity

Chapter nine comprises discussion of two components, structure and leadership and includes mention of these transitions:

conventional leader	- - - - - - - - - - - ▸	eco-leader
emphasis on order	- - - - - - - - - - - ▸	tolerance of chaos in issues and diversity in staff
transactional leadership	- - - - - - - - - - - ▸	transformational leadership
concentration on immediate issues	- - - - - - - - - - - ▸	concentration on process and culture
bureaucratic organisation	- - - - - - - - - - - ▸	network organisation
authority bias	- - - - - - - - - - - ▸	communication bias

Some elements of these transitions can now be presented in a figure representing aspects of both their internal systemic relationships and their links with the direction of change in the external world. The intention is to present the pattern of the whole rather than all elements in it, or the dynamically complex feedback loops that make them up since that would make the picture too complex for useful viewing. In the figure, as a reflection of its central importance in the transition towards eco-sensitivity, 'world view' is positioned at the

centre of a triangle made up of the remaining components (or groups of elements). Nevertheless all the components can be assumed to be related to all others and 'world view' is therefore a weighted component within the system.

As Figure 7 (see page 147) makes clear, a complex of systemic interactions make up the overall transition. Only three 'moments' in this transition are portrayed and only two of these are presented in any detail, but they can be taken as representative of many parts in a continuing process.

Figure 7: Transitions to Eco-Sensitivity
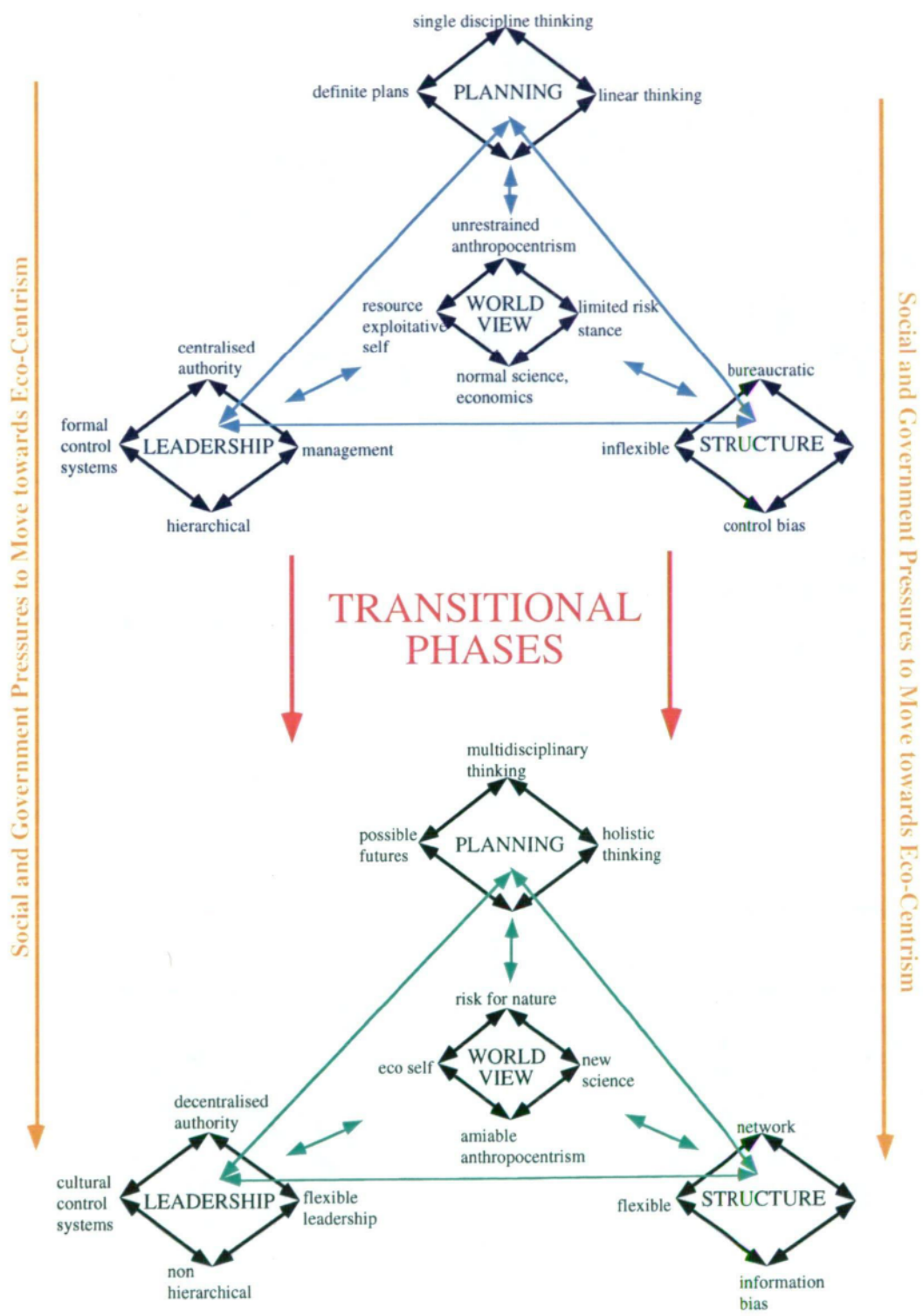
This is an argument for incremental change, and the focus is on key points in a number of important transitions that will take place as management behaves in an ever more eco-centric fashion. There is no intention, however, to define immutable end points for the transition, merely to arrive at an understanding of the changes associated with movement towards what has been called eco-sensitive management.

Before commencing discussion of transitions a further and more detailed defence of the notion of incremental change must be offered since it is of fundamental importance to the structure of the argument. As part of this the ecologically optimistic view of the world required to help 'drive' these transitions is also discussed.

A Defence of Incrementalism

A major element of 'the defence' has already been presented; incrementalism is justified by the fact that it is possible and likely within the 'business system', whereas the major changes that are required to re-focus the basic characteristics of capitalist production are, at best, wildly improbable in this generation. The processes of change that have been outlined also make the point that such fundamental changes are the end result of many incremental shifts, themselves the product of changes at many points in the complex systems that constitute the relationship between business organisations and the natural world. Incremental approaches are also justified because of their compatibility with the changing state of knowledge in the late modern world - the problems also change,

and ultimately so does the definition of vision that guides change; precisely targeted major changes are unjustifiably grand in view of such fluidity of insight.
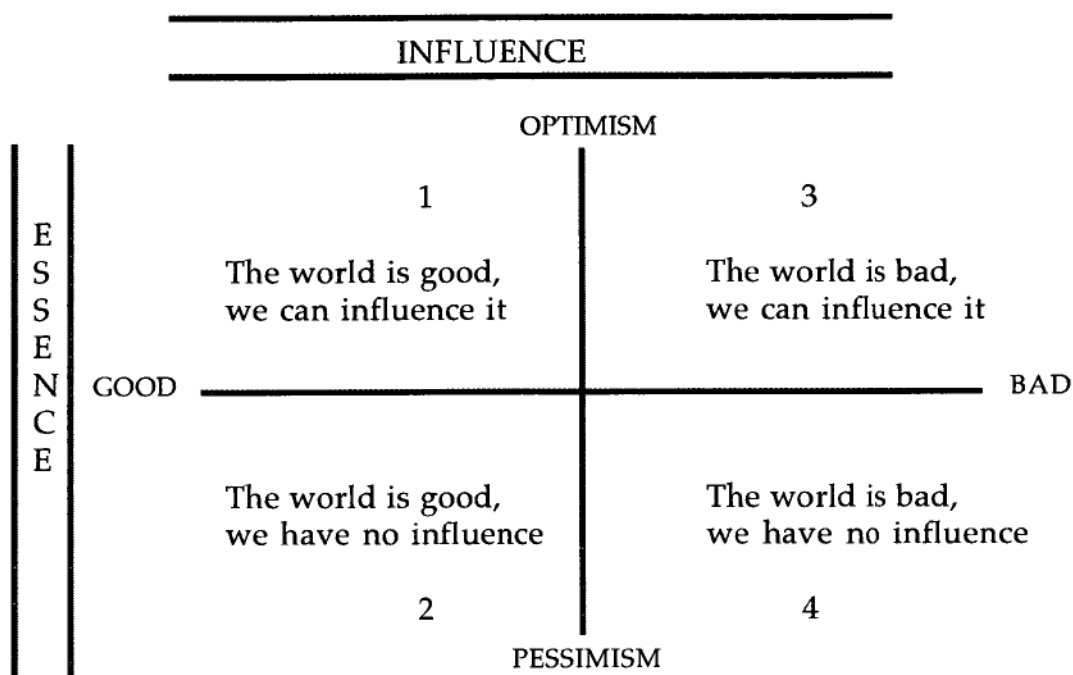
Incremental change in business is best seen as part of a network of changes in other specific areas of activity. Changes to political systems, to other bodies of theory (for example economics), changes in the ordering of the world system (so that the North/South division and the legacy of colonialism wither) and to the extent of environmental co-operation between nation states (already developing but still lacking in real influence) are all required. Given the systemic nature of the world changes in any one area are also contributing to changes in other areas.

The impact of changes to business theory are not only incremental in the context of major changes required to re-orient capitalist production, they are also specifically targeted at the meso level; as organisations adopt different patterns of thought and styles of planning they will alter their activities and this will lead to change at a variety of local or regional levels. Change to one large TNC, for example, could contribute to preservation of the natural world in several dozen mining sites. This is far short of the positive impact that would be required to solve any of the global problems that Beck identifies and that Giddens discusses when he speaks of 'juggernaut society'; acid rain, problems with the ozone layer, and the greenhouse effect are all outside the immediate scope of the approach suggested. Such problems may be within the scope of change in other areas, for example the area of international treaties which earlier discussion suggests will become more significant as globalisation proceeds and nation-states multiply and in doing so become less important, but in the meanwhile meso level change is also useful. It is also immediately achievable.

The apocalyptic view of Beck and Giddens and the eco-alarmism of writers such as Ehrlich make up an invaluable part of the process of alerting the world to risks and in doing so help change community values. They also present arguments which assist in the building and assessment of knowledge. They do not, however, form a good basis for immediate action at either the meso or macro level, since their overall impact is one of sensitisation to danger rather than the provision of signposts for specific activity. They may actually inhibit policy development by implying that it is inadequate to the problems that are identified and discussed. Theory based on the assumption that humans can make a difference, and in this case that the environmentally destructive direction of world capitalism can ultimately be turned around, is of more immediate use.

This distinction between the pessimism of what could be referred to as eco-alarmism and the optimism of the current project is made clearer by using Elise Boulding's (1979) distinction between 'essence', which involves assumptions about whether the world is basically good or bad, and 'influence', which describes the level of perceived helplessness. Coupling these concepts with optimistic and pessimistic positions, the four-sector figure presented in Figure 8.

Figure 8: Essence and Influence Orientation

```
                        INFLUENCE
═══════════════════════════════════════════════════════

                        OPTIMISM

        │                      │
  E     │         1            │         3
  S     │                      │
  S     │   The world is good, │   The world is bad,
  E     │   we can influence it│   we can influence it
  N  GOOD ────────────────────┼──────────────────── BAD
  C     │                      │
  E     │   The world is good, │   The world is bad,
        │   we have no influence│   we have no influence
        │                      │
        │         2            │         4
        │                      │
                        PESSIMISM
```

(Source: Boulding, 1979)

The current discussion suggests that incremental change that impacts generally because of the systemic nature of the environment/society relationship, and specifically at the regional level as business organisations change their mode of operation, falls into sector 3. Eco-alarmists fall into sector 4 because of the implication that nothing can effectively be done about the risks of global change that they so clearly identify. Beck, for example, despite the positive program he offers, is basically an eco-alarmist because his emphasis is clearly on the inevitable and multiplying risks of modernisation, not on the possibility of the solution. This does not lead (at least directly) to positive change. More positive analysis of macro-issues, for example that of O'Riordan and Rayner (1991) who assessed the problems of a management response to global environment change, are likely to be far more productive and are therefore more immediately related to the current project.

Concentration on the meso rather than macro level is also a reflection of both the normal scope of national and regional policies, and of the capacity of humans to understand and solve problems. The first of these points is a product of the distribution of power in global society: significant areas of activity in all society are regionally controlled, and the irony is that globalisation is actually making regional decision-making (at the 'bottom end' of the meso level) more important. Meso level policy focussed at regional level is therefore also becoming more important, and this is where the impact of corporations is immediately felt. The second point is developed by O'Riordan and Rayner : 'Most people in the world are necessarily preoccupied with the immediate demands of making a living from their local environment' (1991:91). The suggestion is that macro level problems are beyond the scope of understanding of all but a 'tiny elite' (though even this could be disputed given the dynamic complexity of the systems involved). A development of this argument is that theory focussed on the meso level will be more readily understood and more readily implemented.

A basic theme of the discussion in chapter two was that business is more powerful and globally pervasive than ever before and that business constitutes a highly significant means of communicating changed values as well as practices. Despite a changing world order it will remain so, and as corporatism declines, as new trading blocs and 'trading tigers' are established, changes within major business organisations have great potential for wide impact. The significant role of TNCs in changes has been made clear, as has their need to fit within new systems of values, and they above all have the power to become positive agents for change. If the environmentally averse character of modernist change is to lessen at all in the next decade, it

is most likely to do so as TNC agents from late modern contexts wield influence on the value systems and business practice of host nations. Again, meso level policies are justified in a wider context.

Chapter Five

WORLD VIEW: BROAD ELEMENTS

Three Stages of Anthropocentricism

An anthropocentric orientation is inevitable in all human approaches
to nature which are seen as having any value for humans. This
includes most organisation activities, given that almost all
organisations, and business organisations in particular, are defined by
the fact that they co-ordinate action in the world in order to further
human interests. The question is therefore not whether business
organisations are anthropocentric but how anthropocentric they are,
with lesser degrees of anthropocentricism reflecting a movement along
a continuum. Fox (1990) provides a useful guide to 'signpost' along this
continuum with his distinction between three kinds of
anthropocentricism; unrestrained exploitation and expansionism,
resource conservation and development, and resource preservation.

Unrestrained exploitation and expansionism is totally anthropocentric;
'the non-human world is considered to be valuable only insofar as it is
of economic value to humans' (Fox 1990:3). It also emphasises the
'physical transformation value of the non-human world' and measures
this in economic terms while equating it with economic growth.
Oelschlager (1991: 286-287) describes 'resourcism' in similar terms,
suggesting that it puts humans outside the 'eco-machine', which is
exploited with the aid of science and the worth of which is determined

via the market. He suggests that the roots of this approach go back to the Neolithic revolution and that it reflects 'the intense homo-centrism of Judeo-Christianity and the alchemy of Modernism' (p.286). For Fox it is also characterised by short-term thinking and by a faith in 'technological fixes' for damage repair when forced to concede long term harm has been done to nature (Fox 1990:3). O'Riordan (1991a) calls this 'technocentrism' and couples it with an optimism about technology that is best exemplified by 1970s writers such as Herman Kahn, whose supreme optimism saw no real problems arising from war, overpopulation or environmental deterioration.

This approach remains dominant in the world economy, despite the positive signs of more responsible business activity assessed in chapter three. It results in unrestrained exploitation which often produces excellent short term profits at great but unrecognised (or ignored) cost to the natural environment, including major impact on biological diversity. The ideology of progress and what Fox (1990:3) calls the 'myth of superabundance' legitimate destructive behaviour which is conducted and justified in the language of 'frontier economics' (Colby 1993). Examples of negative results for biodiversity abound. Broken Hill Proprietary (BHP), Australia's biggest business organisation, provides one with its operations at the Ok Tedi mine in the Fly River district of Papua New Guinea (PNG). The mine, jointly owned with the PNG Government, Amoco of the USA and German interests, dumps 70 million tonnes of waste each year into the Fly River because of the lack of a tailings dam, and directly affects traditional fishing and gardening downstream, with the possible effect extending to the Torres Strait and as far south as the Great Barrier Reef (Davis 1992, 1994; Rosenbaum, 1993). Accurate information on impacts is unavailable however, an

inevitable problem made worse in this case by the competing interests of the partners, by third world (primary export needy) location and by minimal research funding.

Fox's second approach, resource conservation and development, is also 'thoroughly anthropocentric' but has a longer-term focus and recognises that there are limits to material growth, and as Fox points out, in combination these oblige one 'to take the interest of future generations of *humans* (his emphasis) into account in deciding upon present courses of action' (1990:4).

The notion of sustainable development (SD), widely discussed since the early 1980s as a compromise position between development and conservation, represents a set of ideas that fall within this approach. SD is, as Jacobs (1991:59-60) points out, 'a contestable concept: one that affords a variety of competing interpretations or conceptions'. There are then, numerous definitions of SD. In the 'Bruntland Report', which is the most influential work on the subject, it is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development 1990:43). Others emphasise application of ecological ideas to economics (Redclift 1987), integrated decision making (Harris 1992), or rises in real income, education and health standards and general quality of life (Pearce, Markandya and Barbier 1989). Definitions abound. Tietenberg (1992) quotes Pezzey (1989) as finding sixty one, and Pearce, Markandya and Barbier (1989) fill 14 pages with definitions. Tietenberg suggests optimistically that it is a 'nascent concept... still in the process of being refined and clarified' (1992:600), whilst Daly and Cobb applaud the fact that it has been left 'rather vague

because this helps ensure unanimity of support' (1989:75), and Cocks
decides on the same evidence that 'the more you look at sustainable
development, the sloppier it gets' (1992:251).

Despite conceptual vagueness a core of meaning can be identified. SD
involves preservation of the opportunities of future generations, and
given that this means preservation of a large element of the natural
world this implies significant use of long term frames of reference and
holistic perspectives in planning, and provision of greater value for the
natural environment in planning.

None of this suggests that SD is non-anthropocentric. As Folke and
Kaberger point out in discussion of the Bruntland Report and various
World Resources reports (among the key items of literature in the SD
debate): ' The perspective is anthropocentric and the concern for the
life-supporting environment is based on the insight that hurting nature
is also hurting Man' (1991:282).

Another point of significance for the current argument which stresses
the need for 'transitions' is that there are relatively 'weak' and 'strong'
positions within SD, and therefore a continuum of approaches within
the broad category of resource conservation and development. A weak
position could be close to unrestrained exploitation but involve some
consideration of the welfare of future human generations and therefore
long term planning and protection of some natural resources. A strong
position requires that greater value be allocated to nature, that decisions
be taken holistically in order to incorporate those values, that greater
sensitivity to risk-for-nature be developed, and that decision making be
integrated across a range of private and government sectors. Ultimately
it involves change in attitudes towards nature, leading to a far greater
degree of eco-sensitivity than that displayed in a 'weak' position.

Progressive sections of world business are moving towards adoption of (weak) SD positions, as are governments, particularly in core nations. In Australia, for example, the process of developing a SD strategy started in July 1989 with a statement by the Prime Minister, followed by a special meeting of Australian governments in December 1989, a discussion paper in 1990, the establishment of nine working groups on SD and a final strategy document in 1992. The process has been relatively long and thorough, and reflects the willingness of governments in core nations to at least be seen to be embracing SD.

As Daly and Cobb (1989) have suggested, the popularity of the notion of SD is related to its vagueness; it is hard to disagree with something that promises so much but insists on little. SD does not require, at the weak end at least, any fundamental re-orientation of government or business activity other than the realisation of some limits to short term exploitation of natural resources and has therefore proven acceptable at a philosophical level to many conventional thinkers in organisations (see Schmidheiny, 1992). With a transition to stronger SD the requirements are greater and objections will become more significant as difficulties arise in meeting commercial (or conventional government) SD objectives. This comment is even more applicable to Fox's next stage, which requires even greater change.

Fox's third approach can fairly be called 'amiable anthropocentricism'. He suggests that 'the resource *preservation* (his emphasis) approach tends to stress the instrumental values that can be enjoyed by humans if they allow presently existing members or aspects of the non-human world to follow their own characteristic patterns of existence' (Fox 1990:5). These include information, psychological and aesthetic values (among others), and contrast with the emphasis on physical

transformation value in the other two approaches. For organisations it provides a major challenge to development of resources because it implies real brakes on transformation activities, and for biological diversity it therefore promises the greatest level of protection available within an anthropocentric approach. It will also involve a great deal of organisation learning and broad social and cultural change before it is a realistic position for a significant number of organisations.

The three 'signposts', then, indicate key points in a transition. The first describes that part of the anthropocentricism continuum where most business organisations are still operating (particularly resource extraction industries). The second indicates important elements of change towards eco-sensitivity and describes the pattern of those organisations now seeking to operate 'sustainably', whether in weak or strong form. The third requires major change and is currently out of sight for most organisations.

As earlier discussion has indicated, any transition along the continuum will involve complex change to a variety of interconnected elements in the dynamic system that makes up an organisation. An instructive view of the results of such a transition is to consider it as a change to organisation self. As an organisation becomes less anthropocentric its culture and self change.

Organisation Culture and Self: the Eco-Self

Organisations have a self, the manifestation of fundamental aspects of organisation culture in the world. According to Schein (1992:12) organisation culture is a 'pattern of shared basic assumptions', while Limerick and Cunnington define it as 'the set of beliefs, assumptions and values shared by a majority of those within an organisation' (1993:184). The notion is now well established in organisation theory where it has been applied to a range of characteristics shared by groups.

Schein's (1992:9-10) survey of the literature identifies ten: observed behavioural regularities when people interact; group norms; espoused values; formal philosophy; rules of the game (the implicit value for getting along in an organisation); climate (made up of the physical layout and the way people interact); embedded skills; mental models (habits of thinking); shared meanings; and integrating symbols (the ideas and images groups develop to characterise themselves). He then suggests that for a 'culture' to exist these elements must be integrated into large patterns that pertain to stable groups, and that this will reflect the shared learning of groups.

This list and the broad definition offered cast a wide net to which particular emphasis will be added shortly, but first I will comment on the levels at which culture manifests itself. Schein (1992:17) suggests three, arranged in a hierarchy:

Figure 9: Hierarchy of culture

Artifacts

⇓

Espoused values

⇓

Basic underlying
assumptions
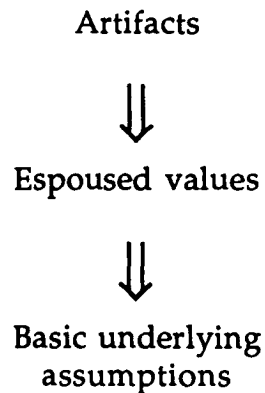
(Source: Schein 1992:17)

Artifacts are 'visible organisation structures and processes' such as architecture, dress, technology and for Schein at least, language. Espoused values include strategies, goals and philosophies. Basic underlying assumptions are taken for granted assumptions that guide individual behaviour. Each layer is successively less visible than that above it, with deeper layers hardest to change. For moves towards eco-centric management this suggests major difficulties because anthropocentricism and growth orientation are at the deepest of the three levels.

Culture is passed on to new members of an organisation over time, not only in the learning of values and procedures and in formal induction programs but also by more subtle revelations yielded as people become recognised members of the organisation. Newly hired workers observe artifacts such as architecture, technology and style of clothing. They are told about the 'espoused values' of the organisation, they gradually become aware of the basic assumptions that guide behaviour, and their world view gradually alters to become consistent with them. Such notions are both implicit and powerful, the deep layer of culture that forms the core of organisation self. This will normally be related to a

broader culture (for example American or Japanese) but will have a particular 'twist' relevant to the organisation in question. Thus organisation members share ideas about such things as rewards and punishments, about teamwork, about quality of work and about power and influence that are broadly consistent with a wider culture. Despite this particular organisation cultures may differ markedly in detail. For example, one computer company may be status-conscious and reward individuals, another may be basically egalitarian and reward teams, but both will be consistent with ideas about financial rewards for effort, high quality of work, commitment to organisation growth and broad economic development.

Whilst a somewhat amorphous concept, the notion of group culture is useful, indicating a reality of shared learning and assumptions in stable groups and organisations. Stable goal directed groups possess cultures that are also readily divisible into levels. For this exercise, however, some important variations on the mainstream that Schein represents can be offered.

The first is to slightly but significantly re-cast the three level hierarchy. The insight that there are varying degrees of visibility to different 'layers' of culture is correct, but it is a more accurate reflection of the situation to depict them in systemic form:

Figure 10: Culture in systemic form
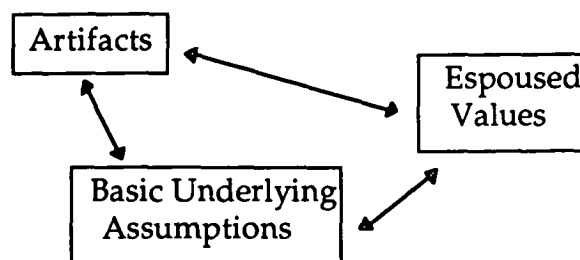
Underlying assumptions remain at a deeper level than espoused values or artifacts but it is important to emphasise that they can effect and are affected by both.

The second is to identify 'organisation self' as a related but separate concept to culture. This is the social manifestation of culture, made up of the views the organisation members have of it (and themselves within it). Internally this is affected most by the espoused values level as individuals examine strategies and practices, organisation mission and 'up-front' assumptions about how the organisation should behave. Externally (as will be discussed shortly), this is affected by the view taken by 'local' society and presentation by media of the activities of the organisation.

Thirdly, and perhaps most significantly, the view taken in this discussion is that the key to understanding how culture and self develop is the 'language' used within the organisation. Assistance in understanding how this works comes with an adaptation by Krogh, Roos and Slocum (1994) of the autopoietic theory outlined in the introduction to part B of this discussion. Their aim is to move strategic management - and management writing generally - into the post-modern world, using perceptions similar to, but a vocabulary varying from, writers in the European hermeneutics discourse (see for example Habermas [1984, 1985, 1992] and also use of autopoietic theory in management by Morgan [1986]). Of particular interest in this tradition is the emphasis on 'language' as a way to understand several processes.

The Krogh, Roos and Slocum autopoiesis lens suggests that the components of an autopoietic system are used to produce new components; in Hames' (1993) terms, they are 'self-renewing'. The

autopoietic perspective also suggests that the world is created by individuals; it is not pre-given. This contrasts with the modernist cognitivist perspective which, they suggest, is directed at discovering representations of a real (given) world via the processing of information about this world.

Autopoietic theory suggests that all knowledge is dependent on the Manager and varies with the point of observation. Knowledge allows the Manager to make 'distinctions' between things (for example between a strategy and a finance book or between different types of marshland) and on the basis of 'norms' determine what it is they see (for example, is it a good or bad book; is it fragile or resistant marshland?).

The theory also distinguishes between data, information and knowledge. Data are elements of potential information, so books, lectures and memos are data that become information through a process of interpretation. In this state it is a source of organisation knowledge.

Data can be 'latent', in which case it is unclear, requiring extensive discussion for a manager to turn it into information, or be 'manifest', in which case it is clear and can easily be converted into information (Krogh, Roos and Slocum 1994:60).

Within an organisation 'knowledge' of the organisation is shared knowledge among organisational members (1994: 60). It allows for members to share 'distinction making' about situations both internal and external to the organisation. Knowledge is also 'scalable' in the sense that managers can move up or down a 'distinction tree' containing knowledge of different levels of generality (1994: 60).

Such knowledge is also connected to an organisation's history which logically reflects the collective understanding of members over time and is fundamental to organisation culture.

A key to understanding how such knowledge develops is what Krogh, Roos and Slocum call ' languaging', the process by which language is not only maintained but is constantly being developed on the basis of previous knowledge, adding new distinctions and refining them. This is a critical point in their autopoietic perspective, one which presents the organisation as (following Habermas), a communicative network. New knowledge structures evolve with new experiences as members develop shared understandings of these experiences.

For knowledge to develop in organisations 'relationships' between individuals must be available so that communication takes place, and these can be formal in the sense of structurally conditioned, or informal. A 'self-description' (self) of the organisation is also part of the system, and for Krogh, Roos and Slocum it is an identity 'which provides criteria for selecting what passes for knowledge [and will] include business ideas, mission statements, strategy documents, vision statements, management principles, guiding values...' (1994:62), a definition wider than but consistent with that offered earlier.

At this point the connection to Schein's 'basic underlying assumption' is obvious and my conclusion that re-orientation of organisation world views based on modernist notions of unfettered growth and extreme anthropocentricism is powerfully supported.

Such change is easiest with some major crisis or series of crises that lead to questioning (or in Schein's terms 'unfreezing') of world views. Major environmental disasters such as Bhopal and Chernobyl provide examples that can be seized upon to effect change in large organisations. Changed culture, however, would not be an inevitable outcome of disaster since it merely presents an *opportunity* for a leader or group to 'move' an organisation. The disaster must be defined as significant by members of the organisation before this will occur. Even in cases of broad social definition of disasters this may not be the case within an organisation. As autopoietic theory suggests, the self renewing self referential aspect of organisations makes it difficult for such ideas to become established.

Whilst autopoietic theory suggests why it is difficult to establish changes in culture it also explains how they may take place. A new eco-sensitivity will first be present in the form of latent data and require significant languaging before conversion into information, then knowledge. Organisations with the most efficient communication systems therefore have the greatest capacity to change. In them new sets of distinctions may develop that allow for analysis of the natural world, as well as new norms about eco-sensitivity, fostering further developments in knowledge. Thus an 'eco-self' can develop gradually, core values alter gradually, with new organisation practices resulting. A disaster may hasten the process but is not essential.

The emphasis on language in this analysis reflects the 'linguistic turn' in recent philosophy, applied to policy and planning by scholars like Fischer and Forester who introduce a book of essays in the area by saying: 'What if our language does not simply mirror or picture the world but instead profoundly shapes our view of it in the first place'

(1993:1). They suggest that as policy and planning rhetoric helps shape problem selection as well as analysis, and organisation identity as well as strategy, language must therefore change before there can be any major change in approach.

Hajer (1993) extends this idea further in analysis of the influence of two coalitions which he calls 'ecological modernisation' and 'ad-hoc technocratic' in a battle over acid rain policy in Great Britain. In the discussion he introduces the idea of a discourse coalition, 'a group of actors who share an ensemble of ideas, concepts and categories' used to present a phenomenon with meaning. When the language of a discourse comes to dominate thinking in society and the way dominant institutions in that society work he describes it as a position of 'discourse institutionalisation'. With this he can explain how the ecological modernists won the battle against the ad hoc technocrats but failed to win the war because the latter continued to dominate the discourse prevailing in institutionalised policy processes.

In autopoietic terms, the ecological modernists had not altered organisation knowledge or core values. For a new eco-culture to develop - and in the acid rain case that Hajer refers to this would require a relatively modest transition towards eco-sensitivity in a government organisation - some development of language and processes of languaging are essential. Had Hajer's ecological modernists understood this their campaign would have had increased likelihood of success.

Change to language, data and knowledge may have many sources; government pressure; charged academic debate which feeds into organisations as new hires enter; changed opinion from local communities (and in the TNC 'local' means globally distributed

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regions, all with some influence); the media. This final influence deserves further analysis. In developing this point, an excursion into Meadian social psychology is useful, at the same time serving to further explain the nature of organisation self and the way it may change.

The experience of Australia's biggest organisation, BHP, provides an example of how the process of incremental change to self may operate.

BHP is popularly known as the 'big Australian' and operates a complex web of resource extraction manufacturing activities world wide in a profit/growth anthropocentric mode characteristic of modernist organisations. In 1991 when a new CEO, John Prescott, took over, the organisation was at the peak of success. It had registered a profit of $1 billion, whilst operating commercially successful gas extraction processes on the Australian North West shelf, the Ok Tedi gold and copper mine in Papua New Guinea (PNG) and the Escondia mine, which is potentially the world's biggest copper mine, in Chile.

Within five years festering discontent among PNG locals near Ok Tedi led to a $4 billion law suit being registered against the company in Melbourne; their Moura coal mine collapsed (for the third time) in Queensland, killing 11 men; their ship the 'Iron Barron' ran aground off the coast of Tasmania spilling fuel that affected fish and bird life and led to community concern. The official government commission of enquiry into the Moura incident blamed the company, while Ok Tedi has become internationally embarrassing. Every major stage of these three affairs received extensive media coverage.

The impact on the 'official line' take by BHP has been profound. They have paid for extensive colour supplements to major Australian newspapers explaining their position on Ok Tedi, have given

numerous interviews; have tried to present a new self to the world. Mr Prescott, interviewed in 1996, confessed: 'We have to make sure we're world class in everything we do, but its fair to say we have been less than world class in our community relations' (cited in Kohler, 1996:80).

Organisation self has changed incrementally, because of BHP worker and broad community views of the organisation, broadly self-reflection in Meadian terms. As the Prescott statement indicates this also has an impact on officially sanctioned organisation practices and ultimately on vision and values. Media coverage of the various disasters facing BHP provide latent data which reaches all workers who use or view mass media - and in first world countries, such as Australia, this means most people.

In one form or another, radio, free to air television, cable television, film, print media, or e-mail, it is likely that some media outlet will take up environmental news. This is not to deny 'blocking' of news that is not judged as interesting enough (including much biodiversity damage), or assessable enough (again as with much complex biodiversity news), or too challenging of powerful interests (as for example oil companies' actions in Africa). Despite such problems media reports will tend to appear, because powerful world media outlets require news to fill programs. Changes to organisation self are one result of this. This argument does not deny the force of critics of media in the modern world (see, for example, Chomsky [1989] and Herman and Chomsky [1994]) but suggests that the tendency towards impelling the reporting of newsworthy items tends to outweigh the forces of repression.

The way towards eco-self and eco-culture is also prepared by the simultaneous fraying and extension of organisation boundaries in post-industrial society. In industrial society the organisation could be seen as a finite and bounded entity, legally, socially and economically locatable in a relatively simple world. The transformation of industrial capitalism that came after the crisis of the 1970s rendered this view obsolete, and Harvey (1989) and others have pointed out that it has become impossible to draw such a boundary around organisations. The number of people in the workforce becomes problematical; do you include contractors, part-timers, short-term workers, consultants? Links with suppliers may become so permanent that they become part of an expanded organisation; as Rouleau and Clegg (1992:10) point out, they represent 'a set of highly formalised and semi-permanent, virtually permanent sub-contractual relations'. There are culturally located variations on the pattern. In Taiwan, for example, kinship relationships may take the place of contracts, but the results are the same: a basically borderless organisation. What happens when organisations are linked by a series of contracts to share supplies, markets and products? Is the modern tele-communications industry described in chapter two, one industry? Ten? It is impossible to say.

A significant implication of this is that the self of every organisation in the 'borderless world' of the global economy has spread. Suppliers, customers and competitors are included in the calculation in a far more specific way than was normal in the world of 1960s industrial capitalism. Planners are therefore familiar with the idea of an extended view and an ecologically oriented extension is made more possible because of this fundamental process of organisation learning.The idea of a spreading of organisation self suggests the essence of the less

anthropocentric organisation self. It involves a similar expansion to that which is suggested by deep ecologist Arne Naess (1989, 1993) in discussing the expansion of individual self beyond the personal or biographic to a deep identification with the natural world. As organisation values, mission and culture begin to expand to incorporate greater sensitivity to the natural world the organisation self expands to include more significant consideration of nature. This means that all elements of organisation activity are affected, so the 'eco-self' will have a pervasive impact on planning, marketing, production, structure and so on (as autopoiesis theory also suggests), and also that the eco-self will impact beyond the conventional (modernist) boundaries of the organisation.

Fundamental to the eco-self is widening the point of view of managers, which is discussed in the next section.

Holistic Thinking

A vital part of moves towards eco-centric management is the presence of holistic thinking in organisations. The basic line in holistic thinking was well summarised by Marcus Aurelius in the second century AD:

> Always think of the universe as one living organism, with a single substance and a single soul; and observe how all things are submitted to the single perceptivity of this one whole, all are moved by its single impulse, and all play their part in the causation of every event that happens. Remark the intricacy of the skein, the complexity of the web (1995:24)

Currently legitimated science ('normal' in Kuhnian terms), however, works in the reductionist framework put forward by Francis Bacon in

the sixteenth century. Knowledge is accumulated via experimentation which selects and analyses one element from a complex picture; analysis of the parts in order to build a picture of the whole. This is associated with use of linear thinking: a simplification of cause-effect relationships that enables reductionism to work by suggesting that chains of causation work only in one direction. This is, Senge (1992:74) suggests, deeply embedded in the subject-verb-object structure of western languages and is consequently difficult to shift.

Reductionism and linear thinking are also associated with Weberian instrumental rationality as used in business planning and with the single discipline/professional organisation of knowledge that is characteristic of modernism. Such disciplines develop as particular subject areas are identified and extracted from the world for further study, and techniques for study of phenomena are legitimated within disciplinary boundaries.

Taking 'the wide view' is however necessary if we are to encompass the variety of relationships in an ecosystem, more so (if that were possible) if considering the eco-system and the impact of organisation activity on eco-systems, as well as the impact of that activity on the organisation itself and its relationships with other elements of the social world. Consider a few of the many disciplinary boundaries that may be breached in analysis of a logging operation: economics (attempting to value the natural resource), botany (one scientific lens on ecosystem and impact), entomology (another lens), zoology (another), forestry (a commercial-scientific lens), production engineering (how to process logs), marketing (how, where and at what price to market the log based products), accounting (what income accrues to the organisation in

dollar values and what costs) human resources specialists (who to hire, how, what impact on human resources development); and the list could go on.

Use of many disciplines will inevitably fragment a complex reality since there is little or no chance of a coherent perspective that allows for simple authoritative answers to questions to emerge from a maelstrom of approaches. The prime considerations in a process using a variety of single disciplines may well become the relative power of the disciplinary camps rather than the question at issue.

To compound the problem well established disciplines are defined by highly developed vocabularies which allow them to describe their slice of the world. These are difficult for 'non-professionals' to understand, so meaningful communication across disciplines over common issues is either difficult or impossible.

Linear thinking and reductionism are consequently inappropriate for understanding complex issues. As discussion in chapter four suggested, there is little chance of finding a simple cause and effect relationship within an eco-system, and obvious actions will often produce non-obvious responses. Additionally, long-term consequences of actions in eco-systems are rarely simple extensions of the short term as linear patterns of thought suggest, so the conventional modernist pattern of thought fails in this respect too.

The reductionist view therefore fails to provide a reasonable perspective because it is partial; it also fails because it is associated with the idea that these parts of the world can be measured and that calculation will reveal this 'micro-complexity'. Modernist disciplines endlessly refine measures of ever smaller elements of the world,

furthering the view that the world is the sum of these measures. A prime example is 'econometrics', the mathematically based discipline that assumes that every part of the human and non-human world can be turned into numbers that can be fixed into tightly bounded models that are then used to explain issues. If such disciplines are to work the world must be simple and completely known - biodiversity is neither.

The disciplines produced through reductionism and use of linear thinking are, however, far from simple. Indeed, the sophistication of analysis and measurement is profound; they are just too narrowly focused to encompass complex issues. This criticism is fundamental but difficult to embed in the understanding of policy makers because of the very success of the scientific and technological processes that use sophisticated forms of reductionism. The development of industrial capitalism can be seen as the progress of rationality, reductionism and linear thinking. As Fischer points out, a 'systematic and disciplined approach to objectives [with] a calculus of precision and measurement to order efficiently the means to specific ends' structure not only approaches to issues but also organisations (1990:61). He goes on to link 'technocracy' and the 'technocratic disciplines [of] the managerial and policy sciences (1990:7) to the technocratic decision making which he suggests endangers the future of democratic institutions. His argument shares with the current one a common understanding that this form of thinking is deeply entrenched in society and will be difficult to change.

A Transition to Holistic Thinking?

Changes towards more holistic patterns are nevertheless important if managers are to deal sensitively with biodiversity. Gradual change is coming and elements of it are already present, as the brief tour taken through the history of systems theory in chapter two indicated and as later coverage in chapter eight will further emphasise. The hard systems theory of the 1960's emphasised certainty of knowledge, clear problems, linear problem analysis, a mechanical framework; it is contingent on the style of rational decision making that is integral to conventional modernist organisations. Soft systems theory came later and it recognises uncertain knowledge, the role of perception in shaping world view, organisation learning, and dialectical change. Cybernetic thinking is another development. It seeks to use computers to handle the problems of fast changing systems (see Cavaleri and Obloj 1993). The line of development is from limited reductionist models towards more extended models that move beyond simple reductionism in an attempt to include both more elements of the world and more of the complexity of processes within the world. The systems movement crosses disciplinary boundaries - biology, political science, economics and communication theory for example - and whilst it has never achieved its promise of the early 1970s it has altered organisation perceptions of their world. These are now presented in (closed) system form in management texts, and systems concepts such as feedback are presented (albeit simplistically) as part of the necessary perspective and conceptual armory of the manager.

Senge (1992) takes systems discourse a step further in distinguishing between detail and dynamic complexity. 'Detail complexity' is where there are many variables, for example those that feature in strategic

plans and business forecasts. For this complex systems models are required, an extension of the hard systems approach. Dynamic complexity, however, includes 'situations where cause and effects are subtle, and where the effects over time of interaction are not obvious' (1992:71). Conventional linear patterns of thought, Senge suggests, are not equipped to deal with such situations and this is a problem for organisation survival, because 'the real leverage in most management situations lies in understanding dynamic complexity not detail complexity.'

He then argues for a 'shift of mind', a change in the language of business away from the linear view towards use of system based language such as feedback and towards recognition of frequently occurring systemic structures. This represents a major shift away from reductionist thinking, and is suggested by Senge as a means towards economic rather than eco-survival. It is nevertheless a powerful shift because it paves the way for the extended thinking required if 'the wide view' is to be adopted by business organisations.

Within academic circles specifically multi disciplinary thinking has become more common in the last generation too, and can be expected to gradually feed into the knowledge base of organisations. Developments in ecology and the 'environmental sciences' are significant in this regard. The trend will continue; as Crook *et al.* (1992) point out, differentiation of knowledge and disciplines moved so far in the modernist society that we are headed towards 'de-differentiation', arguably a small step beyond issues based multi-disciplinarity. At this deep seated level then, the required change towards the style of

thinking to service a holistic perspective is coming. Within management thinking, strategic management theory, a central area, was born out of multi-disciplinary vision (see Chandler 1995).

Within business writing a further indicator that a transition towards holism is taking place comes with the 1980s development and later extensions of 'stakeholder theory'.

In American management writing - and it should be remembered that the academic discipline of management is largely an American product - the idea that firms have stakeholders other than shareholders only gained currency with Freeman's text *Strategic Management: A Stakeholder Approach* in 1984. Since then, as Donaldson and Preston point out, about a dozen books and more than 100 articles with primary emphasis on the stakeholder concept have appeared (1995:65). The assumption made in this theory is that 'all legitimate interests participating in an enterprise do so to obtain benefits and that there is no prima facie priority of one set of interests and benefits over another' (Donaldson and Preston 1995:68). With appropriate changes made for type of organisation (for-profit firm, government body, private not for-profit) and culture (in Japan for example, suppliers have more power than in the USA), the idea is applicable world-wide and it is now a basic line of thought in the field within management studies that is usually called 'business and society' (for further development of this point see Hanson, 1994b).

The theory has three bases, descriptive, instrumental and normative. In the descriptive aspect it presents 'a model of what the corporation is. It describes what the corporation is as a constellation of co-operative and competitive interests possessing intrinsic value' (Donaldson and Preston 1995:66). The instrumental aspect 'establishes a framework for

examining the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals' (Donaldson and Preston 1995:67). Jones investigated this and suggested that it provides a major basis for further research, concluding 'that behaviour that is trusting, trustworthy and co-operative, not opportunistic, will give the firm a competitive advantage' (Jones 1995:432). The normative aspect, however, is of most significance for this argument. It asserts that managers should acknowledge stakeholders and respond to them because it is a moral requirement. Donaldson and Preston (1995), prominent scholars in American business ethics, conclude that this is the 'ultimate justification' for stakeholder theory.

Connections between this and eco-management have already emerged. Stead and Stead (1992, 1995) have asserted that the earth is the 'ultimate stakeholder', a line of argument also present in Starik (1995). The argument has been well developed and represents a valuable contribution to the 'turning around' of management discourse; the more the notion of significant (or ultimate) stakeholder status for the natural world is discussed the more likely it is that it will be taken into account in management decisions. Stakeholder theory itself does not specifically prepare business organisations to consider the natural world, but it does encourage debate about, and consideration of, a wider legitimate constituency. The earth is not yet seen as an ultimate stakeholder but, as these ideas gain currency will gradually become the stakeholder that exercises persuasive influence over all other stakeholders.

Despite these promising developments (represented by Stead and Stead) this is not yet the case. Recently produced strategic management texts designed for the capstone unit in 'Strategic Management' courses in Business and Commerce degrees fail to give the natural environment a major role. In Byers, Rue and Zahra (1996), Dess and Miller (1993), David (1995), Hill and Jones (1995) and Hitt, Ireland and Hoskisson (1995) for example, the word 'environment' means 'commercial environment', and the natural world features only in very brief discussions of environmental regulations. Introductory management texts, for example Bateman and Zeithaml (1993), accord it greater prominence by allocating a chapter to environmental matters, but this is still far short of a conferral of legitimate stakeholder status.

Changes in academic management are then coming, but slowly. An eco-centric world view, however, requires more than the stakeholder perspective can deliver directly. The educative role of stakeholder theory is however a useful part of a more pervasive re-orientation towards a less anthropocentric approach. The key to re-oriented organisation activities is for all stakeholders to keep the natural world in mind. Central to this should be their view of risk, an issue discussed in the next section.

Risk

Risk is defined in the *Shorter Oxford Dictionary* as: (1) Hazard, danger, exposure to peril ... (2) The chance or hazard of commercial loss; spec. in the case of insured property of goods.' This neatly captures the essence of the concept, both the notion of 'hazard', and the commercially oriented flavour it has in industrial society. Missing is mention of the anthropocentric flavour of risk in standard discussion and policy analysis. Effectively it means 'risk for humans' - and in this discussion this is what 'risk' will mean - whilst the idea of 'risk for nature', that will be developed later, is either ignored in the literature or seen only when it affects humans.

Risk is a major topic for debate and an important concept for policy making in the global economy. Nuclear catastrophes at the Three Mile Island and Chernobyl have alerted the world community to the danger of nuclear power. Other major matters of world concern are oil spills (see Hinrichson, 1990); chemical factory explosions such as that at Bhopal have killed thousands (see Shivastrava 1992); rises in cancer rates from various causes potentially affect a broad sector of the population; problems with drinking water cause concern (see Mol and Spaargaren 1993); and the possible implications of the greenhouse effect have a broad impact (see Liggett 1990). These and many other concerns lead to Beck's idea of risk society (1990a) and to Wildavsky (1988) suggesting that the 'search for safety' is central to the modern political agenda.

Risks are, then, obviously 'out there', but the concept is more elusive than a listing of risks would suggest, as the number of risk perceptions and classification of perspectives indicates. Bradbury (1989) distinguishes only two types of risk perspectives, the social construction

and the physical. Shivastrava (1994) looks at psychological, economic and sociological perspectives. Slovic (1985, 1987) looks at perceptions of hazard types. May (1989) looks at systems, cultural and industrial perspectives. All these classifications are useful, but in the present discussion, where the intentions are to indicate the anthropocentric nature of current risk theory and describe useful insights of some of those theories for later application in discussion of risk-for-nature, a transdiciplinary approach developed from Renn (1992a, 1992b) will be used. He distinguishes a range of approaches to risk: actuarial, toxicological/epidemiological, engineering, economic, psychological, cultural, social. In this discussion the first four approaches will be grouped together as 'mechanist' because of their common assumption of a basically mechanistic, limited and controllable world.

The first of the four mechanist risk perspective categories includes those risks most obviously related to the modernist perspective. The actuarial approach assumes a straight forward problem; calculable probabilities of its occurrence and calculable consequences. It assumes stable cause-effect relationships and is the basis of the insurance system that Beck's (1992a, 1992b) analysis sees behind the approach of industrial capitalism to risk. Toxicological studies look at narrow definitions of risk for humans from chemicals via animal experiments, while epidemiological studies cast a wider net in examining differences between populations after exposure to different levels of some risk agent. Engineering approaches all assume technology can control risk.

These approaches have in common simplified models of the world and the notion that probability of harm is readily calculable using fairly simple statistical procedures. The question of how and what 'risks' will

be selected is left unexamined, a point that the psychological/cultural theories take up.

A second set of technical perspectives includes economic (including financial approaches). The economic approach is part of utility theory, applying probability theory to the standard 'economic man' who is free to operate in a (tightly modelled) unconstrained market. As the following summary of the economic approach to 'risk' from a best selling first year university economics text implies, whilst it may have a limited application in some very clearly defined problems, it fails to encompass the complexity of either the human or the natural worlds:

> Uncertain outcomes are described using a frequency distribution that lists all the possible outcomes and attaches probabilities to them. Attitudes toward uncertain outcomes are measured as a degree of risk aversion based on the rate at which a person's marginal utility of wealth diminishes, more risk-averse people having more rapidly diminishing marginal utility. Information is valuable because it decreases risk and it pays to use scarce resources to generate and disseminate information. Because information is valuable it pays firms to provide information to consumers at a cost. They do this by advertising. The type of advertising - type of information conveyed - depends on the nature of the good (McTaggert, Findlay and Parkin 1992: 435).

The underlying economic assumptions of rational actors in a certain world who seek to maximise utility provide obvious limitations to this approach. It fails because this does not reflect human reality, just as it fails to encompass the complexity or value of the natural world, with an allied assumption that nature is there to be exploited (see Clarke 1989 for a full criticism of economic approaches to risk).

Financial approaches are directed at facilitating institutional control over the possibility of financial losses. Calculations of different financial risks become extremely complex as they attempt to handle the complexity of the market (see Felmingham and Coleman, 1995, Chapter 20). The approach is very narrow in orientation though, measuring few

human problems and almost no environmental problems, necessarily so because few such problems are clearly defined in the market place, much less defined in calculable financial terms. Nevertheless, in a capitalist economy a financial risk bias is a ruling feature of business organisations, and an element of this will remain in organisations directed at (financial) profit.

The broad category of psychological approaches to risk concentrates on the cognitive approaches of individuals in defining risk, often investigating the way different individuals in different social positions define risk. Fischoff *et al.* (1981) and Slovic (1987) follow this line, Slovic using psychometric measures of risk perception to discuss risk. The key idea in this work is that risk perceptions differ between individuals: there are assumed to be risks 'out there' but, for example, lay people and experts see them differently.

Renn (1992a:65), after analysis of the psychological literature, summarises the contextual variables that affect perceived seriousness of risk. The first is expected number of fatalities, but this shows a weak correlation with 'perceived riskiness of technology' (1992a:65). The second is the potential for catastrophe, with low probability/high consequence risks perceived as more threatening than more probable/low-medium consequence risks. The third is a group of 'qualitative risk characteristics' including the conviction of control over consequences, familiarity with the risk and perception of dread with respect to consequences (which has a great affect on the perceived risks of nuclear power generation). The final set of variables includes those associated with beliefs about the cause of the risk, and the suggestion is

that risk beliefs are 'often part of an attitude that a person holds about the cause of the risk, that is, a technology, human activity, or natural event' (1992a:65).

The psychological approach offers the insight that perception varies, and related research into the impact of perception of consequences and dread is useful for the environmental debate because it suggests part of the reason for limited perception of environmental problems. They are, with the exemption of some high profile high consequence risks, such as ozone depletion and global warming, low (human consequence) and without any (human) dread. Psychological theories, however, suffer from their focus on the individual, since ignoring the cultural and social levels ignores group processes, group variations and aggregated perceptions, and therefore ignores the very stuff of policy making.

Cultural theory extends risk theory, suggesting that there is little connection between risk and an observable 'real' world. Douglas and Wildavsky (1982) suggest that risk perception is a social process, pointing out that we consent to some risks but not to others and that this bias is socially organised. They quote with approval Fischoff *et al.*:

> Values and uncertainties are an integral part of every acceptable risk problem. As a result there are no value-free processes for choosing between risky alternatives. The search for an 'objective method' is doomed to failure and may blind the searchers to the value laden assumptions they are making (cited in Douglas and Wildavsky 1982:4).

The emphasis here on the role of values and political process in risk recognition and aversion strategies is characteristic of cultural theory.

Schwarz and Thompson (1990) also look at cultural influences on risk definitions. The perspective they develop allows Thompson (1995) to explain how individuals in different positions develop different sets of certainties about an issue. Discussing environmental degradation in the

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Himalayan region he points out that it has generally been seen as the result of ongoing deforestation, which leads to landslides and downstream flooding as the land loses the capacity to hold surface water, with humans in pursuit of agricultural land and fuel therefore seen to be at fault. Thompson (1995:29) argues that this 'certainty' has directed decades of policy in the region, but is simply wrong. Investigating further, he identifies four different (ideal typical) definitions of the problem, each characterised by a particular view of nature. 'Hill farmers' see as many problems as there are localities in the Himalayas, see nature as capricious, and believe that solutions will only work if negotiated with locals. Their 'myth of nature' is fatalistic. The UN Food and Agriculture Organisation (FAO) sees the problem as a general one, serious but soluble with the help of established experts. Their myth is of nature as perverse/tolerant. The 'individualist' sees the problem as not too serious and will quickly be resolved if market distortions are removed. Their myth is that of nature as benign. The Deep Ecologist position is that the problem is irredeemably serious, and that both markets and FAO style hierarchies are part of the problem. Their myth is of nature as ephemeral. Thompson's argument with respect to policy is an extension of this. He suggests that a plurality of approaches is required to solve the problem since each has something to offer. We will return to this later in the discussion.

Overall the contribution of cultural theory is to point out the cultural structures of perception of risk. Thompson's view of the FAO is of particular interest. Generalising, he suggests that '... those who are in the business of control tend whenever possible to see things in a way that renders these things as susceptible to control inherently fixable by those with the relevant knowledge and organisation' (1995:30).

A broader lens than that of cultural theory is provided by Beck (1992a, 1992b) and Giddens (1990, 1991) who put risk at the core of the analysis of 'reflexive modernity'. The basic ideas of this transition have already been presented: within risk society risks are an inevitable part of the broad pattern of change; they multiply and they cut across social divisions, affecting all. Beck suggests that modernist society deals with risks via insurance which 'goes back to the beginning of inter-continental navigation, but with the growth of industrial capitalism... was continually perfected and expanded into nearly all problem areas of social action' (1992b:99). This 'calculus of risks connects the physical, ... and the social sciences [and] can be applied to completely disparate phenomena not only in health management but also to economic risks, risks of old age, risks of unemployment, risks of traffic accidents ....'. In sum, modernity, which brings uncertainty to every niche of existence, finds its counter-principle in a social compact against industrially produced hazards and damages, stitched together out of public and private insurance agreements' (1992b:99-100). This whole process rests on four pillars, 'each of which is abolished by nuclear, chemical, genetic and ecological eco-hazards'.

> First one is concerned here with global, often irreparable damage that can no longer be limited, the concept of monetary compensation therefore fails. Second precautionary after-care is excluded for the worst imaginable accident in the case of fatal hazards; the security concept of anticipatory monitoring of results fails. Third, the 'accident' loses its delimitations in time and space, and therefore its meaning. It becomes an event with a beginning and no end; an 'open-ended festival' of creeping, galloping and overlapping waves of destruction. But that implies: standards of normality, measuring procedures and therefore the basis for calculating the hazards are abolished; incomparable entities are compared and calculation turns into obfuscation (Beck 1992a:102).

Beck's summation of the modernist industrial/commercial approach is useful. It is, he suggests, based on insurance, on the notion of limited damage, on a limited notion of accident (something outside of systemic control), on measuring procedures and calculation of hazards. In social

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construction terms it is a control system suited for a limited world and a pliant population. A financial bias to risk definition is the ruling notion. Managers assume that almost all risks are financial, either directly (as for example in market behaviour) or indirectly (as for example in negligence suits). Shivastrava extends this critique, suggesting that: "This mindset ignores the numerous ecological, technological and health risks emanating from industrial hazards...' (1995:126).
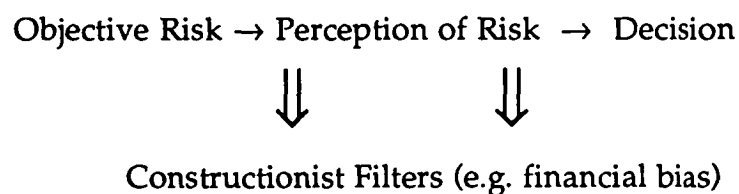
Whilst the direction of criticism in this position is reasonable, the situation is actually more complicated. Within industrial society an official response has usually been required to public concern about a broad range of risks including such things as the risks to humans from nuclear power generation, risks from disposals of hazardous wastes, risks from ozone depletion and the carcigenous properties of some (out of many possible) industrial processes. The response has been (as Beck indeed suggests) to focus on technical factors and an attempt to develop standard scientific information that quantifies risks from particular activities, setting a level of 'acceptable' risk (see Schwarz and Thompson 1990:103-20; Fischer 1993:100-103) This orientation is 'mechanist' and closest in orientation to the 'can-do' mind-set off engineering. Within the USA the Environmental Protection Agency manages environmental policy issues in this way, supplying technological data that allows a limited framing of problems that satisfies the requirements of normal science. Within Australia various state environmental agencies follow the same pattern using management regulations based on quantitative measurements of risk. As the debate about the Wesley Vale pulp mill in Tasmania demonstrated in the late 1980s, this is a powerful bias. In the latter case protracted public debate and a bitter political struggle was resolved only

after recourse to scientifically credible (although still problematic) measurements of the likely environmental impact of the proposed mill project by the CSIRO.

What emerges from this analysis of three levels of approach to risk? The first thing is the anthropocentric core of the idea. It is 'risk for humans', and even in the natural environmental crisis driven analysis of Beck and Giddens this orientation remains, as they focus discussion on the wider risks to humans of various problems. The common bias in all theories then, is towards the world of humans, to the total exclusion of concern for risk of damage to nature as nature, rather than as human-useful nature.

The second is that, whatever the 'level' of analysis, risk is socially mediated and, consequently, so are decisions. At a general level the model that operates looks like this:

Figure 11: Risk model

Objective Risk → Perception of Risk → Decision

⇓ ⇓

Constructionist Filters (e.g. financial bias)

There are therefore no objective methods for selecting between risks; people pay attention to some and ignore others and, as Thompson argues, the social position of the person defining the problem will alter problem definition, risk assessment and policy. As Beck and Giddens indicate, there is widespread anxiety about the 'high consequence' (usually macro-level environmental) risks of modernity, and a multiplication of risks that are present but still hidden from all human

perception. At the meso level, however, business organisations operating from standpoints of unrestrained or only partially altered anthropocentricism continue to operate with a financial bias in risk analysis (their filter), remaining confident that sophisticated financial and legal instruments can contain the hazards that impact on organisation performance. Beck may be right in suggesting that the 'pillars of the calculus of risk' have been abandoned at the macro level, but at the meso level the processes of insurance and tort law together with vague government regulations allow organisation activity to continue despite 'risks' in areas such as consumer safety, worker compensation, and product development.

The distinction between risk and uncertainty, whilst not pursued so far in discussion, is worth mentioning at this point. Knight (1921) offered the classic distinction. Certainty is when you know for sure what is going to happen. Risk is when you don't know for sure but know the odds. Uncertainty is when you don't even know the odds. Our discussion suggests that certainty rarely exists (Douglas and Wildavsky 1982:3, suggest on this: 'What would be needed to make us understand the risks that we face? Nothing short of total knowledge [a mad answer to an impossible question]'). Risk and uncertainty, on the other hand, are ever-present, but the precise understandings required for a distinction between the two are rarely (if ever) present.

The inherent uncertainty in scientific research, simple lack of this research and the hidden and/or delayed nature of human impact on the natural world contribute to this problem. As well, information overload may inhibit analysis (even though the information is poor this is important), people and organisations often out of self interest or

protocol necessity rather that as a result of calculation or considered judgment, and even when a reasonable level of information exists it may not be communicable.

Decisions are nevertheless taken with, as Thompson's (1995) Himalayan analysis suggests, contradictory certainties about problems. This does not mean that the 'real' situation is revealed, merely that some, for varying reasons, assumptions are made about problem definition and information areas required by policy makers (such as, in his analysis of the FAO).

Organisations which seek to operate eco-sensitively will ultimately need to operate with a non-anthropocentric stance towards risk, using the concept of risk-for-nature.

Risk for Nature

Risk-for-nature (RFN) means the risk of harm to nature directly and/or indirectly, in the short and/or long term. It encompasses the potential harm to nature (and biodiversity) of human action and its measurement represents an end towards which eco-sensitive organisations should strive.

At the global level RFNs are clearly multiplying with the advance of industrial capitalism and the resultant 'high consequence risks'. At the organisational (local) level the degree of deliberate or conscious damage to nature will vary according to the extent of development of organisation self and movement along the continuum of anthropocentricism. At the resource exploitation end there will be no

concern over any damage to nature, at the other, the 'amiable anthropocentricism' extreme, there will be considerable concern. As organisations strive to move through this continuum and become more eco-sensitive they will need to deal with limitations on their capacity to act appropriately.

Such limitations occur at all three levels. The first has already been suggested - a modernist (basically financial) bias ignores RFN. The strength of this limitation is emphasised by use of the insights of cultural theory - managers will tend to see nature as there to be used, and damage as an inevitable part of the process of producing profit. Given the technocratic orientation associated with this stance any problems are fixable, but in any case, given a resource exploitation stance, these problems will not be problems of nature, but problems that affect humans.

The second limitation applies with organisations further along the anthropocentric continuum. There may be an official intention to take RFN into account in decision making, but this is likely to be both limited in intensity (the extent to which it is regarded as important within the organisation) and scope (appreciation of the number and type of RFN). Managers will be hampered by a lack of organisation knowledge (in the autopoietic sense). Data, or more specifically latent data in the form of scientific information, may be sought, but it is unlikely to become part of knowledge. The gulf between scientific and commercial vocabularies and understandings is such that knowledge building will be slow and understandings that become part of the organisation core few in number because all but the most eco-sensitive organisations simply do not have the capacity to incorporate complex

notions of RFN into their core of meaning. This is because they lack the communication capacity and the vocabulary (distinctions) as well as the willingness and skill required to change.

The third limitation affects those 'aware' organisations, those which have advanced beyond unwillingness to bother with RFN and incapacity to understand the idea and appreciate that it entails matters of considerable complexity. Reasonable appreciation of RFN requires a level of understanding of eco-systems, biodiversity and the complexity inherent in assessment of human impact on nature that is not yet available. Science is an unreliable ally to the eco-sensitive organisation.

In order to further develop this analysis a basic view of the relationship between the totality of nature, total RFN, scientific knowledge and organisation knowledge is represented in the following figure:

Figure 12: Risk-for-Nature, scientific knowledge and organisation activity

Total
Organisation
ctivity
(4)

Total
Risk for
Nature
(2)

Total Scientific
Knowledge of
Risk-for-Nature
(3)

(1)
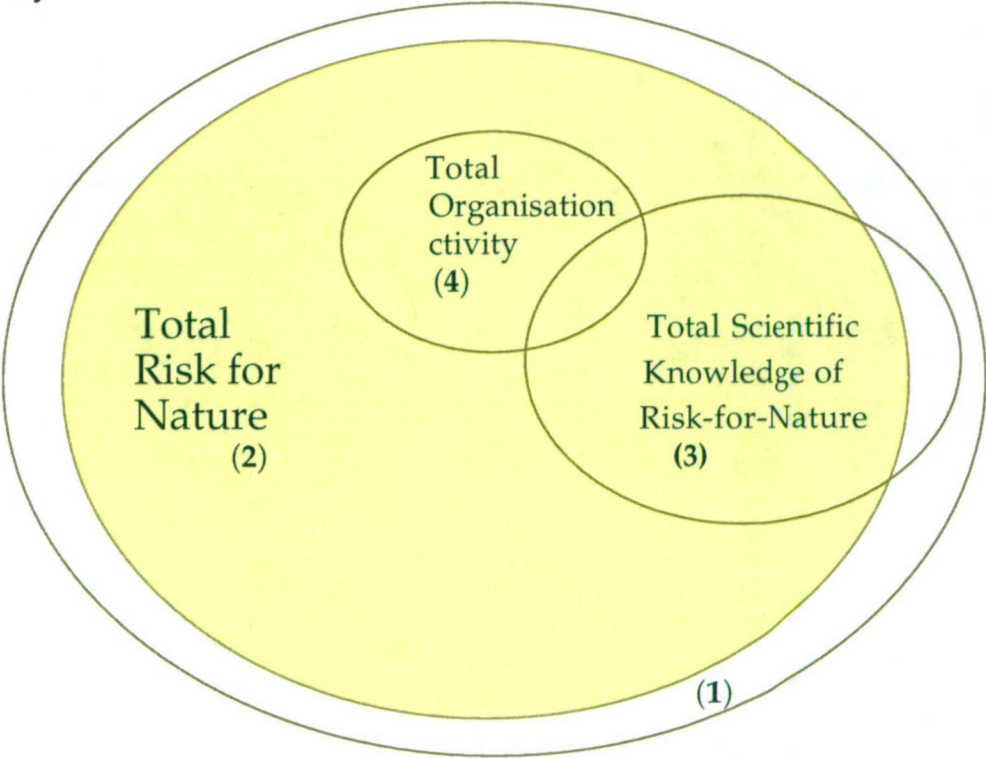
The figure presents the totality of nature in the largest oval (1). The next oval (2) represents the sum of all human impact on nature, hence 'real RFN', that is the sum of all current impacts by humans on nature. Developing McKibben (1990), the suggestion is that, given uncertain knowledge, we cannot know that all nature has been altered by humans, but that it is likely that either all or almost all has been, hence the close proximity of these two circles. The third oval (3) represents the totality of human scientific knowledge about RFN, a zone where, with varying degrees of confidence, scientists claim to understand aspects of human impact. This circle overlaps total human impact and extends slightly into 'total nature' as a reflection of the assumption of imperfect knowledge - logically there may be some scientific 'knowledge' about RFN that is incorrect. Oval four (4 in the diagram) represents the extent of impact on nature of any one organisation. It is represented as varying from the greater scope covered by scientific knowledge, reflecting the fact that organisations often operate without any idea of impact and that organisation knowledge (in the autopoietic sense) will always be less than scientific knowledge.

Obviously knowledge that feeds perceived RFN can only grow after human interest in an issue has developed. We tend to know far more about elements of biodiversity after significant impact than before, both for this 'stimulating interest' reason and because of the lag between it and the development of scientific knowledge. The relationships in this pattern can be presented in the form of a decay curve relating time and 'environmental integrity', a notion defined by the extent of 'untouched nature' evident in any definable segment of the natural world.

Figure 13: Knowledge acquisition and decline in environmental integrity
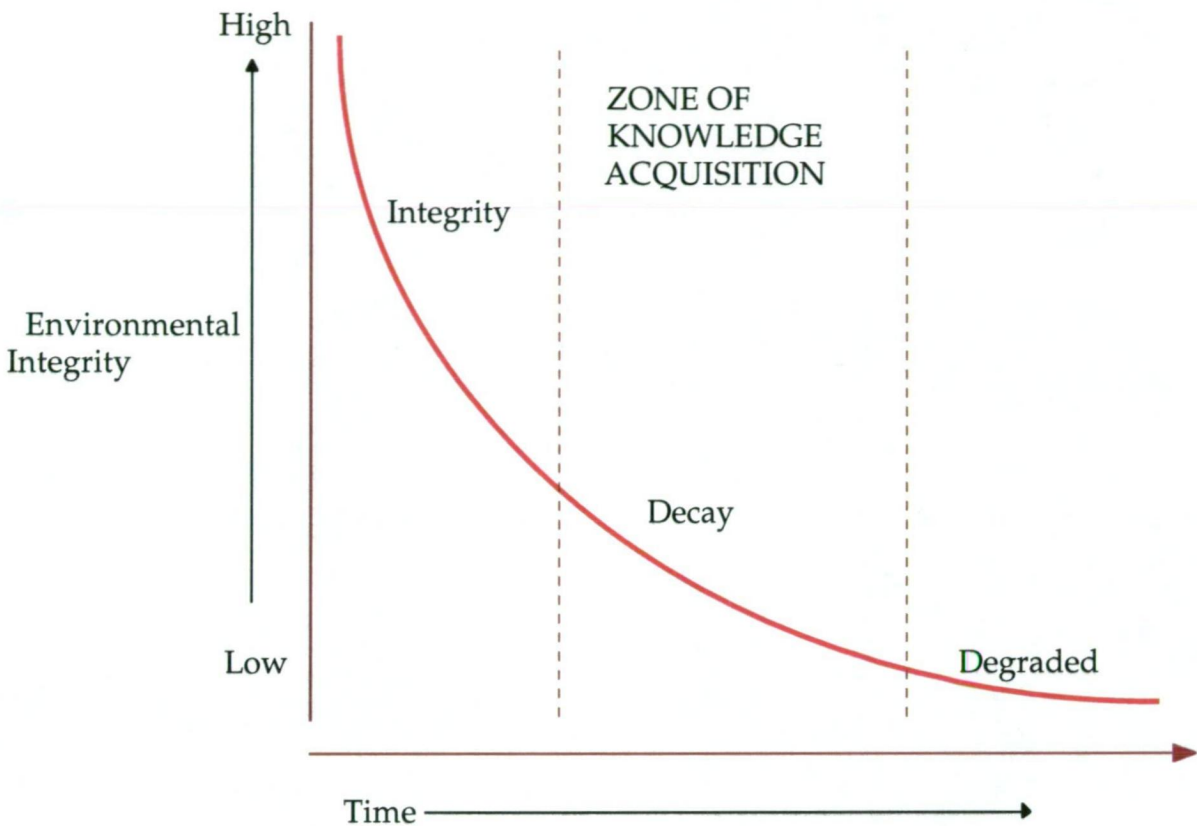
The contention again is that there is little or no pure nature left and that with the passing of time the integrity of any identifiable element of (or extent of fit with the notion of untouched wilderness) will decline. Scientific knowledge will tend to develop only after a significant decline in this integrity, fed by increased appreciation of research problems and the capacity to fund the research effort. An obvious implication of this is that we know more about that which we have almost lost than that which we have not touched. The zone of knowledge acquisition tends to focus on a point where integrity is denatured to the extent that 'wilderness' has vanished and people have become concerned. RFN is

integrated after risks for humans (for example risk of loss of amenity) are perceived.

What does this suggest for organisations and biodiversity? Changes to organisational approaches to RFN are of obvious importance in the development of an eco-self, as some risk approach is fundamental to the sensitivity with which developments which involve RFN are approached. Holistic thinking is part of this too, since it provides the framework within which a new approach to risk is placed. Risk is a fundamental part of a total view of the organisation within the social and natural worlds. This provides background to analysis of additional factors associated with the transition to eco-sensitive assessments of RFN.

The first of these is a move away from the dominance of financial approaches to RFN. If the bias is financial then the decisions are too; the concentration is on money profits in the short term, and the analysis is of ways to control monetary risk. Within this view sophisticated accounting systems and calculations of such things as bond rates and future market operations predominate. For example, a decision may be taken to destroy an area of mangrove swamp in order to erect a marina because sale of moorings will provide a boost to annual income, while the construction uses up cash resources that are doing badly in the short term money market. Damage to the mangrove system and the long and short term consequences of this are ignored. An unreservedly eco-centric approach would eliminate all financial consideration from risk calculation, but given the continuance of profit-seeking capitalist activity some element of a financial bias will remain: Fox's (1990) stages of anthropocentricism are useful in explaining this. With movements from unrestrained exploitation and expansionism through resource

conservation and development and towards what was earlier called amiable anthropocentricism there is a steady increase in the influence of an eco-bias (towards protection of biodiversity). This is a balancing bias that tempers the financial bias of organisations that leads to actions that harm biodiversity. In the mangrove example, an exploitative company would proceed irrespective of RFN so long as profits were sufficiently likely, whilst a resource conservation company would at least hesitate because the impact on nature could mean the loss of long term possibilities for other human uses, and the amiably anthropocentric company would not proceed because their expanded eco-self would suggest that obvious damage in the short term, with many possible long term consequences to the eco-system, could not be justified for profit. Such a company would seek a project elsewhere.

This suggests the second factor in a new approach to RFN, a redefinition of 'decisive action'. Discussion so far has indicated that organisations will be gradually less willing to act in ways that may harm biodiversity, effectively moving towards an informed usage of the 'precautionary principle' advocated by the UK Royal Commission on Environmental Pollution (Newsom 1992:28) and advocated in Germany as the Vorsorgenprinzip. This means less obviously decisive decision makers in that they avoid development decisions or prevaricate awaiting further information or new insights.

A difficulty in achieving this comes with the fact that decision makers in the fast changing and complex world economy are rewarded for speedy decision making, and as Wally and Baum (1994) and Hitt and Tyler (1991) argue, speedy decision makers are highly tolerant of risk and have a strong propensity to act. They are also rewarded with promotion in business organisations. This will not change while the

requirements for flexible responses to a fast changing business environment remain, consequently the understanding of what constitutes decisive action must change. Avoiding developments must be seen as decisive in some circumstances, a low tolerance of RFN as a positive feature. Such changes will develop as the eco-self develops for organisations and holistic thinking and longer term time frames are used in planning.

A third factor is the usage by decision makers of the insights of the social constructionists. Given the understanding that there are conflicting certainties when it is assumed that knowledge is present, the risk averse decision maker will seek out and make use of these different perspectives. Thompson's (1995) analysis of deforestation suggested using all four of the perspectives identified. Similarly, evaluation of our hypothetic mangrove development could involve organisation planners, local residents, ecologists and fisher people. Fischer (1993) makes a related point when discussing a 'participatory approach' to risk assessment. Having criticised technical knowledge as a poor response to the new ways of looking at risk he suggests that 'lay persons' be integrated with experts in 'the much needed discourse' on risks (1993:106). O'Riordan and Rayner (1991) call this 'vernacular science', in which 'moral preferences, public consciousness, and trust in participatory decision procedures' have important roles.

The constructionist perspective yields a wider range of participants - including as many different 'expert' views as possible - and, as presented in the current discussion, applies it (in contrast to Fischer, 1993) at the organisation rather than macro level. This is a difference in emphasis rather than a clear distinction, given that important decisions will involve government and the public as well as the organisation, but

is nonetheless significant since it indicates that change within the knowledge base of the organisation is required.

In terms of the autopoietic analysis presented earlier this is a major change to core beliefs but, given association with the development of eco-self, it is one that is already under way in many organisations. A further significant factor in establishing the new approach to RFN is suggested by the autopoietic lens. Knowledge growth involves new distinctions, additional data and the process of languaging. Understanding of RFN will require that many more 'distinctions' be established and knowledge added to the organisation core. This will be facilitated by the presence of scientific gatekeepers within the organisation charged with the task of increasing the amount and meaningfulness of scientific data entering and being communicated. The key is the communicability of this data and this suggests that such gatekeepers should be employed as much for their ability to communicate science as for specific scientific abilities. It also suggests that they be multi-disciplinary and open to ideas, since RFN issues may involve a variety of modernist disciplines.

The role of scientific gatekeepers is already clear in the literature on technology and innovation, where standard advice to organisations which want to innovate is to employ technology gatekeepers who present communicable data about changes in science and technology to organisations (Carlopio 1994). The RFN (or more widely, biodiversity issues) gatekeepers would occupy similar positions, with the capacity for organisation cultures to adapt to their role increased by the present acceptance of technology gatekeepers.

Such gatekeepers would ideally be multi-disciplinary with knowledge of both ecological economics and the precesses of 'new science', matters dealt with in the next chapter.

CHAPTER SIX

NEW SCIENCE AND ECO-SENSITIVE ECONOMICS

The broad disciplines of science and economics are vital to organisation world view, science (in particular natural science) because it represents legitimated knowledge about the natural world, and economics because it represents the language of power, a vocabulary and way of thinking that structures business and government dealings with the natural world. For eco-sensitive managers both a new science and a new economics are necessary tools, and as the discussion will indicate, transitions from old to new are already underway.

New Science

Discussion of RFN has already indicated that what has been called 'science' is fundamental to directing the activities of eco-sensitive organisations. The fundamental point is a simple one: those who act in the world need to understand what they are doing, and biodiversity understanding is basically scientific, mostly coming from the 'natural sciences' that seek to understand the world of living things.

It has already been suggested that science be communicated (hence communicable) within business organisations, and that there be an emphasis on multi-disciplinary work in order that the complex

interaction between ecology and organisations be understood. In earlier discussion too, it was suggested that 'big science' is contracting in accordance with the gradual drop in funding from the declining corporatist state. Along with this there has arguably been a failure of the 'grand design' to control nature which started in the seventeenth century with Francis Bacon and reached its peak with the lunar landing program of the 1960s and 70s. As Beck (1992a, 1992b) and Giddens (1990, 1991) point out, control over nature has slipped and control over damage to nature has risen as a focus. This has been assisted by a loss of public faith in normal science which, whilst still greatly respected, has slipped from the height of public regard within core nations in generations born since the second world war.

Crook *et al.* (1992) place these changes in the context of the broad process of post modernisation. On the suggestion that funding restrictions on research are leading to control of science by corporations and governments they comment:

> Far more plausible is the image of decentred and transitional science in which the level of the nation-state becomes less and less relevant. Hyperdifferentiation corrodes the disciplinary structure that underpins modern science. As research fronts proliferate disciplines fragment, and for researchers in particular fields communication across disciplinary boundaries may become more important than communication within a discipline (1992:41).

Their conclusions are persuasively argued and important for this argument, given that they suggest transitions in science useful for preserving biodiversity that are driven by forces more fundamental than organisation intention, government coercion or public pressure.

This analysis does not suggest that expert knowledge becomes less important within post-modern society. It becomes more important in providing answers to significant questions thrown up by the success of technology and the onrush of the (now flawed) grand design. The modernist project of rational control continues to exert strong influence both in research and as provider of the basic vocabulary and understandings that legitimate business organisation and government activity. The trend is, however, away from the edifice of big science (and, as we will see in the next section, neo-classical economics) and this provides further opportunities for favourable developments in the quest for eco-centric management.

The issue is not whether there will be a 'new science', or whether it will be autonomous in the modernist tradition, but 'the manner in which science will dissolve into and transform other economies and discourses...' (Crook *et al.* 1992:218). The way is open for an optimistic ethical eco-centric 'science' to develop, and for new ways to use this science in policy making. The term 'new science' is used to describe the processes required for preservation of biodiversity instead of available similar terms in the literature, in particular 'post-science' (Crook *et al.* 1992), 'post-normal science' (Funtowicz and Ravetz 1993), and 'vernacular science' (O'Riordan and Rayner 1991, O'Riordan 1991b) because it borrows from all without reflecting any one exactly. In particular 'new science', as presented in this discussion, is focused on meso level issues rather than reflecting the macro level bias of the identified alternatives.

Such a science is 'optimistic' in the sense of Boulding's influence optimism (1979). It comprises a body of knowledge and groups of researchers explicitly directed at furthering better outcomes in the world. This does not mean that the normal science tradition of curiosity-driven research is abandoned - Huizinga's (1968) analysis of humanity as 'homo ludens' rather than 'homo faber' suggests

this is too deep seated to replace in any case - but rather that it is married with policy relevance. As management of organisations (and governments) becomes more eco-centric more of this research will be directed at issues that have little or nothing to do with direct human benefit. In terms of the decay curve described in discussion of RFN, research interest extends further up, sensitively investigating before human impact has a great impact on the integrity of nature.

It has already been suggested, too, that new science be communicable, a point fundamental to the 'scientific gatekeeper' role, suggested as part of the handling of RFN. This implies that new science needs to be expressed in understandable - albeit necessarily sophisticated - language. Since 'experts' and consequently the boundaries of disciplinary expertise will continue to be influential even as they are broken down in the processes of post-modernisation, an achievable process is to produce parallel texts for policy relevant science rather than strive for an entirely new approach to reporting. One text would be conventionally scientific, and probably relatively inaccessible to all but fellow researchers, the other directed at scientifically literate but non-specialist users. But the insistence should be that both texts be produced.

The parallel text should thus be at a level that a sophisticated reader could understand, someone with the vocabulary common to those who have achieved a grade twelve education standard in the subjects common to core-world oriented education systems. This suggests reasonable understanding of mathematics and basic science as well as reading and analysis skills. In the Ok Tedi case described earlier this means that educated local villagers would be able to gain access to relevant scientific understandings and communicate these

to their fellows, and for issues arising in the core world it means that either a majority or significant minority of local people affected by a development would be able to understand and take part in debate.

Communication of scientific findings through use of parallel texts will also expand organisational knowledge of specific issues because it facilitates languaging and the development of new distinctions that feed the eco-self.

The impact of parallel texts will become far greater as the power of information technology to store and deliver information to a wider community of scientists, organisations and stakeholders increases. All policy relevant information - in both 'texts' - can potentially be stored and accessed world wide through internet technology, thus providing a store of data that can serve to inform any development proposal. In order to be successful this data would need to be organised according to clearly understood international protocols, and the development of these through committees of scientists and citizens at an initial stage in the process. At the same time there must be a willingness on the part of organisations to use such information, which would grow as eco-sensitivity increases and the boundaries of organisational knowledge expand.

These are significant changes but will be helped by continuing developments in communication technology, and as eco-sensitivity further develops, by increasing numbers of scientific gatekeepers.

These changes will not occur immediately since major alterations to the current practice of normal science is involved. As Yearly (1992:519) and Gilbert and Mulkay (1984) point out, science is not intended for use by consumers but by other workers in the same scientific discipline, and more importantly by those working on the same or similar problems within the discipline. Crook *et al.*

(1992:215) suggest that : 'Research scientists appear to be deeply suspicious of *any* (their emphasis) non-technical reporting of their work. On the one hand they seem to believe that their findings are almost wilfully distorted .... On the other hand, working scientists are dissmissive of the efforts of colleagues who produce "popular science"'.

Parallel texts and cross-national and cross-disciplinary communication of results will therefore develop slowly, but both are pushed on by forces of fundamental change. The disintegrating boundaries of normal science and its immersion into the social world - scientific problems such as the ozone hole are also social, as evidenced by increases in skin cancers - will gradually lead to greater willingness to communicate research in understandable form. Significant 'cutting edge' research in many areas is now often followed by popular writings, for example in chaos theory (see Gleick 1988), fuzzy logic (see Kosko 1994), and complexity theory (see Waldrop 1992). In these three cases popularisation lagged only a short time (in years) behind fundamental research. Cross national and cross disciplinary sharing of information is also a current trend, already fed by information technology as well as by the normal science practice of (frequently international) peer review of scientific papers, and pushed on by the deeper processes of post-modernisation.

An additional problem for new science comes with the fact that science can claim only limited and provisional knowledge on any issue. Nothing is fully known, nor is current understanding final. This is particularly true of ecological science, as discussion of biodiversity in chapter four made clear. Cramer (1987:500) summarises the argument here in suggesting that environmental scientists are handicapped by 'the low level of theoretical development of ecology'.

The new science response is to place this understanding at the forefront of scientific and public understanding of science. It impacts particularly in the approach to environmental issues which are now widely considered to be of general significance. For such issues, however, there is limited understanding even in the matters organisationally considered to be reasonably well understood, and no real knowledge of organisation impacts for most organisation activity. This requires a new approach to uncertainty in biodiversity issues by a scientific community aware that it is of central importance in developing organisational knowledge about issues. This onus is given greater weight, too, by legislative requirements that such things as environmental impact assessments be conducted before organisations proceed; here, too, legitimated normal science is of fundamental importance.

The shape of this science can be further developed with reference to the Funtowicz and Ravetz (1991,1993) model for problem solving strategies for environmental issues. They use a biaxial model representing 'systems uncertainties' and 'decision stakes' on the axes, with decision stakes (a value judgment) ranging from low to high according to cost, benefits and the commitment of parties involved in an issue, and three levels of uncertainty, the technical, methodological and epistemological. 'Technical' indicates that standard routines are adequate, 'methodological' includes 'more complex aspects of the information [such] as values or reliability', and 'epistemological' indicates that 'irremediable uncertainty is at the core of the problem,' (Funtowicz and Ravetz 1991:143). This model then represents problem solving strategies (see Figure 14).

Figure 14: Funtowicz and Ravetz's Model
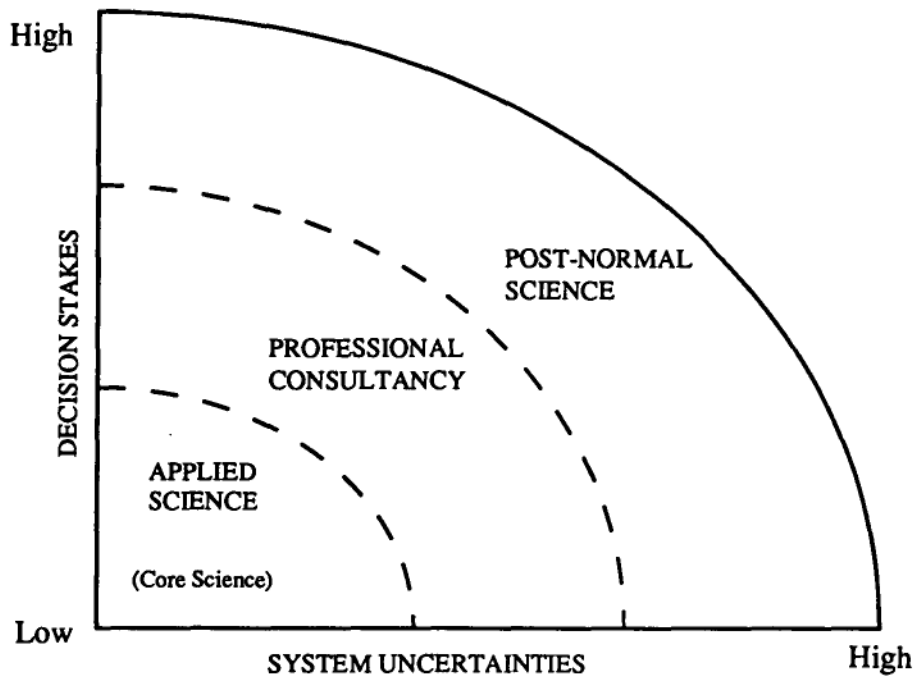
(Source: Adapted from Funtowicz and Ravetz 1993:745)

In the 1993 version of their model each of the zones includes the one before it, (adapted from Funtowicz and Ravetz, 1993:745) so 'applied science' includes the processes of 'core science' and 'professional consultancy'. 'Core science' emphasises peer review and deals with 'certainty'. 'Applied science' uses a wider set of peers including 'users of all sorts' and it is 'mission oriented' (Funtowicz and Ravetz 1993:740), but its outcomes resemble core science in that they have 'the features of reproducibility and prediction' (1993:749). 'Professional consultancy' deals with higher decision stakes and unique situations and involves greater individual judgment. It is 'client serving' (1993:740). 'Post-normal science' involves situations with high level (epistemic) uncertainty and high decision stakes. It also involves an 'extended peer community' including, for example, the people affected by large scale pollution problems, or the victims, carers, journalists, activists and self-help groups involved in the

AIDS debate. The example of building a dam serves to explain the interaction of the four zones: core science informs applied science which is used in the basic construction, but to design the optimal shape requires professional consultancy and to assess the impact on the hydrological cycle in the district requires post-normal science (based on Funtowicz and Ravetz 1991:147).

Insights from the model are useful. It is clear that the level of uncertainty affect capacity to solve problems and that 'decision stakes' and level of complexity also affect problem solving. A number of developments for a new science relevant to macro level biodiversity problems can, however, be suggested.

With use of parallel texts and sharing of what therefore becomes communicable information, the role of curiosity driven 'core science' expands from the very limited one allocated by Funtowicz and Ravetz (1993). 'Experts', as Crook *et al.* (1992) point out, will remain important in any case because of the continuing power of established science, but with increased communication of their ideas they can also make a much greater contribution to policy and debate over biodiversity issues because their specialised insights are fundamental to an increased general understanding of these issues. Beck (1992a) points out that they have never been more necessary than now; having been pivotal in humankind's conquest of nature they remain pivotal in the quest to control its consequences because they are repositories and producers of the knowledge required to handle the complexities inherent in this project.

The mission oriented zone of 'applied science' and the value-judgmental 'client serving' zone of the professional consultancy which includes it should also be altered, though in this case by contraction rather than expansion. Both include 'core science', but in neither case is the suggested expansion of peer community and

debate enough to guard against the influence of values and development of judgments that are antithetical to the preservation of biodiversity. Until most organisations operate in an eco-centric fashion, exploitative anthropocentric values will tend to produce applied science and consultancies that validate development that contributes to loss of biodiversity. There is also a real danger in poor environmental research or research which is tailored to the group paying for it rather than the problem under investigation. With transitions towards eco-centric management this tendency wanes, but in the meantime the influence of an expanded new science that values knowledge before results provides a better barrier than a mission or client orientation.

The shape of what Funtowicz and Ravetz call 'post-normal science' can also be altered after further consideration of the idea of an extended peer community that is fundamental to it.

This is effectively an expanded group of stakeholders who take part in debate, an idea echoed by O'Riordan's 'vernacular science', 'a special mixture of scientific analysis, communication and participation' (O'Riordan 1991b:150). In the AIDs example they include everyone with an interest in the area, failing to distinguish between those who can contribute to debate as primary users of knowledge and those who contribute primarily as developers of knowledge. The former may be called 'user-peers', and the latter 'knowledge peers', and as the following argument suggests the distinction between them is significant.

Three sets of knowledge peers can be identified to extend scientific knowledge of biodiversity. The first is natural scientists generally; as communicable information spreads and disciplinary (and sub-disciplinary) boundaries break down the number of scientists who can readily contribute to policy relevant research grows. They may

not be 'direct responsibility' researchers but can nevertheless contribute insights from their own research. The second includes social scientists who contribute insights from their own conceptual viewpoints; for example, a social scientist can help identify issues for research into ozone impacts and help in designing the research process by splitting cancer victims into useful demographic groups. The third group is made up of people with indigenous knowledge of the eco-system or the particular species under scrutiny. This is perhaps more important for biodiversity than other areas of scientific or policy interest, given that such people have, as McNeely (1988) and Norse (1993:160) indicate, a depth of knowledge built up over millennia, one that is both suitable and sophisticated and complements rather than challenges the insights of normal scientists.

The pattern in this extension of knowledge is an onwards expansion of the areas of legitimated knowledge towards a linking of disciplinary fields, and towards an incorporation of many types of knowledge in the quest for an understanding of biodiversity. As with the other transitions that have been discussed this will not happen immediately but will rather take the form of a gradual expansion that is already underway. Normal science is developing science-based multi-disciplinary areas (such as environmental studies) already, and as discussion of ecological economics will shortly indicate, there are efforts to incorporate social science into natural scientific inquiries as well as natural science into the social science of economics. Legitimation of indigenous knowledge is likely to be a subsequent step because it involves a greater leap by established science, but in the area of biodiversity it is already occurring, pushed on by the desire for business organisations to be seen to have taken account of the needs of the indigenous people in

organisation developments. Again, BHP at Ok Tedi provide an example, belatedly recognising the value of local knowledge about the impact of their operations.

Expansion of the ranks of knowledge peers also expands the effectiveness of user peers because it provides for more broadly based understanding of issues. In new science the roles of these two peer groups develop synergstically, both fed by an emphasis on the communicability of information.

Discussion so far has concentrated on changes to the Funtowicz and Ravetz problem solving approach. Before drawing it together it is necessary to explain an adaptation of their biaxial model.

It is useful to bear in mind that the Funtowicz and Ravetz axes are both knowledge-dependent. Decision stakes are determined by knowledge of costs and benefits while system uncertainties are related to the extent of knowledge of the system under scrutiny.

Decision stakes for biodiversity issues at a meso level are, using the insights of social constructionists, the product of a social process rather than a given. An organisation's acceptance of the seriousness of the issue (hence decision stakes) will be the product of processes at either or both of the meso or macro levels.

At the meso level the extent of organisation knowledge and the progress within the organisation towards eco-sensitivity can set stakes for eco-sensitive organisations that are high to very high depending on the perceived level of scientific understanding, whilst for less sensitive organisations such stakes are low irrespective of knowledge. In RFN terms, appreciation depends on both knowledge and eco-sensitivity.

At the macro level, governmental pressure, media coverage, the level of socially communicated scientific understanding of issues, and public activism will all place pressure on organisations to act or refrain from acting. Hence two levels interact as the meso level is influenced by the macro, for example, as an organisation's identity is changed by media exposure of environmentally insensitive operations. It is also common for action to be entirely the result of meso level pressures, for example, an organisation failing to develop an area of rain forest even though unhampered by external pressures, just as it is possible for an organisation to be prevented from developing a 'resource' because of government (macro) pressure.

At both levels, and at any number of socially located positions within them, there will be (despite reservations about the idea of 'given' decision stakes articulated in discussion of constructionist ideas in chapter five) notions of the 'real situation' with respect to an ecosystem or species, especially in cases where there is widespread acceptance of a serious decline in environmental integrity. This will result in a broadly accepted notion of the 'real situation', one that impacts at both the macro and meso level. There is, for example, an appreciation of the threats to the endangered species of wedge-tailed eagle in the Australian state of Tasmania. Despite widespread decline in environmental integrity this 'real' appreciation varies according to factors such as the attraction of the species or eco-system, the degree of media exposure and the efficiency of environmental pressure groups in putting the issue forward (see Hanson 1994).

One result of this multi-layered analysis is an expanded role for normal science which, it is suggested, can handle more low stakes situations than Funtowicz and Ravetz suggest. Another, equally significant, is a much expanded high stakes zone reflecting an

organisation's impact on the natural world, with a new science 'fuelled' (or informed) by normal science required to handle these issues.

The Funtowicz and Ravetz system uncertainty axis also requires change. Given that recognition of the provisional and uncertain nature of scientific knowledge is a feature of new science this axis can be labelled 'uncertain' at the epistemological level. At the level of legitimated knowledge however, there is a possible distinction between scientifically accepted adequate knowledge and recognised inadequate knowledge, hence classifiable as 'acceptably certain' to uncertain. For biodiversity issues the situation is one where there is adequate knowledge about relatively few species or eco-systems.

The new science biaxial can now be presented:

Figure 15: New Science
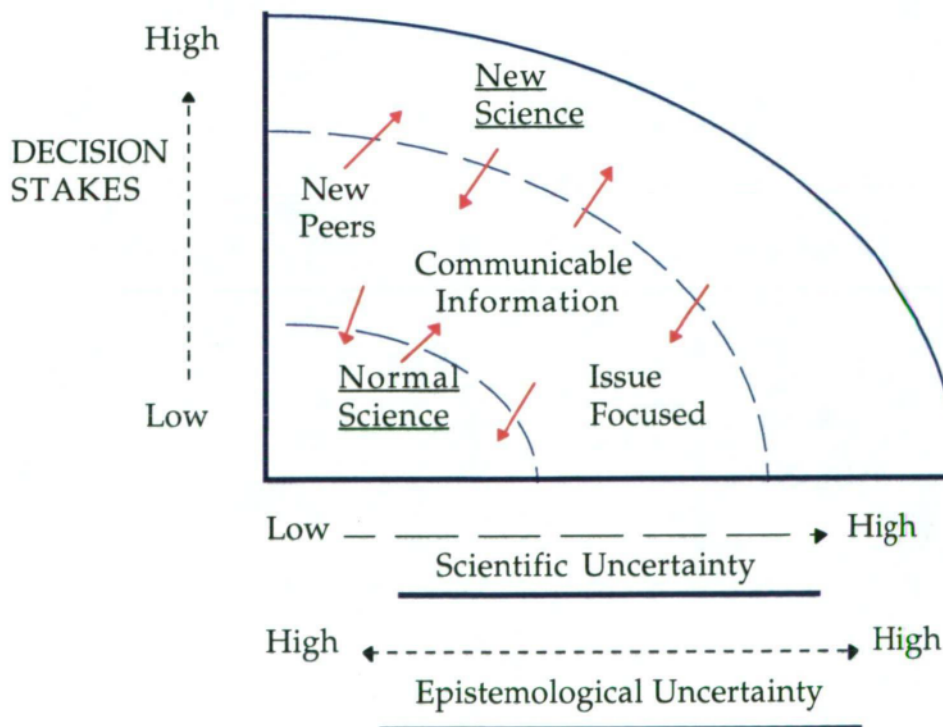
This reflects the arguments already offered. Decision stakes are rarely low. When high, normal science may be the answer but for most situations it is new science based on and penetrated by normal science that provides answers. The Funtowicz and Ravetz zone of applied science is swallowed by new science which is, with recognition of different peer communities, an emphasis on communication, and with expanded fields of legitimated knowledge, capable of handling many issues. With any issue though, part of the new science stance is to recognise high levels of epistemological uncertainty. Indeed, the assumption of limited provisional knowledge is basic to the process of new science. The horizontal 'uncertainty' axis reflects this fact with dual labelling. Epistemological uncertainty is always high, but an additional 'scientific uncertainty' label reflects the state of legitimated knowledge. This ranges from low levels to high, with the lower levels covered by existing normal scientific knowledge, and some higher levels covered by the processes of new science.

Where decision stakes and/or scientific uncertainty are very high a zone of political and community debate is indicated in the new science model. Significantly this is a well-informed debate, fuelled by the communicability of new science. In the Funtowicz and Ravetz system this is the realm of 'post-normal science', but in fact, outside the scope of any science, debate needs to be based on recognition of uncertainty rather than on implications of a 'scientific' handling of an issue. The boundaries of new science expand gradually to fill this zone. With high levels of eco-sensitivity in political and/or organisation systems this will be a zone of inaction, and with lower levels a zone of action taken in almost total ignorance of impacts. In RFN terms, eco-sensitive organisations will not proceed with high RFN (high uncertainty, high stakes) but may proceed as the boundaries of knowledge expand.

New science offers much to organisations and communities. It expands the role of science, rendering it more central to decision making. An issues focus, new communication systems, expanded user and peer communities and a growing multi-disciplinarity in approach to issues also expand its potential to produce the knowledge that organisations require for sensitive handling of biodiversity issues. Simultaneously, the processes of new science expand the role of the community, both in the processes of developing knowledge and debates about levels of knowledge. 'New science' is a combination of tools (for example parallel texts) and attitudes (for example, an issues focus) that can lead to fundamental changes in the way organisations approach risk, and, as they become more eco-sensitive, RFN.

The transition from acceptance of the limited field of discipline bound 'normal science' to 'new science' is obviously complex and will take time. As the discussion has indicated though, the directions of change in science (a breakdown of big science), in organisations (acceptance of the need for quick change and use of gatekeepers), and information technology (facilitating communication), make it possible.

A New Economics

The discipline of economics remains the language of power, a narrow but powerful set of concepts and understandings that legitimates and purports to explain the economic behaviour of humans. Policy goals (see Daly and Cobb 1989:63) and organisation behaviour are deeply affected by the techniques and theories of economics which are the most overtly scientific of the social sciences, its high standing in the world reflected in the fact that it is the only 'soft' science honoured by the awarding of a Nobel prize.

The approach to nature of conventional economics, however, is intimately related to unrestrained anthropocentricism and economic growth unfettered by ecological concern. A new economics is therefore required to support eco-centric approaches to management, and as the following discussion of the 'evolution' from classical, through neo-classical, to 'new environmental economics' and then ecological economics suggests, there are already significant moves in this direction. This brief history of economic approaches to the natural world is necessary both in order to make sense of the new approaches and also because elements of earlier approaches are still significant influences on organisation decision making. Ultimately an eco-centric economics is required, one that is incorporated by and also incorporates ecological understandings, but in the meantime the surprisingly broad church of conventional economics remains dominant.

Folke and Kaberger (1991) use Colby's (1990) work to group conventional approaches to economics in the 'frontier economics' paradigm, and suggest that it predominated in both capitalist and Marxist economics from about 1870 to 1970. Their term echoes Boulding's 1960s notion of a 'cowboy economy' (reprinted 1992), a world of 'reckless, exploitative, romantic and violent behaviour,'

(Boulding 1992:31). In order to further understand the link between the various schools of economics that can be classified as members of this 'frontier' paradigm and economic growth, a brief history of the major elements of conventional economics is useful.

The first major economic writing was undertaken by classical economists, in particular Adam Smith (1723-90), Thomas Malthus (1766-1834) and David Ricardo (1772-1823). They provided an interestingly pessimistic assessment of the prospect of long term growth. According to Pearce and Turner (1990:6) they '... stressed the power of the market to stimulate both growth and innovation, but remained essentially pessimistic about long term growth prospects'. Such pessimism vanished with the advent of now dominant neo-classical theory, which has nevertheless retained Smith's doctrine of 'the invisible hand', where the self-oriented actions of individuals are seen to lead to overall benefits to society so long as the market is allowed to operate free from government constraint. This notion remains significant, having increased its dominance over the last decade with the wave of privatisations world-wide and the 'renaissance' of capitalism with which they have been associated. The modern 'Chicago school', represented most publicly by Friedman (1980), presents the modern face of the doctrine.

The Marxist model followed classical economics, placing capitalism in a historical context and presenting a labor theory of value where workers provided value, while exploited by owners of capital. The natural world was separate from humankind, and there to be exploited. In Eckersley's summation of Marx this non-human world '...was first and foremost "the primary source of all instruments and objects of labor" and was variously referred to by Marx as a "laboratory", "the original tool house", or "the original larder"' (1992:77). Eckersley goes on to point out that both generic streams of modern 'eco-Marxism', the 'orthodox' and 'humanist', accept

Marx's view of history and 'thereby an instrumentalist and anthropocentric orientation towards the non-human world, ' (Eckersley 1992:82). On that basis it holds little promise for an economics that is 'eco-centric' (in terms of the meaning given to eco-centrism in the current argument).

The next school chronologically is neo-classical economics which developed just after 1870 but remains fundamental to mainstream thinking. Jevons (1970, first published 1871) followed by Meinger in the same year and later Walras, all, according to Blaug (1978:309), working independently, described a model of economics similar to the Newtonian physics that was then dominant and much admired for its clarity and explanatory power. Their approach was deliberately value free (scientific) and based on a theory of perfect competition in a closed system where time was irrelevant. Rational individuals in this system seek to maximise utility by satisfying numerous substitutable wants. The natural world is unpriced and the interest of future generations irrelevant. Basic to the system is marginal analysis, featuring calculations based on increases or decreases in the marginal utility of actions, which enables employment of the differential calculus that Newton developed. Calculation is also aided by the quest for quantification; to fit the model things must be measured and specific (nearly always monetary) values provided. The sub-discipline of welfare economics provides the vehicle for the handling of some environmental issues within the neo-classical model.

These ideas have not persisted without challenge. The institutional economics of Veblen (1970, first published 1934) and Commons extends the neo-classical view of human nature, arguing instead for culturally located individuals whose preferences change over time. Institutionalists also take a more complex view of the economy, locating it in a web of institutional arrangements that includes

important scientific and technological elements, and they also 'demand an integration with other social sciences', (Blaug 1978:711). The natural world is also given a major role in institutional economics, with environmental problems seen to be an inevitable part of economic progress and pollution seen to be a significant social cost. Despite having lost a 'battle' for the control of mainstream economics to the neo-classical school, the institutional perspective remains significant, represented, for example, by the *Journal of Economic Issues*, which continues to represent the wide interests of institutionalism under the banner of 'evolutionary economics'. Its emphasis on disciplinary integration and sensitivity to the unwelcome effects of economic growth provides therefore, both an historical example and modern indication of the shape of eco-centric economics.

Other broad-scale attacks on the neo-classical perspective have been common. For example Joan Robinson (1971) has pointed out its deficiencies from a neo-Marxist standpoint, and Ballogh (1982) argued strongly that it is irrelevant (paying little emphasis to the fact that 'relevance' need not be supported by demonstrated 'worth'), while Etzioni (1988) has put forward a new economics with a moral dimension, featuring non-selfish 'properly socialised' human beings and 'social collectives' as the major decision-making unit .

Despite these attacks and attempts at reformulation the central ideas of the neo-classical school, including its mechanistic model, quest for measurement and calculation, and the building of complex but incomplete conceptual models of the world, structure the world view of professional economists throughout the developed world. Mainstream environmental economics has developed from conventional economics as ecological awareness has risen, applying basically neo classical assumptions to environmental issues. It has had two peaks of popularity, one in the 1970's in the first of the

modern waves of environmentalism reflected by the Club of
Rome's studies, and a second in the late 1980's mirroring a more
recent peak in ecological awareness. The aims of this emerging sub-
discipline were, and remain, modest, and are well summarised by
Pearce and Turner, prominent scholars in this sub-discipline:

> After 1970 a majority of economists continued to argue that economic
> growth remained both feasible (a growing economy need not run out of
> natural resources) and desirable (economic growth need not reduce the
> overall quality of life). What was required was an efficiently functioning
> price system (1990:13).

These views govern approaches taken to pollution control and to
resource development, and whilst not the eco-centric economics
required for new approaches to policy at government and
organisation levels they demonstrate a transition from the position
of neo-classically legitimated economic growth and anthropocentric
resource exploitation that had been basically accepted in core nations
from 1870 to 1970.

The Folke and Kaberger analysis puts the environmental economics
approach in the category of environmental protection, 'concerned
mainly with ameliorating the effects of human activities .... on
damage control' (1991:282). It involves use of environmental impact
assessments and the weighing up of costs and benefits of
development possibilities. In order to do this economists are
required to value the environment using techniques legitimated
within economic and policy making circles, then compare quantified
costs and benefits in a cost-benefit analysis (CBA).

This process has been used in core nations since the early 1970s.
Barde and Pearce (1991), for example, include discussions of case
studies from Germany, Italy, the Netherlands, the United Kingdom,
and the United States in a survey of the valuation of natural
resources. Their claim is that this research demonstrates that the
techniques used to quantify values of nature are 'reliable' but 'rarely

used in decision making' (Barde and Pearce 1991:Preface). Their explanation for this suggests three 'categories of obstacles' to use, the ethical, political and methodological. These are worthy of brief description, since they indicate the wide breadth of attacks on environmental economics, some from exploiters of the natural world, some from protectors.

Ethical obstacles include objections to the quantification of nature from institutionalist and deep ecologists, who suggest that it is impossible to place proper value on the natural world. Barde and Pearce rather oddly dismiss these because they ' do not seem to prevail in decision making circles' (1991:7). Political obstacles are said to be more significant, particularly the fact that benefit estimates are designed to make policy objectives and decision criteria explicit and therefore scrutinisable. This is unwelcome to policy makers because it lessens their freedom to act. Methodological obstacles are, they suggest, 'significant but over-estimated' and can be overcome with training, organisation of data bases and preparation of guidelines.

The attacks on a new but conventionally located environmental economics then, come from all sides but most fundamentally from entrenched and unrestrained exploiters of the natural world. Barde and Pearce are representative of a real concern for the natural world within sections of the establishment of economics, one that threatens organisation's rights to untrammelled exploitation. The advance from conventional neo-classical economics they represent is modest from the point of view of many who deny the assumptions and techniques of the economists concerned (far more than the instrumentalists and deep ecologists that Barde and Pearce [1991] refer to), but is nonetheless highly significant because it is gaining in influence despite the opposition that has been discussed. The late 1980's and early 1990's indicate something of a high tide for

the new environmental economics. Pearce, Markandya and Barbier's *Blueprint for a Green Economy* (1989), for example, sold world-wide as paperback, but originated as a report for the UK Department of the Environment. In Australia, again representative of core nations, Sinden (1991) has listed over 100 different environmental valuation studies, and the Federal Government supported for a number of years a Resource Assessment Commission that produced reports on valuation techniques (see for example Streeting, 1993) as well as large scale - albeit controversial - valuation studies (for example that on Kakadu National Park, see Resource Assesment Commission 1991).

These examples do not so much indicate specific instances of the natural world being borne in mind in decision making (even though this is significant, irrespective of ethical or academic objections) but they do indicate growth, however uneven, in institutional acceptance of the worth of the natural world. At the organisation level tools are provided to value the natural world, and related to this (and more importantly) organisation learning takes place. Individuals become aware of the techniques and develop skills in using valuation techniques, aided in this by the 'how to' books that follow significant acceptance of the need for such things as environmental evaluation.

As economic learning and further methodological refinement proceed the way is prepared for 'resource management' (Folke and Kaberger 1991:282). This is, they suggest, the 'basic theme' of the Bruntland and annual World Resources Institute reports and therefore mainstream 'resource conservation'. In the Folke and Kaberger version, however, this represents a considerable advance on the Pearce style environmental economics response to sustainable development since, they suggest, it involves a focus on

'eco-systems processes, rather than just stocks of physical resources', as well as attention to 'stabilisation of population levels in developing countries' (1991:282).

The methodological and value analysis subtleties involved in giving full effect to this are extended yet further in their final paradigm, 'eco-development', which more specifically sets out to 'restructure the relationships between society and nature, by re-organising human activities so as to be synergistic with ecosystem processes and functions' (Folke and Kaberger 1991:282). They suggest that this involves 'the management of adaptability, resilience and uncertainty' as well as a move away from anthropocentricism.

Both paradigms require extensions to conventional systems, a challenge that 'ecological economics' seeks to answer:

> Ecological economics is a new transdisciplinary field of study that addresses the relationships between ecosystems and economic systems in the broadest sense ... By transdisciplinary we mean that ecological economics goes beyond our normal conceptions of scientific disciplines and tries to integrate and synthesise many disciplinary perspectives. One way it does this is by focusing more directly on the problems, rather than the particular intellectual tools and models used to solve them, and by ignoring artificial turf boundaries (Costanza and Daly 1991:3).

This is a very broad statement of intent and the field is still developing, analysing new areas and attempting to develop new methodologies. Herendeen (1994) provides an indication of the areas of research that have resulted in his survey of the activities of ecological economists in striving for a measure of total environmental cost of human activities. He lists developments in theory in environmental impact statements; in the linking of ecological and economic systems; new forms of valuation using energy analysis; new resource accounting; ways of adjusting GNP to include resource depletion; considerations of the externality costs of electricity production; development of a theory of 'ecological distress syndrome'; some theory in 'no-regrets strategies', (1994:100-3)

This is part of the growing list of research in ecological economics, which is continuing to develop just as further refinement in the methodology of neo-classical environmental economics takes place. At the same time that economics remains the language of power, increasingly (albeit unevenly) acceptance of the need to use some of the ideas of environmental economics in decision making provides an indication of positive change.

CHAPTER SEVEN

THE SHAPE OF ECO-CENTRIC STRATEGIC MANAGEMENT

Strategic management can be defined broadly as the field of study and practice that deals with top level organisation strategy. Top level managers and their support teams deal with such strategy in a quest to provide direction for organisations. It is therefore of critical importance in eco-centric organisations because it is a significant determinant, at least, of the direction of organisation operations in the short to medium term and, at the most, of the direction of the organisation (including its approach to the natural world) in the longer term as well.

This broad definition will be extended shortly in a discussion which develops the broad shape for a model of eco-centric strategic management and at the same time draws together insights from the literature on a range of related issues. As earlier discussions have indicated, the challenges to such a model are profound. Discussion of biodiversity indicated the paucity of available knowledge of this central environmental issue, the lack of research workers in the area, and the complexity of the issues involved. Despite this, knowledge of this and other environmental issues changes quickly, although most of this is inaccessible to organisations because it is available only in obscure academic journals where it is expressed in 'difficult' language. Early discussion in chapter five emphasised too the pervasiveness and embedded nature of anthropocentric world views and culture that

inhibit adoption of eco-centric practices. In partial balance, the remainder of chapter five and chapter six indicated promising new ideas in the areas of risk management, science, and economics that could be incorporated into a new strategic management process. A central question is how can this best be done? One answer is, by developing an eco-centric style of strategic management.

Strategic Management: The Schools

What has strategic management offered so far to counter such challenges? The field is broad, as Chandler's definition of strategy implies: 'the determination of the basic long term goals and objectives of an enterprise and the allocation of resources necessary for carrying out goals' (1962:7). Central to this classic 'plan based' notion is the idea of rational planning and action backed up by the collection and analysis of information. This has been a preoccupation for managers of organisations (including armies) for millennia, with a relevant written heritage going back almost two and a half thousand years to Sun Tzu (1986).

The notion of strategy as a plan is an idea entrenched in organisation life and the huge field of scholarship that has developed to assist managers fully reflects this fact. There are, however, other established points of view as well, and to review this literature in order to develop insights for an eco-centric strategic management model might seem an insuperable task. It is possible, though, with the assistance of

Mintzberg's (1990a) analysis of 'ten distinct points of view' on strategy formulation. These 'schools' provide a good basis for later discussion even when presented in summary form. They fall into three groups. The prescriptive group includes the 'design', 'planning' and 'positioning' schools, all of which suggest how strategies *should* be formulated. They also provide the basis for conventional undergraduate courses in strategic management and for most organisation plans, and reflect the planning bias that has dominated the strategy literature.

The next six schools, the 'entrepreneurial', 'cognitive', 'political', 'cultural', 'environmental' and 'learning' schools, focus on how strategies are *actually* made rather than how they should be made.

The last school, the 'configurational', is Mintzberg's preferred option and clusters elements of the others into a single perspective, making use of insights from all. As the ensuing discussion will indicate, this is broadly the case here with insights drawn from several schools in support of a learning school based model for eco-centric management. Before this though, other schools need introduction.

The 'design school' is, in Mintzberg's opinion, the most 'deeply rooted' in current practice and is based on the SWOT model which suggests analysis of internal strengths and weaknesses and external opportunities and threats in order to arrive at a strategy. It has been associated with the Harvard Business School (see Andrews 1971,1980) and makes up the core of most undergraduate textbooks on strategy (see for example, Hill and Jones 1995, Thompson 1990, Dess and Miller 1993). Mintzberg (1990b:172), in fact, suggests that a critique of this school can in some ways be taken as a commentary on the currently popular beliefs in the field of strategic management in general.

According to Mintzberg's characterisation, the design school writers suggest that strategy should be a controlled process of thought, that the chief executive officer (CEO) should be the chief strategist, and strategies should be made explicit but kept simple and informal (Mintzberg 1990a:113-114).

The 'planning school' developed at around the same time as the design school, with Ansoff (1965, 1979, 1984) its most prominent exponent. In the Mintzberg description of it the Ansoff model is broadly similar to the planning model but is more formal and far more complex. Diagrammatic presentation of the planning system in Ansoff's work includes more than fifty elements, seventy points of 'management decision', and a profusion of flows connecting them (1965:202-203). The planning school literature in general is full of advice on how to budget, schedule and program. The CEO remains architect of strategy, but planning staff are really responsible for operating these systems. Ansoff's recent (1991) defence against Mintzberg's (1990) attack calls it the ' school of holistic strategic management' and makes the point that there have been many advances within it between 1965 and 1990. These include such things as ' diagnostic procedures .... for sequencing strategy/structure development ...', use of the notion of organisational capability (to replace strengths and weaknesses), and development of 'interactive computer software for strategy formulation in turbulent environments' (Ansoff 1991:452-453). The emphasis on complexity, on planners, on formal skills and authority, and on the power of rational thought remain.

The 'prescriptive school' focuses on the idea of strategy as a position in the market place and much of the modern work classifiable within its scope stems from Porter's analysis of competitive strategy (1980,1990). In

this conception strategy is about analysis of the market then selecting a position and generic strategy. The process is analytical, based on economic criteria, conscious, explicit, future directed and requires the skills of an analyst (planner). The basic Porter 'five forces model' used for industry appears simple enough for a well educated person to use with confidence (however misplaced this may be) and it has been very widely accepted in conventional business practice.

These three schools in the prescriptive group share the same bias towards rational planning and an assumption that a knowable world is 'out there' which can be controlled, so that organisations are prepared for and control the future. Taken together they can form the basis of what Prahlahad and Hamel (1994) call 'traditional strategic management'. This conception reflects aspects of all three schools, but widens them to include directions of current conventional research and has the following key elements:

- Strategy is about positioning a business in an industry
- The focus is on existing and stable industries rather than industries in transitions (declining or emerging)
- Specific business units remain the focus rather than corporations
- Economic analysis is the basis for conclusions (rather then any interplay between economy and politics, or economy and society)
- 'Strategy is the result of an analytical process [and] execution of strategy is an organisational process' (Prahlahad and Hamel 1994:11)

This is obviously a stylised view of a complex and, as Ansoff (1991) points out, a still evolving body of literature, but it is nevertheless clear that the basis of these schools is analysis which relies on the availability of information. There is an overall assumption that management

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guidance can control the future, and an emphasis on established expertise and use of hard data. The notion of formal planning is basically unchallenged from within these schools, untouched even by critics on the outside such as political scientist Wildavsky (1973) who provided fairly early and savage comments that contain a truth that is perhaps ironically a major defence for planning:

> Planning is not really defended for what it does but for what it symbolizes. Planning, identified with reason, is conceived to be the way in which intelligence is applied to social problems. The efforts of planners are presumably better than other people's because they result in policy proposals that are systematic, efficient, coordinated, consistent, and rational. It is words like these that convey the superiority of planning. The virtue of planning is that it embodies universal norms of rational choice (1973:141)

Whilst Wildavsky's intent is critical his statement on the symbolic value of planning is notable. Formally rational plans symbolise order and efficiency; they persuade management and workers that things are under control. In an uncertain world this is, contra Wildavsky, a generally useful role and it constitutes an important defence for rational planning. On its own it may indicate that rational planning is necessary to control anxiety in an uncertain world.

In other important ways however, formal planning of the sort under discussion is incapable of dealing with a world that cannot be rendered orderly enough to be encompassed by linear thinking processes. Even in sophisticated form, planning fails in the face of change. A demonstration of complexity of conventional planning systems striving to encompass the intricacies of a large organisation, and also of their weaknesses, comes with International Business Machines, IBM.

As outlined by their Director of planning in the late 1970s (Katz 1978), IBM included a range of 'divisional' plans, plans for operating units within divisions, business policies planned at the corporate level, and

reviews of operating units. It also included the distinction between 'program planning' for specific products or to improve productivity and 'period planning' which balanced the wide range of program plans. They were 'operating plans' which used time horizons of two years and overall 'strategic plans' with five year horizons. Managers of operating units were advised to maintain 'an awareness of emerging problems or opportunities' and top management to 'maintain a continuing focus both on the strategic direction of the business and the commitment to, and control against, the plan of record' (Katz 1978:2).Their planning and management staff were selected from amongs the best and the brightest available. Despite this they failed to respond to the relatively obvious challenge of the personal computer, failed to restructure as the business became unwieldy, and have since the 1980's gradually weakened their once apparently unchallengeable position in the market. The conventional planning maps, even in a refined form and operated by clever people, failed.

This is not to suggest that formal conventional planning is without any direct (as distinct from symbolic) value. Managers must plan in order to handle Senge's (1992:71) 'detail complexity', the many variables that must be controlled if an organisation is to produce goods and/or services. For much of the time and in many organisations that is all that is required, and assumptions about identifiable problems in a stable world are both convenient and realistic. However, all organisations are occasionally, and some organisations are continually, faced with the challenges of survival in a complex world economy. The challenge then is that of handling 'dynamic complexity, ... [where] an action has one set of consequences locally and a very different set of consequences in other parts of the system, ... [and when] obvious interventions produce non obvious consequences' (Senge 1992:71). This, of course,

neatly summarises the problem of dealing sensitively with the natural world, and as discussion in chapter five indicated, suggests that a holistic view of organisations and events be adapted.

In the face of already existing dynamic complexity as well as a changing future conventional planning tends to fail because existing maps designed to handle detail complexity are inadequate. Another well known illustration of this is the Peters and Waterman (1982) set of excellent companies, used by them to back up the conclusions of one of the most popular successful business books of the 1980's. Within five years two thirds of them were in trouble. There is nothing unusual in this. In the USA, one third of the *Fortune 500* industrials listed in 1970 had gone by 1983 (deGues 1988:70).

Incapacity to handle a changing future or dynamic complexity provide obvious handicaps for handling the world of biodiversity issues and conventional prescriptive schools can be dismissed on these grounds alone. The Mintzberg critique goes further though. In what was a coherent and powerful argument against planning his 1994 work *The Rise and Fall of Strategic Planning* virtually argued for a dismissal of planning in all complex situations.

With these criticisms in mind we can turn to other schools.

The first of Mintzberg's descriptive group is the 'entrepreneurial school' which suggests strategy is a visionary process which comes from a leader who uses creativity and intuition. The stress therefore is on an individual's qualities rather than on any process of formal planning or on capacities of the organisation. This style best suits a simple organisation structure that is responsive to the leader's direction (Mintzberg 1990a:139).

The 'cognitive school' emphasises the importance of cognitive processes in the mind of the strategist. Whilst Mintzberg presents this as 'work that could eventually grow into ... a school' rather than an established body of work (1990a:142), it is nevertheless worthy of comment because of the insights offered. These writings focus on issues such as distortions of reality when framing strategy, cognitive styles and concept formation. They are significant matters and elements of related work have already been used in discussion of risk and RFN in the previous chapter.

The 'political school' focuses on the influence of politics in promoting and retarding strategic change. The notion of politics is defined broadly by Mintzberg to include both the internal exploitation of power which binds strategy (micro-politics) and the external political sphere which affects organisation direction (macro-politics). Such matters have largely been ignored in the planning oriented (conventional) literature and the lesson that they need to be taken into account when discussing strategy implementation is the most obvious one that can be drawn. It has been teased out by MacMillan and Jones (1986), Mintzberg (1983) and Pettigrew (1977) and is applied in many studies, for example in Pettigrew's (1985) study of Imperial Chemical Industries.

This political lens is most obviously useful in explaining change processes in large organisations where blocking by sections or divisions slows or prevents change. Consequently, as change management writers emphasise, the micro-political dimension needs to be taken into account in change management, just as analysis of the macro-political level is necessary to explain the influence of government on organisations.

The central insight of use to us from this school is well stated by Mintzberg when he suggests that ' the very fact the process [of strategy formation] is political means that the organisation is likely driven more by parochial interest than common interest, which makes it difficult to arrive at strategies (1990a:162). The difficulties of establishing eco-centric strategies, particularly 'turn around strategies' that seek to alter existing perceptions (and culture), illustrate an extension of this idea suggested by autopoietic theory: the greater the variation from core identity the greater the micro-political dimensions of change formulation and implementation. At the same time the obvious point that the macro-political sphere is a major source of influence on the degree of eco-centrism within an organisation remains, making the macro and micro spheres together a complex mix of forces influencing strategy (these insights are again employed in chapter nine).

The 'cultural school' looks at the influence of the established patterns of belief shared by the members of a collectivity, in our case, a formal organisation. Discussion of autopoietic theory in chapter five made reference to insights from this school and the theoretical lens developed there; one such insight, emphasising the importance of culture and identity but recognising the inevitability and necessity of cultural change, will continue to be used in the remainder of the thesis.

In the 'environmental school' factors such as leadership and culture are passive, because the common line in these studies is that organisations are forced into positions by exterior forces. In the most extreme form it is known as 'population ecology' and uses a model of natural selection to explain 'birth', 'life' in an ecological niche, then 'death' of an

organisation, (see Hannan and Freeman 1977, 1984). In less extreme form ('contingency theory') it argues that organisations must adapt to the exterior forces presented to them or perish.

This school presents obviously useful ideas, but in basically ignoring the importance of leadership, culture, political forces and the complexity of change processes, and hence the difficulties involved in altering organisation identity, it renders a complex world too simple to be of real use in explaining how organisations may best become more eco-centric.

At this point it is useful to summarise the argument so far. It has been suggested that the three prescriptive schools offer little to management of and planning for complex dynamic challenges such as management of biodiversity issues. They do however offer useful prescriptions for relatively static situations and simple problems and they do have important symbolic value for management. The political school provides useful insights into macro-political influences on organisations and micro-political impacts on change processes within, and some of those insights have already been incorporated into the argument in chapter five, just as have social constructionist insights broadly situated within the 'cultural school'. The cognitive and ecological school offer little direct assistance, although the insight developed in chapter five that organisational cores develop slowly in complex interaction with organisations' environments is related to the contingency theory variation of the ecological school.

What has been developed so far then, is a theoretically varied (issue driven) background for development of an eco-centric strategic management. Learning school theorists provide the injection of ideas required to complete the picture.

A Basic Learning School Model for Eco-Centric Management

The essence of models classifiable within the learning school is that strategists learn as they go, so that as issues arise and new information is obtained they continually change the direction of suggested action. These core understandings have been usefully developed by a range of theorists.

Lindblom's *The Science of 'Muddling Through'* (1959) set out a process of problem solving by making 'successive limited comparisons', an 'incremental pattern of policy making' which avoids mistakes because it relies on knowledge of 'past sequences of policy steps' (p.86) and do not involve big policy jumps. Lindblom points out that this is a system rather than a failure of method and suggests that it is how policies are really made.Weick (1979) provided theoretical background to this position in arguing that all planning is related to past learning:

> Our view of planning is that it can best be understood as thinking in the future perfect tense. It is not the plan that gives coherence to actions. Coherence comes from the fact that when the act to be accomplished is projected in the future perfect tense the means for accomplishing the act become explicit, and the actions run off with greater coherence ... A plan works because it can be referred back to analogous actions in the past, not because it actually anticipates future contingencies .... Any plan is either phrased in terms of something one has done before or else it is meaningless (1979:102).

The message here is that organisations take actions that have worked somewhere before; they can only plan having already learned. This is, as Mintzberg (1990a:152) points out, a reversal of the logic of the still widely accepted prescriptive school. In doing so it provides a powerful lesson, an insight that is important for learning school models, but one that goes too far in denying the power of envisaging futures and some forms of planning. It is possible to use past guides as guides to future plans, future visions.

Quinn (1980) developed Lindblom's incrementalism, adding an element of intention to arrive at 'logical incrementalism'. In his system formal planning is a building block of limited power that is 'excellent for some purposes', but strategies actually 'emerge in ways that differ quite markedly from the usually presented textbook methodologies. The full strategy is rarely written down in any one place. The processes used to arrive at the total strategy are typically fragmented, evolutionary and largely intuitive' (Quinn 1980:15).

Quinn (1980) also provides advice on how this happens within organisations. Total strategy is the result of the development and interaction of major sub-system strategies (for example the internal learning, and innovation and the government-external relations sub-systems). The particular mix of planning processes within an organisation is also dependent upon 'culture or ethos, management style, organisation form, external opposition, time horizons and degree of control over events' (Quinn 1980:43). This, of course, reflects the insights of the political school.

In Quinn's model top management have a dominant role but tolerate ambiguity, and avoid overspecification in order to leave the scope to cope with new information. They probe the future while integrating sub-systems using techniques such as scenario planning, formal planning and 'devils advocate' (1980:57). They have a good grasp of political matters and also 'build the seeds of understanding, identity and commitment into the very processes that create their strategies' (1980:145).

Quinn's logical incrementalism offers much for the management of complex issues. It is open to new information, aware of the need to build understanding, takes into account systemic insights, and is flexible whilst capable of direction. The view he presents of top management's role is also useful, as is reflected in discussion of eco-centric leadership in chapter nine.

Further insights classifiable within the learning school and useful for a new model to handle biodiversity issues come with the work of Mintzberg and others on types of strategy (Mintzberg 1978, 1987, 1994; Mintzberg and McHugh 1985; Mintzberg and Waters 1982, 1984). The conventional notion of strategy as a plan (that is, deliberate strategy) is distinguished from strategy as a pattern of actions, 'that is, consistency in behaviour over time' (Mintzberg 1994:23). The former is intended strategy and this is sometimes (though rarely, he suggests) 'realised', but usually fails to achieve results and hence is 'unrealised'. The latter is a pattern of strategy that is not directly intended, and is 'emergent'. Links to the learning school come because deliberate strategy precludes learning, while the more common emergent strategy relies on it, but:

> In practice of course, all strategy making walks on two feet, one deliberate, the other emergent. For just as purely deliberate strategy making precludes learning, so purely emergent strategy making precludes control. Pushed to the limit, neither approach makes much sense (Mintzberg 1987:69).

An example serves to further explain how emergent strategy may develop. When Honda first entered the USA motor-bike market they aimed for success with big bikes. This deliberate strategy was unrealised, as American bike-riders did not want big Hondas. People did, however, notice and approve of the small Honda bikes used by Honda staff to run errands, and following up this lead a successful emergent strategy to sell small bikes to an entirely new market of people who had never owned

a bike before developed (Pascale 1984). In this case deliberate strategy was unrealised and emergent strategy resulted from an 'accident' from which the organisation learned.

Deliberate strategy can result from the efforts of a CEO, or planning group, but so can emergent strategy as they pick up signals from the organisation environment and act on them (as Honda did) and in Weickian terms as they reflect on previous actions: 'Strategies grow like weeds in the garden. They take root in all kinds of places, whenever people have the capacity to learn'(Mintzberg 1987:70).

In the work of Mintzberg and McHugh (1985), several structures for strategy formation are identified. Umbrella strategies take place after senior management has set out broad goals but the specifics are left for those lower down in the organisation; the conception is deliberate but the details are emergent. Process strategies are when the central leadership controls the process of strategy making and the structure and specification of who makes strategy, but the actual strategies are left to others.De Geus (1988) in an influential article (see for example, use by Senge 1992, and Redding and Catalanello 1994), provided further insights within the learning school. Reflecting on the history of planning at Royal Dutch/Shell, where he was head of planning, he argued that organisational survival depends:

> ...on the ability of the company's senior managers to absorb what is going on in the business environment and to act on that information with appropriate business moves. In other words they depend on learning. Or, more precisely, on institutional learning, which is the process whereby management teams change their shared mental models of their company, their markets, and their competitors. For this reason we think of planning as learning and of corporate planning as institutional learning (De Geus 1988:70).

The notion of planning as learning applied to leaders and to institutions ('institutional learning') is the key to Shell's approach. From this perspective the strategic management process is one of continual organisation change at the same time as it charts a course for the organisation in the future. Royal Dutch/Shell is trying to become a 'learning organisation'.

For Senge this is 'an organisation that is continually expanding its capacity to create its future' (1992:14). For Garvin it is '... an organisation skilled at creating, acquiring and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights' (1993:80). For Pedler, Burgoyne and Boydell, who prefer the more 'convivial' term 'learning company', it is ' an organisation that facilitates the learning of all its members and transforms itself' (1991:ix). The common thread in these (and other) definitions is continual learning leading to organisational change.

In the mid 1990's the idea is somewhat faddish and given to vagueness, as pointed out by Tom Peters (himself a surfer of fads as a popular business writer!): 'Most talk about "learning organisations" is maddeningly abstract or vague - and perpetually falls short on the specifics' (1992:385). Garvin, in a similar vein, suggests most discussions of learning organisations focus on 'high philosophy and grand themes, sweeping metaphors rather than the gritty details of practice' (1993:79).

Such criticisms ring true, much as they would for any general term directed at describing a grand idea, and as earlier discussion indicated, the term 'sustainable development' receives similar criticisms. The usual solution in the case of a learning organisation is to pin it down through a specification of its constituent processes. As might be

expected the results vary, but the common theme is an intention to create a system that learns. Senge's prominent version includes five 'disciplines':

- Personal mastery, which is concerned with personal growth and individual learning.

- Mental models, where the internal images we use to view the world are brought to the surface and alternative ways of seeing this world are envisioned.

- Shared vision, the building of a vision that emerges and enthuses people.

- Team learning, building learning in groups.

- Systems thinking, which ties the other disciplines together, and the practice of which is integral to the creation of successful learning organisations.

An emphasis on continual learning in order to survive in a competitive and dynamic world economy represents a management theory orthodoxy for the mid 1990s reflected in a specialist journal such as *Management Learning* and in texts prepared for the wider market. One example is Rylatt (1994), who reflects Senges's views whilst adding little, while Redding and Catalanello (1994) add only emphases in experimentation and improvisation as responses to challenge.

What can be taken out of this for an eco-centric model of strategic management? Strategic planning process should, in order that they sanction no action that could lead to long term harm to nature, concentrate on the short term, building policies incrementally. Strategies will then be flexible and capable of incorporating new information. It must, however, be held together with a longer term 'umbrella' strategy that is a product of an eco-sensitive strategic intention and culture oriented towards protection of the natural world. Such an 'umbrella' is necessary in order that the realised strategy be

broadly eco-sensitive, bearing in mind the realisation that much of it will, despite the incrementalism that lies at the core of this process, inevitably be emergent. Further, as short term strategies change, the long term eco-sensitive umbrella will continually change as the 'vision' gets altered by events - a learning process consistent with Weick's insights.

In the short term then, incremental strategies that are eco-sensitive, held together in the long term with an eco-sensitive intention based on an evolving eco-sensitive culture are advocated. Both of these are based on learning and continual incorporation of new information into the planning process.

This represents a particular form or type of learning organisation, the eco-learning organisation. This is one held together by a shared culture, and best analysed (as in the broad argument in this work) through a cultural lens. It is one that deliberately pursues two major categories of knowledge simultaneously. Knowledge of 'conventional ' matters such as commercial opportunities and commercially advantageous ways of behaving is one focus. The other is less commercial, pursuant of knowledge from fringe areas of science, economics, management theory and any number of multi and trans disciplinary areas.

This is another serendipitious conjunction of aims. The same basic process facilitates both conventionally commercial and eco-sensitive activities. The eco-centric organisation therefore requires transitions in thinking (towards active pursuit of learning) and process (in order to facilitate this) that are simultaneously consistent with organisation survival and capacity to behave in an eco-sensitive fashion.

With this as background the next chapter can turn to basic processes that facilitate organisation learning, processes consistent with the view of learning-informed logical incrementalism that has been here developed.

CHAPTER EIGHT

THE PRACTICE OF ECO-CENTRIC STRATEGIC MANAGEMENT: SCENARIOS AND SYSTEMS THINKING

Two related processes are basic to planning practice and information handling in the eco-learning organisation. Scenario based planning has a direct use in that it provides a practical system for planning and an indirect use in that it alters world views and assists in establishing a learning culture within organisations. Use of established techniques in systems theory (an applied form of the holistic thinking discussed in chapter five) offers the same mix of direct and indirect uses, and can be integrated into the scenario based system. They will be discussed in turn, before brief consideration of how the mental models of individuals may be changed towards more eco-sensitive patterns.

A Scenario based eco-centric planning system

This planning system is 'prescriptive' in the sense that it is a suggested way of planning that formulates transitions towards eco-centric management. It is also 'descriptive' in the sense that it describes existing systems developed to handle commercial problems that nevertheless fit eco-centric management practices. The basis is a scenario technique but it also incorporates the systems thinking perspective and a version of Quinn's (1980) logical incrementalism, whilst also taking a process view of strategy.The

Mintzbergian view of strategy as a process is useful because it suggests there is always 'strategy' even if it is not articulated. All organisations have, in this view, a biodiversity strategy and overall environmental strategy made up of the pattern of their actions with respect to the natural world . This *need* not, and usually *is not*, an element in their formal planning system. Part of the eco-centric system is the 'mapping' of such strategies using techniques such as those that will be explained in later discussion of mental models.

Quinn's (1980) insights, adjusted for a world in which organisations have access to new science and economics and vastly expanded sources of general information, provide a key to the system. Planning proceeds through the scenario system that will shortly be described, but actions which affect the natural world will be 'incremental' rather than 'significant' in impact because organisations strive to minimise damage while remaining open to new sources of information which direct both these and later actions. An assumption of incrementalism, with the size of each 'step' governed by the extent of available knowledge, is important to protecting the natural world. This does not mean that a 'long view' cannot be taken, indeed that is one key to the usefulness of scenario systems and to developing a point of view that facilitates protection of the natural world. The view is long, but successive actions are incremental. What then is scenario based planning and how does it fit into the system?

Schwartz (1991:3-4) provides a recent definition: 'Scenarios are a tool for helping us take a long view in a world of great uncertainty ... a method for articulating the different pathways that might exist for you tomorrow, and finding your appropriate movements down each of these possible paths.' They are a way of organising ideas about possible future worlds while at the same time changing perceptions of the current world, and therefore deal with both

information and perception. They are based on information about the forces that drive organisations, but explore and expand this information by including uncertainties about its accuracy and utility. Consideration of these uncertainties is fundamental to altering perceptions of those involved in the scenario development (Wack 1985b).

Earlier discussion has suggested that decisions in organisations are taken after testing against mental models of how the world and the organisation operate. In a world in which survival for most organisations depends upon learning about future possibilities, scenarios structure ideas about *possible* futures.

In this important sense scenarios are different to 'forecasts' which are based on the past with simple extrapolations to the future. The forecasting model suits conventional planning because it is based on available (usually quantifiable) information; it is definite in form, and suits planning modes that require precision. This tends to work in stable situations, and as Wack points out ' more often than not they can be reasonably accurate. And this is what makes them dangerous. They often work because the world does not always change. But sooner or latter forecasts will fail when they are needed most' (1985a:73). This does not mean that there are not many 'givens' that prevail for almost all possible futures. For example it is relatively easy to use demographic data to assess the age-structure of a population any number of years ahead with reasonable confidence. These do not constitute the whole picture, but to the extent that they are useful they can be incorporated into scenarios as 'certainties'.

The basic scenario process is to prepare and then examine multiple possible futures and base strategies on the outcomes of the process. Scenarios are a technique which accepts uncertainty and attempts to understand it (Wack 1985a:79), while at the same time altering the

perceptions and mental maps of participants in the process. Changes to understandings and strategies may not occur immediately but as Mercer (1995:46) suggests, ' ... failure to have an immediate impact on published strategy should not, however, discourage those considering use of the technique. Our own experience, and that of Shell, was that the first scenarios produced are relatively neglected in the subsequent planning. It may take literally years for the process to deliver all its benefits'. Mental maps, perceptions and skills all take time to develop, just as organisation culture and identity takes time to change, but all can and do change, and scenarios are an important tool in facilitating the process.

The history of scenarios goes back to the USA Air Force in World War II which used them in order to plan against what opposing forces might do. Herman Kahn, according to Zenter (1982:14), introduced the idea into the planning world in the 1950s and by the late 1960s was talking of 'surprise free futures .... a means to improve understanding rather than forecasts' (Kahn and Wiener 1967). In the early 1970s the 'hard systems' based computer models of Meadows, Meadows and Forester (1972) and the Pestel and Mesarovic (1974) studies of growth and environmental impact were examples of the computer based scenario techniques used at that time. 'Soft models' followed. The Delphi technique (now used for some decision making in business) was used to develop scenarios (see Linstone and Turoff 1975), and complex cross-impact analysis techniques were also developed (see Fontela 1976).

Organisational use of scenarios in the 1970s and for much of the 1980s, however, was dominated by the Royal Dutch/Shell group of companies (Shell). They began trialing scenario planning in 1971 after deciding that the 'unified planning machinery' which provided them with detailed plans for all areas of operation as well as forecasts for six years ahead was unable to cope with the degree of

uncertainty in their industry (Wack 1985a). Shell began using the technique throughout the group in 1973, establishing a reputation for prescience by successfully employing it in preparation for the 1973 world oil crisis. In 1981 they again used scenarios to good effect and sold off excess oil when other companies stock piled after the start of the Iran/Iraq war, subsequently profiting when prices dropped as a glut of oil developed. Further public demonstration of success for scenarios came in the 1991 Gulf war when Shell's chairman suggested they were so well prepared that business proceeded without a pause or perception of a major problem.

The Shell group's use of the technique has been used to explain its rise from the bottom in the early 1970s to near the top of a financial ranking of big oil companies. The business success story of Shell and prominent articles by Shell planners have given scenario planning a solid reputation in world business. This, together with the inclusion of comment on scenario based planning in learning organisation literature, has provided the technique with a 'respectable' commercial reputation.

How does the scenario system work? A technique recommended for wide adoption needs to be ready and easy to use. In the early years of scenarios this was not the case, since the early hard system approach and the complex soft systems approaches of the 1970s were difficult to use, and as Linneman and Klein (1979) suggest after analysis of a sample of USA companies using 'multiple scenario analysis', these 'established procedures' were ignored and *ad hoc* 'do it yourself practices' that led to poor decisions were used instead.

A number of prominent recent proposals stressing simplicity as well as rigour have been presented to answer the resultant call for useable systems, overcoming the looseness inherent in the 'do it yourself' approach taken in the 1970s. Three of these can be

considered in order to draw out elements to serve as a basis for an eco-centric system; the Schwartz (1991) model, Mercer's (1995) version, and the 'future mapping' process described by Mason (1994).

Schwartz (1991) was head of Shell's planning division before starting the Global Business Network, an information gathering and processing organisation which was set up to assist organisations to think about futures. He suggests an eight stage process for developing scenarios:

1. Identify the focal issue for decisions. This should be specific, since without an issue there can be no useful scenario (because all require a focus).

2. List the 'key factors' influencing the success or failure of the issue. Examples include facts about competitors and suppliers. These are 'micro-environment' considerations. In conventional strategic planning these make up the 'task environment'.

3. List the 'driving forces' in the macro-environment. Schwartz suggests consideration of social, economic, political, technological and natural environment forces, and points out that some are predetermined (for example, demographics) while others are 'highly uncertain' (for example, public opinion). In strategic planning literature these make up the 'general' environment. This is a research intensive step, requiring information and sensitivity to trends and trend-breaks.

4. Rank key factors and driving forces on degree of importance for the issue and degree of uncertainty. The idea is to identify factors or forces that are most important and most uncertain.

5. This is based on the key factors and forces. The idea is to compose 'scenario plots' using them and ending up with 'a few' scenarios.

   He explains how this works (1991:140). A team is gathered, they know the issue and have done their research, then: 'We sit around talking for a day, developing ideas in response to these questions:

   - What are the driving forces?
   - What do you feel is uncertain?
   - What is inevitable?

- How about this or that scenario?'A direct comparison can be made to making up a movie script. You start with an idea (he suggests car racing); develop characters (these are like building blocks for scenarios); and consider possible plots (rivalry between drivers/ developments of courage?). The plot can go many ways from here, but will be carried by the logic of character and situation.

Schwartz also suggests three main plots, what Kleiner (1994) calls 'classic stories'. 'Winners and losers ... starts with the perception that the world is essentially limited, that resources are scarce, and that one side must get poorer' (Schwartz 1991:147). This is the plot for most elections, for wars, for most debates about logging of old-growth forests. 'Challenge and response' is where a problem leads to adaptation and productive change. A character builds as challenges come forward, for example, or in the sustainable development debate a core assumption is that both environmental protection and economic growth are possible if appropriate changes are made. 'Evolution' is where slow changes take place. Schwartz suggests these are hard to detect but easy to manage once detected. The prime example offered is technological changes which provide 'new tools' for an existing system.

6. Choosing two or three scenarios and fleshing them out. This requires a return to key factors and forces, with each given attention in each scenario.

7. Implications for the focal issue of step one are identified. What vulnerabilities have been revealed? 'Is the decision or strategy robust across all scenarios...?' (Schwartz 1991:231).

8. Select key indicators that can be used to predict which of the scenarios is likely to develop.

The Schwartz system is relatively simple to understand but requires skill and wide multi-disciplinary knowledge to operate. The same is true of Mercer's system which is, however, even simpler in structure.

Mercer deliberately set out to describe an easy scenario process in order to make it 'more accessible to a wider range of organisations' (1995:81). His system, developed at London's Open University but with reference to Shell's experience, is directed at wide-ranging business environmental scenarios that examine the 'total external environment of the whole industry within which the organisation operates' (1995:82). It has three 'stages' (or groups) of activities: environmental analysis; scenario planning; corporate planning.

Environmental analysis is an information collection stage, using as wide a range of sources as possible and best conducted as a team. Here, as with Schwartz, the importance of widely read, multi-disciplinary and extensively linked people is obvious. Scenario planning follows, with six stages:

1. Identify the drivers for change, 'the most important factors that will decide the nature of the future environment within which the organisation operates' (1995:83). Mercer suggests that people should look ten or more years ahead in order to counter the tendency to merely extrapolate from the current situation. Such a time horizon also tends, he suggests, to make people look 'farther out' into the external environment.

   The list of drivers should then be extended in a brain-storming session before being sorted out to arrive at a list that includes those that are both important and uncertain.

2. Put group drivers into combinations that are meaningful to participants. Mercer suggests this is the most difficult step, requiring intuition. It 'usually produces' seven to nine groupings.

3. Work out what each of the groupings represents. These are 'mini-scenarios'.

4. Reduce the seven to nine mini-scenarios to just two or three. Mercer suggests just two because managers find it difficult to deal with more. These should be 'complementary' rather than 'good versus bad' to prevent managers slipping into single track ('good') forecasting. These should then be 'tested' to see if they make sense to participants in the process.

5. Write scenarios in the form most suitable to managers who are going to use them as a basis for strategy. Usually this is in written form, often reports, sometimes an expanded list, and could include numerical material and/or use of a fictional character as a device.

6. Examine these scenarios to determine the most critical outcomes.

Corporate strategy is the stage at which the firm's resources are matched to the challenges identified in the scenario. This ensures strategies are prepared for alternative futures.

Mercer's process is relatively simple, team based and strategy oriented. It is iterative; people go back and forth between stages and steps and continually polish scenarios. All this helps ensure that it is a process of learning.

The final scenario building model, 'future mapping', will not be considered in detail; however two key ideas are worthy of discussion. Mason's (1994), description, suggests it is based on two sets of tools, 'end states' and 'events'. A scenario is a series of events that lead to an end-state. The notion of events is the first of the 'key ideas' referenced.

Events are definite and recognisable. For example the trend to smaller and faster computers is deconstructable into events. It may be claimed that, for example, a 140 mhz carriable machine will be available for $1000 by 1997. We can then readily see if this happens. The appeal of this concept lies in its 'grounded' nature, in that it provides a series of useful focal points for inclusion in scenario descriptions.

The first stage of future mapping is the second idea. In this managers meet in order to develop a 'conventional wisdom scenario', a picture of the group's current mental model. This is done by managers identifying and then listing events that are considered

highly likely and highly unlikely before posting them chronologically on a wall and putting them into thematic clusters. Mason (1994) suggests this is typically the first time that managers have visualised their underlying thinking, which is revealed through the events and themes selected as highly likely.The shape of the eco-centric system can now be outlined using elements of the three models presented. For simplicity it is presented as four stages, issue identification, identification of driving forces, scenario building and strategy.

Issue identification provides the focus for scenario building. Issues need to be specific but important given that the technique can be time consuming. This does not mean that issues need to be immediately and absolutely sharp in focus and expression. An initially fuzzy issue can be rendered gradually sharper in what is an iterative process of scenario shaping and strategy development. A soft systems based willingness to continually examine assumptions and to assess how reality is being constructed is therefore part of the process.

In order to spread learning and maximise the opportunity for insights this should involve relevant line managers and a selection of line workers, making up as wide a group as is possible.

The next stage is identification of 'drivers'. Mercer's single category classification is preferred because the Schwartz distinction between 'factors' and 'driving forces' may be obscure, just as there are problems in strategic management distinguishing between the task and general environments. This does not mean the distinction cannot be used, it does in fact constitute a useful framework for initial thinking, merely that it is too loose to form the basis of a classification system.

Mercer's suggestion that a ten year time frame be used is useful too, a simple idea that forces people to think outside the immediate world of the organisation and to go beyond mere forecasting of the probable. It suits an eco-centric process because it forces people to consider the possibilities of long term and widespread change even when there are no short term indications. (This is a pattern common in environmental issues as exemplified by the history of commercial fishing world-wide.)

This is the research-intensive part of the scenario process because good analysis requires information and sensitivity to nuances within data. The future mapping idea of 'events' can be included in this step. In order to focus thinking on drivers, specific (indicative) events should be identified to use in tracking them.

New science, which is particularly useful in informing views on ecologically related issues, will become gradually more available to participants in scenario building as it becomes communicable through the parallel text system outlined in chapter five, and as it becomes part of the electronic web of information that is increasingly being used by researchers in all disciplines. This, together with other changes in information and understanding, makes up an important category of intellectual drivers.

A final step in this stage is a classification of 'drivers' according to degrees of importance and uncertainty. Scenarios will be driven by the most important/most uncertain drivers. Again, the natural environment will be important (so long as it is included in the system in the earlier steps) because ecological impacts are always uncertain.

The next stage is writing the plots. Mercer's idea of grouping drivers is a key, bearing the issue in mind together with a concentration on the most important and the most uncertain drivers.

This preparation of scenarios in some communicable form finishes the preparation stage. The aim is communication, a combination of communicability and use of communication pathways. This suggests that it does not matter what form scenarios are given so long as they are readily understandable and so long as they fit the communication infrastructure and culture they are aimed at. They are most commonly written and presented on paper and, if this is the case, should be in plain language. They may include graphs, figures and tables, but only if required in order to tell the story and presented in such a way that the audience can understand them. They may also be presented in video form. Computer technology facilitates their communication throughout an organisation however large and geographically dispersed it may be.

The final and most obvious stage of the scenario building process is strategy formation. The key question is what strategies fit the scenarios? Answers allow exploration of possible organisation responses to the alternative futures that have been developed, just as Shell was able to explore responses to a very low oil price in the early 1970's.

In the eco-centric system three scenarios should be prepared. The first is effectively the conventional wisdom scenario, made up of the routine expectations of the organisation. As Mason's future mapping process suggests, these reflect current mental models. The second will be made up of the other most plausible of the combinations of certain and uncertain drivers, emphasising possibilities that may require organisation response. Following Mercer's line, it must be complementary rather than contradictory so

that it is directly useful to the organisation. The third scenario is also complementary (hence comprehensible) but also specifically emphasises ecological matters in order to focus attention on the natural world and improve organisation learning. Knowledge of the natural world will therefore improve irrespective of the interests of participants. They may not be personally interested but will nevertheless learn about such things as river eco-systems because they are required to consider them as part of an organisationally useful process focused on possible futures.

Because this process results in strategies that are useable in a conventional organisation world, ecological learning is not threatening to participants. Such learning can be spread widely within the organisation if scenario preparation groups include people from as many sections and levels of the organisation as possible, and with up to ten in each scenario team (Mercer's guideline) there is scope to include line workers as well as stake-holders from outside the usual organisation boundary, for example local residents near a mining operation.

The process will be iterative which also increases the potential for learning. Whilst it has been presented in segmented stages the reality is that teams will move up and down the stages, for example by refining issues after considering focus or refining conventional wisdom after looking at future scenario outcomes.

Specific scenario development processes take time. Kleiner (1994) runs an annual scenario program for an organisation, meeting twice a week for six weeks and communicating via computers in the meantime. The Shell process extends over months (see Wack 1985a, 1985b, for example). It will take at least the 'Kleiner time' to generate

the material required as background and develop the insights necessary to write scenarios. This length of time spent specifically considering issues also helps ensure learning.

The scope of organisation activity is constrained not only by organisation learning and resources but also by the social and political forces operating in the macro environment. Scenarios indicate possible futures, but the macro world constrains possible actions and at the same time constrains the scope of the possible futures that are developed. As the developed world becomes more eco-sensitive the scope of possible action and the shape of possible futures become more limited. As with all such change, however, it is unevenly distributed, both in the political world, because some nation-states have populations and political systems more eco-sensitive than others, and in the world of organisation as some learn more quickly than others.

The relationship between incrementalist scenario building and the zone of possible natural world related action and its impact on possible futures is best presented diagrammatically:

Figure 16: Eco-centric Scenario Planning
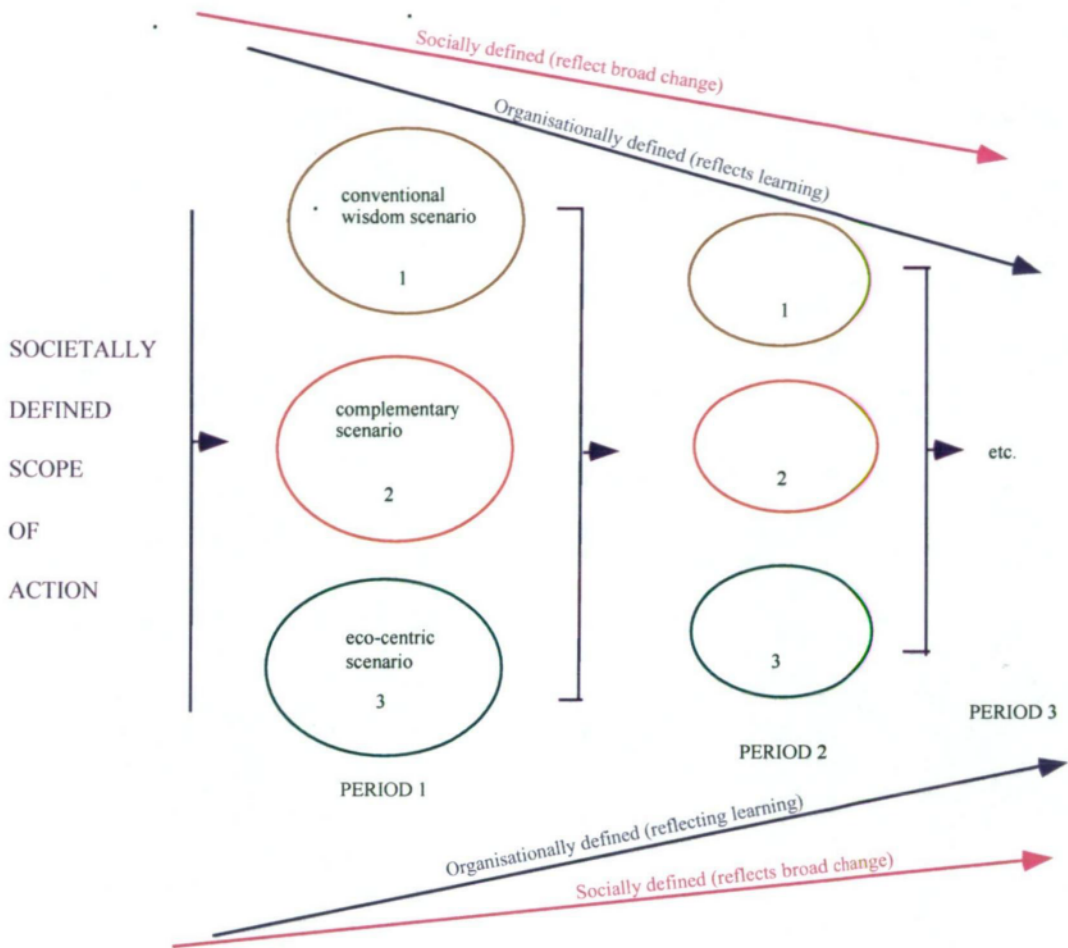
As this diagram indicates, the zone of possible action that affects nature decreases with time and developing (broad culture) eco-centricity. Simultaneously, organisation world view will tend to undergo a greater transition towards eco-sensitivity, one that reflects organisation sensitivity, thereby further constraining the scope of action. The extent to which this will be the case will vary according to the particular mix in any one organisation of leadership opinion, organisation cultural change, internal and external politics, planning expertise and accessible and useful information (see Quinn 1980:187).

This analysis does not eliminate the likelihood of emergent strategies playing a significant role in action. Indeed, as new information is included into consideration it is likely that much realised strategy will be emergent as new events take place and the organisation responds. Such strategies will, however, be developed with skills enhanced and attitudes changed by the scenario process. They will also be constrained within the same 'zone of action'.

The key to the usefulness of this style of scenario planning for eco-sensitive organisations is the simultaneous presence of ecological learning and commercial utility. In an uncertain business world planning which uses a scenario system is becoming more common. The process outlined uses this as a tool for increasing the eco-sensitivity of organisations.

Systems Thinking: The Basic Appeal

Systems thinking, defined as a complex body of generic theory, insights and techniques rather than as any single theory or systems approach is part of the eco-sensitive management for both direct and indirect reasons.

A major direct use is relatively clear and has been exemplified by the model used to explain the position of an organisation in its broad environment in the introduction to part B. Systems thinking facilitates understanding of complex situations, allowing understanding of the whole as well as the parts. In relatively simple form it allows for description of detail complexity (useful for

structure) and dynamic complexity (for such tasks as building models of organisation activity and its inter-relationship with the natural world).

Related to this is a facilitation of the growth in understanding by management of eco-systems. When considered systemically business organisations and eco-systems are structurally similar. Both include inter-related units (or agents) operating in complex patterns, and both require consideration of the 'whole' before 'parts'. It is unlikely that many current business managers will have formal training or a deep interest in ecology, but given the growing popularity of systems theory it is likely that a growing proportion will be able to gain this knowledge and understanding more quickly than previously because their mental models already include compatible systems language and understanding. In autopoietic terms, compatible distinctions are already established in organisation discourse.

The impact of such activity, whilst indirect, may be profound. Once managers start to think in terms of systems, and systems concepts such as feedback, cause and effect loops, and time delays between cause and effect, they change their world. As language changes so does the world. As new terms (distinctions in autopoietic terms) are established new insights are possible. As knowledge develops organisation identity changes. Once systems language has been established a basis for discourse institutionalisation of insights useful for eco-sensitive management has occurred.

The best example of the potential of this process comes with 'feedback', a central notion of systems thinking. It is defined by Senge (1992:75) as any 'reciprocal flow of influence' (see introduction to part B for earlier discussion).

This concept is of specific significance for eco-sensitive management because it encompasses an overthrowing of extreme anthropocentricism. The idea of using nature in simple exploitative fashion without considering consequences is impossible in a world structured by feedback language since this carries with it the assumption that we are part of the natural system, just as it is part of us. In Senge's words '...the human actor is part of the feedback process, not standing apart from it' (1992:78). Allied to this is the important realisation that in a system no one is fully responsible for poor performance nor is anyone free from blame or praise. In an eco-centric company everyone and every process is responsible for an insensitive operation, all are worthy of praise for a sensitive one. One outcome of this (mentioned again in the next chapter) is that the eco-centric organisation is more collaborative than combative.

Such advantages for eco-sensitive management stemming from system thinking are powerful even though they will be most often a serendipitous result of the adoption of system language by organisations seeking to cope with complexities defined as of a business rather than an ecological type. The facilitation of eco-sensitivity is nevertheless there, carried by an altered discourse and furthered by skills developed through use of the tools offered by systems thinking.

Before going on to consider further tools of particular use for eco-sensitive management brief comments on their source are necessary in order to provide intellectual context.

Theoretical Background

Hard systems approaches rely heavily on deterministic assumptions and emphasise an engineering approach to rational decision making. They assume problems are well structured, that all necessary information can be obtained and that the world is orderly and capable of being modelled without real difficulty. Mathematical expression of this world is possible, and operations research, an application of hard systems theory, relies on mathematical models to make business decisions (see for example Kwak and DeLurgio 1980). This is still the basis for many conventional academic courses in Management in core nations such as the USA and Australia.

In the environmental debate the hard approach has been well represented in various computer based 'world models', firstly by Forester (1971) followed by the Club of Rome model (Meadows, Meadows and Forester 1972), and by a number of other smaller models in the decade following (see Meadows 1982 and for a recent discussion of world models, Meadows, Meadows and Randers 1992). Forester's preface to *World Dynamics* is interesting, both for what it says about the advantages of systems thinking, and because it presents a cogent criticism of much 1990s thinking. Referring to stresses in the world system he comments:

> Over the last several decades interest in economic development, population growth and the world environment has expanded rapidly ... . But it seems fair to observe that most of the activity has been addressed to separate facets of the world system. Little has yet been done to show how the many actions and forces are affecting one another to produce the total consequences we observe (1971:vii).

Despite the hopes for insights implied in these words and echoed in other hard systems world models, the 'hard approach' is handicapped by the problems of any rational, tightly bounded modeling process. The need to cram a complex world into a model, however many elements are included and however powerful the

computer that runs it, is fraught with difficulties. Environmental issues are often ill-defined and little understood, and their relationships both internally (within eco-systems) and externally (with the rest of the world system) too dynamically complex for a model to encompass. This does not mean that 'hard' models lack utility. They can yield insights and lead to a higher level of awareness in system-makers, but they cannot reflect the world, paradoxically because they claim to reflect it too precisely, thereby limiting it so greatly that an accurate representation is impossible.

The soft system approach is designed to overcome many of these problems. Checkland suggests soft systems are the 'learning paradigm', in contrast to hard systems thinking which is 'the optimisation paradigm' (1993:258). Cavaleri and Obloj's summary of soft systems approaches includes five principles: perceptions are subjective and problems are therefore the result of perceptions, they are not 'out there'; problems are complex, so it is better 'to identify general issues than to define specific problems'; improvements rather than solutions are the goal; identified systems are not real, but 'projections of mind'; improvements to systems rely on learning and are not optimised outcomes (1993:133).

The soft systems approach, recognising limitations of the human mind and emphasising insights similar to those of the social constructionists discussed in chapter five, is suited to the handling of ecological problems. Whilst cautious about assuming that 'reality' can be reflected in models it is nevertheless optimistic that useful approximation can be developed and gradually improved.

Cybernetic systems originated in the 1940's (Weiner 1948) as a way of regulating or 'steering' systems. The emphasis is on control of systems via feedback loops which make up their underlying 'structures' (which in systems theory refers to the pattern of

relationships among systems components). Cybernetic theory is closely related to engineering ideas of regulation by measurement in a process including performance → measurement of feedback → alteration of performance → measurement. This is structurally the same as the system operating while a thermostat regulates room temperature.

Elements of all three approaches are evident in systems dynamics, an integrative approach which owes much to Forester, a computer pioneer, who became professor of systems dynamics at M.I.T. as well as being an influential member of the Club of Rome and a major influence on Senge (1992), currently pre-eminent amongst popularisers of systems thinking for business. From the hard systems approach comes an emphasis on model building, on use of computers, and the assumption that the system is knowable. From soft systems theory comes continual challenge to assumptions and changes to the model. A specifically reiterative process of model design and emphasis on feedback within system structure comes from cybernetic theory. System dynamics is also consistent with aspects of autopoietic theory with its emphasis on the closed nature of the system and the importance of the system structure (the pattern of the feedback loops in systems dynamics).

Forester was concerned that managers could not understand dynamic complexity without the aid of computers, responding to earlier work by Simon (1957) on human limitation which was influential at the time. Simon suggested that individuals cannot operate with complete information but rather must operate with 'bounded rationality', doing the best with available information and mental capacity: ' The number of alternatives he must explore is too great, the information he would need to evaluate them so vast that even an approximation to objective rationality is hard to conceive'

(1957:79). The Forester answer to information overload was systems thinking and computers. (The first two years of the 1970s were, after all, a period of technological optimism, as Stafford Beers' now somewhat ironic introductory comment to his 1972 work on cybernetics suggests.)

The basic Simon/Forester theme of human limitation continues to exert influence. Senge, for example, updates it for the 1990s in his argument for systems theory: 'Today, systems thinking is needed more than ever because we are becoming overwhelmed by complexity. Perhaps for the first time in history, humankind has the capacity to create far more information than anyone can absorb, to foster far greater interdependency than anyone can manage, and to accelerate change far faster than anyone's ability to keep pace' (1992:69).

Whilst Senge's answers do not depend on computers to the same extent as those of Forester, they do go back to early writing in systems dynamics. In the current discussion they are used extensively but with a more specific background of assumptions from soft systems theory. In what follows therefore, the stress on the influence of language in defining reality, on the need for continual examination of assumptions, and on an iterative process of modeling, should be taken for granted.

Useful Tools and Techniques within Systems: Theory Directly useful for Eco-Sensitive Management

The aim in this section is to provide a general illustration of the usefulness for eco-centric management of selected systems thinking techniques rather than to set out a text-book recipe for their use which would be a task requiring a book in itself.

The concept of feedback has already been referred to. Feedback language represents a fundamental re-orientation of perception, but is also a useful tool for action. In systems thinking any identifiable element can be linked to others via use of 'causal loops'. There are two basic types of loops worthy of mention in this discussion: 'reinforcing' and 'balancing'. (For a full coverage of feedback's use see Richardson, 1990.)

Reinforcing loops represent feedback that builds in a reinforcing process so that small changes can lead to greater ones. This can be good or bad. For example, in diagrammatic form, a good loop is presented in Figure 17, and a poor one in Figure 18:

Figure 17: Recycled paper loop

paper producer
using recycled
paper

greater supplies
of paper for
recycling

more recycled
paper products

greater sales
for other
company
products

sale of these
products

community
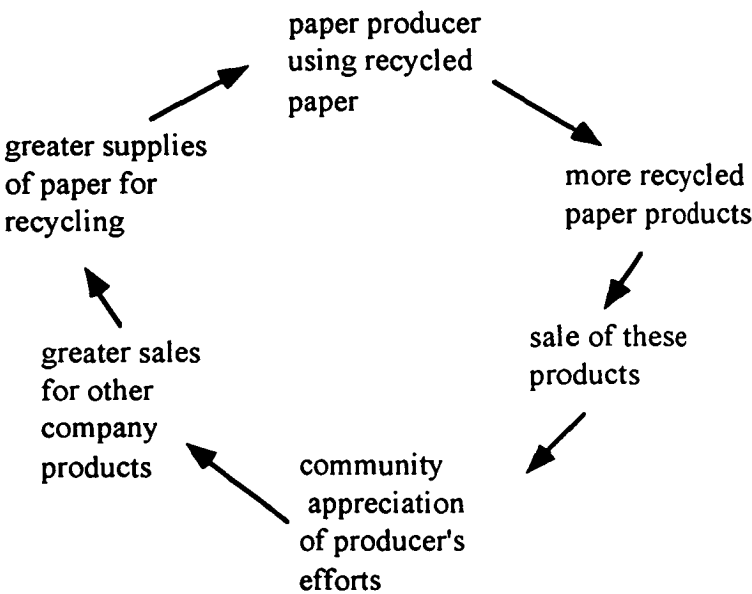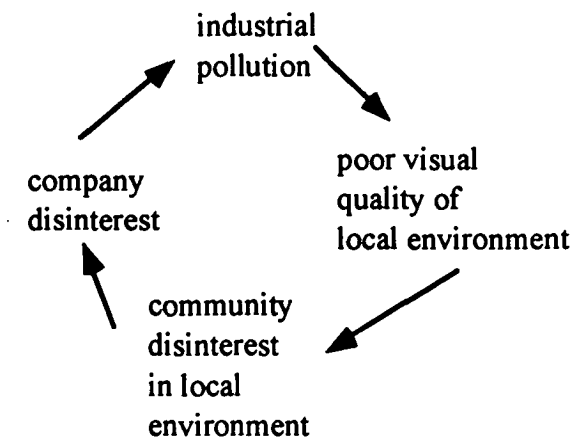 appreciation
of producer's
efforts

Figure 18: Pollution loop

Balancing loops represent stability, as for example in stability within an ecosystem or in the balancing feedback process that maintains the human body. In organisations balancing loops are easily found, for example production adjusts to orders and prices in the free market adjust to demand. In a balancing situation there is a target (either explicit or implicit) and a gap. These can be represented diagrammatically, for example with a wood-yard supplying fire-wood:
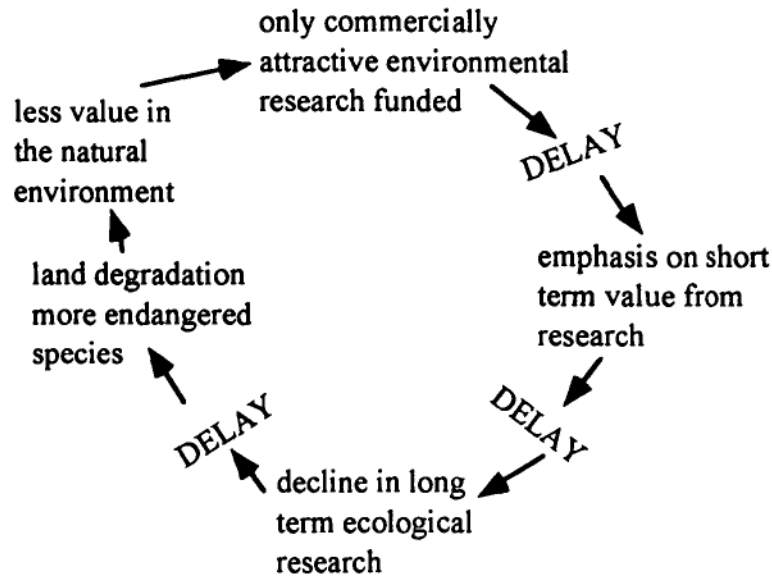
Figure 19: Wood-Yard loop
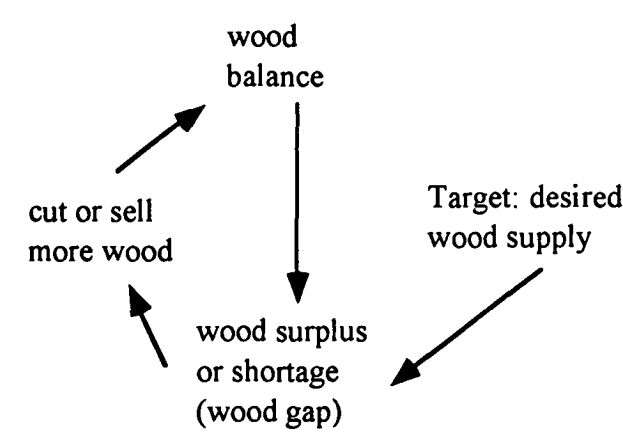
Senge suggests that balancing loops are more difficult to see than reinforcing loops because nothing may seem to be happening. The system may be pursuing an implicit target, so in his example, a leader may encounter resistance to change that 'seems to come from no-where' (1992:88).

In systems, delays between action and consequence are also significant, as well as being difficult for individuals to appreciate. In the recycling loop presented earlier there are significant delays at several points. The length of such delays may be difficult to calculate but realisation that they exist is significant in understanding how the system works. This is of central importance for an organisation's understanding of eco-systems because of the delayed nature of much important change after human impact on nature.

The two forms of feedback and the notion of delays are the building blocks for systems diagrams which may be very complex but may be revealing even when simple. An example of a simple but useful systems analysis is provided by the Australian State Government of Victoria which in January 1996 decided that government run research programs would be corporatised, opening them up to commercial competition. Possible impacts can be presented diagrammatically in a reinforcing loop with delays.

Figure 20: Corporatised environment research loop

only commercially
attractive environmental
research funded

less value in
the natural
environment

DELAY

emphasis on short
term value from
research

land degradation
more endangered
species

DELAY

DELAY

decline in long
term ecological
research

The message is simple, a reinforcing cycle that will gradually lead to less and less research and an increasingly endangered environment. At each stage delays will apply and the pattern may be lost if this is not borne in mind.

This simple illustration supports a general argument offered earlier: systems modeling of organisations can be very complex, including multiple interlocking loops, but even when complex will rarely be any more so than the relationships between the parts of an ecosystem and in both cases the system is built up using the same basic idea. Learning how to model organisation systems therefore provides the skills and many of the understandings necessary to model and/or understand ecosystems. The discipline of seeing wholes before parts is fundamental in both cases as is the role of inter-relationships, delays, flows, patterns.

Organisations staffed by people who use systems thinking have one of the basic understandings necessary for eco-sensitive operations because they possess an important set of skills that facilitate such activity.

Modeling systems nevertheless remains an extremely complex activity and assistance for those unable or unwilling to develop their own models comes with the notion of systems archetypes or patterns that re-occur. Senge suggests that they are 'simple stories that related again and again [and] reveal an elegant simplicity underlying the complexity of management issues' (1992:94). The idea has obvious similarities to the scenario archetypes discussed in the previous section, with the system version distinguished by use of systems concepts. Senge offers nine such archetypes, reflecting current orthodoxy in systems dynamics, and provides reasonable examples of their application to organisation activities. Of the nine at least four also have direct application to biodiversity issues and these provide examples of the usefulness of the idea for eco-centric management.

The first can be called 'limits to growth 'where: A process feeds on itself to produce a period of accelerating growth or expansion. Then the growth begins to slow and eventually comes to a halt, and may even reverse itself and begin an accelerating collapse' (Senge 1992:379). This is a direct borrowing from Meadows *et al.* (1972) and has obvious application to any identifiable ecosystem or natural resource. Use of ecosystems without regard to consequences is definitional of exploitative anthropocentricism.

Shifting the burden is where: 'A short-term "solution" is used to correct a problem, with seemingly positive immediate results. As this correction is used more and more, fundamental long-term corrective measures are used less and less. Over time, the capabilities

for the fundamental solution may atrophy or become disabled, leading to even greater reliance on the symptomatic solution'(Senge 1992:381) Environmental application of this comes frequently with mining operations that use tailings dams to handle waste disposal, an apparently reasonable short term solution that hides rather than solves a problem. This is related to the idea of 'eroding goals': 'A shifting-the-burden type of structure in which the short-term solution involves letting a long-term fundamental goal decline' (Senge 1992:383). Application comes with any dumping operation, for example, sea dumping of jarosite.

The tragedy of the commons archetype is familiar to environmentalists: 'Individuals use a commonly available but limited resource solely on the basis of individuals needs. At first they are rewarded for using it. Eventually, they get diminishing returns which causes them to intensify their efforts. Eventually, the resource is either significantly depleted, or entirely used up' (Senge 1992:385). This is a specific (and acknowledged) adoption by systems dynamicists of Garrett Hardin's ideas with classic application to the fisheries industry world wide.

The final archetype can be called 'fixes that fail': 'A fix, effective in the short-term, has unforeseen long-term consequences, which may require even more use of the same fix' (Senge 1992:388). This archetype is seen in much agricultural activity. Land is cleared, used and becomes infertile. Fertilisers are added, the land is re-used but then more fertiliser is required, and more, and more. Similar patterns are evident in the use of insecticides.

These archetypes are likely to be given increasing use as eco-centricity develops because of their application to environmental matters, and especially biodiversity issues. As with the scenario

archetypes (or stories), they are notions now used by organisations seeking survival but can be readily adopted to serve environmental ends.

Further assistance in coming to terms with systemic patterns and interdependencies comes from the growing supply of what are called, by some, 'micro-worlds' and also, in reflection of modern technology, 'management flight simulators'. These are computer generated worlds that allow users to explore options without real-world consequences for mistakes. With good micro-worlds people learn about patterns that may occur in the real world and develop skills that allow them to cope with this world. There are obvious similarities with the learning that result in process of scenario building, with micro-worlds representing ready made generic scenarios.

A powerful way to extend understanding of environmental issues is, then, to make ecologically focused micro-worlds available, such as the 'World-391 Explorer' which allows exploration of the limits to growth archetype and the thirteen different scenarios described in *Beyond the Limits* (Meadows, Meadows and Randers 1992). More 'micro-worlds' of interest are likely to be offered as organisations become more eco-sensitive, resulting in further increases in the capacity to give effect to eco-sensitivity.

Interested people can already build their own micro-worlds, effectively computer models of known or invented systems. Available software for both Macintosh (Micro-world creator, i-Think) and MS-DOS (i-Think, Stella, Power-Sim, Sim-tek) are already available worldwide to facilitate this process.

Scenarios, System Thinking and Mental Models

Both scenario planning and systems thinking have immediate and
practical applications for organisations. Scenario planning works as a
planning process and systems thinking provides a tool that allows
description of both detail and dynamic complexity. Both also have a
positive influence on the learning climate within an organisation
since both involve incorporation of new data and information into
organisation knowledge. Both lead to development and use of
multi-disciplinary thinking and provide a means for incorporation
into formal processes of new and perhaps unorthodox information
from, for example, science and economics.

These processes help alter, slowly, organisation culture by changing
language and understandings, and therefore by altering institutional
discourse. For individuals within organisations they provide an
opportunity to assess and perhaps alter their existing mental models.

'Mental model' in this discussion means the semi-permanent view
individuals hold about their world, one that renders it meaningful
and structures everyday activities and reasoning processes. The
notion is common to a variety of disciplines. Churchman uses the
Hegelian 'Weltanschauung' to refer to images of the world and ways
of viewing (1971:169-170). Senge prefers the term 'mental model' for
'internal pictures of how the world works' (1992:174). Checkland
follows Churchman using 'Weltanschauung' to indicate the
(unquestioned) image or model of the world which makes a
particular human activity system a meaningful one to consider (see
Checkland 1993:214-225). Argyris, who helped pioneer 'action
science' which aims to achieve more effective learning in
organisations, refers to 'master programs' (1991:103). In this
discussion the term 'mental model' is preferred because it is the
simplest available and best reflects the practice of planning.

Eco-sensitive organisations require eco-sensitive individuals, implying transitions from the exploitative view of the natural world that is dominant in human culture. It has already been suggested that while broadly based ecological consciousness is rising, a basically exploitative anthropocentric notion remains dominant in all or almost all world cultures and certainly in the mental models of individuals active in the growth oriented global economy. In simple terms the transition towards eco-sensitivity in individuals mirrors central elements of the organisational transition: towards holistic thinking; new understandings of risk for nature in human activity; new knowledge in areas such as science and economics; pursuit of problem centred multi-disciplinarity. Ultimately, as Naess (1989) suggests, the 'expanded self' encompasses more of the natural world than before and the individual cares more about actions that affect it.

Such changes in world view are difficult, however, because individuals 'defend' their mental models which consequently have a resilience similar to that of organisation culture and self. Argyris's analysis of this is noteworthy. He refers to the defensive reasoning that individuals use to defend their world view and emphasises it's tacit nature: 'one of the paradoxes of human behaviour, however, is that the master program people actually use is rarely the one they think they use' so that their 'espoused theory of action' is different to actual behaviour (1991:103).

This idea applies particularly to deep seated elements of world view that make up the network of assumptions about the natural world. People who consider themselves kindly disposed towards animals eat meat from animals raised in cages and barbarically killed; workers who love the sea work in factories that pollute it; fishermen over-exploit fish stocks but consider they respect the resource.

Individual eco-sensitivity and the Naessian 'extended self' may therefore be slow to develop, inhibiting transitions in eco-sensitive organisations. Argyris suggests that most (impliedly western) 'theories in use' rest on the same set of governing values, providing a further cautionary note in this argument:

> There seems to be a universal human tendency to design one's actions consistently according to four basic values:
> 1. To remain in unilateral control;
> 2. To maximise 'winning' and minimise 'losing';
> 3. To suppress negative feelings; and
> 4. To be as 'rational' as possible (1991:103).

Taken together this is a summation of central values of the growth oriented global economy. As individuals become more eco-sensitive they will abandon win-lose values and change towards win-win and compromise/collaborate ideas, just as they will start to consider alternatives to the emphasis on control and conventional linear styles of rationality. How can this take place?
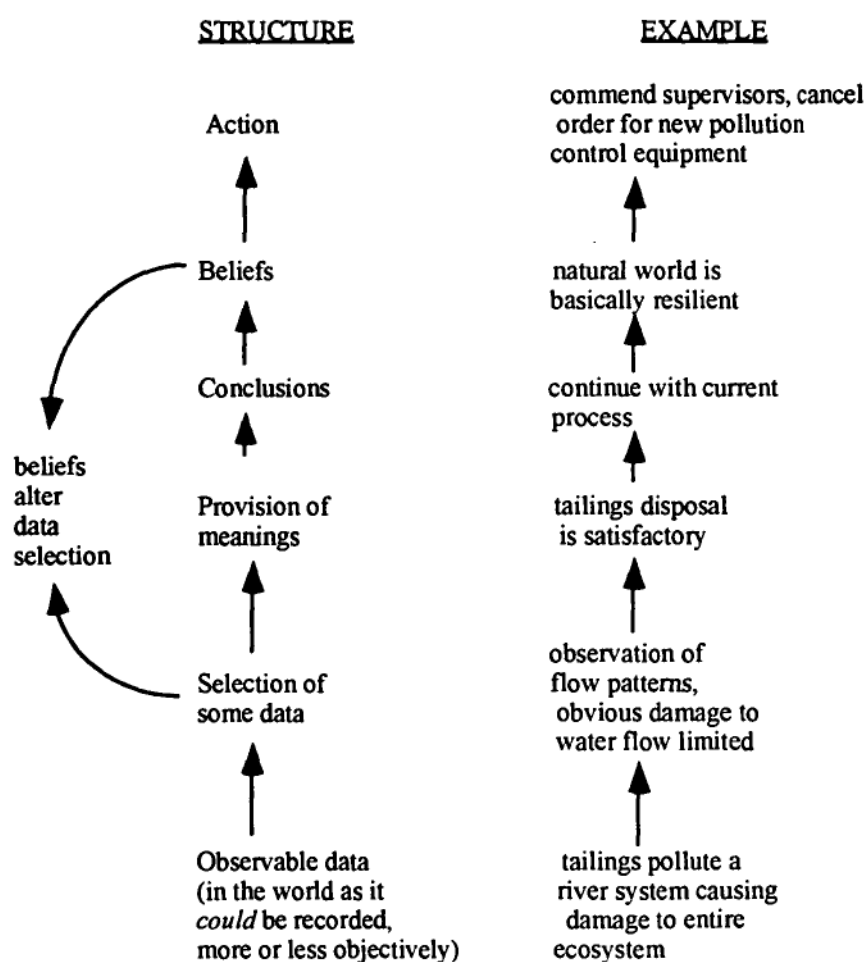
Scenario planning and systems thinking provide powerful tools while new writing and ideas in areas such as science, economics and strategic management as well as in growing multi-disciplinary understandings provide useful background. In more eco-centric organisations too, organisation culture will encourage more eco-sensitive behaviour and eco-centric thinking.

In addition to these activities and influences, all already discussed, a range of specific tools suggested by 'action-science' thinkers can be used to uncover mental models. Two will be discussed in order to provide an indication of the uses of this branch of management thinking. (For a full range see Argyris and Schon 1978, Argyris, Putnam and Smith 1985, Argyris 1985, Argyris 1982, Argyris 1990, Argyris 1991.)

Examining what Argyris calls our 'ladders of inference', pathways of increasing abstraction from observable data to generalisations about the world constitute one such technique (see Argyris 1990:87). Normally individuals go from observable data to generalisation and then action so quickly that steps in the process remain unexamined and with them the mental models that allow conclusions to be drawn. This (adapted) ladder provides an example:

Figure 21: Mining tailings ladder of inference

STRUCTURE   EXAMPLE

STRUCTURE	EXAMPLE
Action	commend supervisors, cancel order for new pollution control equipment
↑	↑
Beliefs	natural world is basically resilient
↑	↑
Conclusions	continue with current process
↑	↑
Provision of meanings	tailings disposal is satisfactory
↑	↑
Selection of some data	observation of flow patterns, obvious damage to water flow limited
↑	↑
Observable data (in the world as it *could* be recorded, more or less objectively)	tailings pollute a river system causing damage to entire ecosystem

beliefs alter data selection

Once such a 'ladder' is recognised and individuals become used to the idea it becomes much easier for them to analyse their reasoning processes. In the example offered a manager might therefore re-

examine the original observable data, checking for damage to nature in a more rigorous way. Such a process, of course, will be enhanced as managers obtain a more complete level of understanding and the sophisticated vocabulary necessary for describing eco-systems. Another action-science idea is balancing inquiry and advocacy. The insight here is that managers in the global economy have life time training in argument but little in learning (and still less in collaborative wide-scope learning). To help managers obtain inquiry skills, tools such as conversational protocols have been developed; for example, advice on how to draw out the reasoning of people ('How does this relate to your other concerns?') and use of unconventionally un-aggressive language (instead of 'What do you mean?' use 'Can you help me understand your reasoning?').

These protocols - and a range of other techniques for improving inquiry skills - are admittedly likely to be of more use for managers already anxious to change rather than those who are content with the mental model that has made them successful. They are nonetheless powerful because they present a way of changing thinking towards the flexible patterns suitable for eco-centric management.

Many such techniques may be used by eco-sensitive leaders who attempt to hasten the transition towards an eco-friendly world. The next chapter's discussion explores the style and some possible strategies useful for this sort of leader in more detail, before discussing the related idea of the organisation structure that is best suited to eco-sensitivity. At the same time, chapter nine serves to bring together some major lines of argument from preceding chapters, given that the 'eco-leader' will use the understandings already presented in earlier discussion.

CHAPTER NINE

LEADERSHIP AND STRUCTURE

Leadership

Leadership, defined simply, is 'the ability to influence people towards the attainment of goals' (Daft, 1994:478). It is a reciprocal process involving changes to both leaders and those influenced and involves the use of legitimate leader-power.

Beyond these relatively straight-forward points the huge literature on leadership provides little clear guidance, with enormous variation on issues like whether leaders are born or trained, the traits of leadership, the type of leader required for different situations, and the differences between leaders and managers.

The choice available within the literature is therefore broad and in this discussion the basic approach is a cultural one, focusing on leaders as initiators and embedders of organisation culture which is in a continual, but slow, state of change. This is consistent with the approach taken earlier and focuses attention on key 'world view' elements in the transition to eco-sensitive management.

Discussion will concentrate first on the leadership 'understandings' consistent with eco-sensitivity before moving on to consider the 'styles' that help ensure creation and maintenance of eco-centric organisations and then assessing the difference in leadership challenges between start-up and mid-life/mature organisations.

In all this discussion it needs to be borne in mind that the eco-sensitive leader is one who seeks to direct an organisation beyond the merely pragmatic processes of either staying in fit with current regulations and stakeholder expectations or getting in just ahead of expectable changes to them. Certainly, pressure from a variety of forces in broad culture are forcing most organisations (in the core world at least) to behave more eco-sensitively, but the truly eco-sensitive leader will strive to move organisations beyond the expectable, effectively operating in advance of any changes in broad culture.

The level of current 'best practice' for environmental leadership is therefore some way before the activities of the eco-sensitive leader who seeks change in the organisation as a whole and in style of operation and thinking of people within it. 'Best practice' is an ongoing (and always changing) part of this but it tends to be reflective of current orthodoxies rather than truly visionary change. This is not to say that it is unimportant, merely that it is less important than changes to the total approach of the organisation.

Leadership Understandings: The Mind of the Eco-Learning Leader

Many key understandings about the mind of the eco-leader reflect earlier discussion: The world is constantly changing; continual learning is required for organisation survival; new information will become available on issues; this will nevertheless never be complete. What can be called an eco-learning leadership style is comfortable with such ideas.

The classic Zelaznik distinction between managers and leaders captures the essence of the leader's attitudes to problems:

> Leaders tolerate chaos and lack of structure and are thus prepared to keep answers in suspense, avoiding premature closure on important issues. Managers seek order and control and are almost compulsively addicted to disposing of problems even before they understand their potential significance (Zelaznik 1992:131, referring to his 1971 article).

The ability to tolerate ambiguity allows room for changing decisions and is consistent with pursuit and use of new information and theory, scenario planning styles and continual revision of world view.

The eco-leader will also be conversant with, and a behavioural model for, scenario planning and systems thinking and practice and thereby capable of spreading those ideas through the organisation. Leaders who think in and use 'feedback' rather than linear language are a powerful force for changing organisation discourse because they possess the power to exert control over elements of that discourse. A leader, for example, may insist on feedback language in board meetings and in planning group meetings and in doing so will gradually establish that language within the organisation.

Such a leader will also be one of Elise Boulding's (1979) 'influence optimists', believing that those elements of the natural world affected by organisation activities can be protected and/or improved. Again, as a behavioural model this results in influence on others, thereby improving organisation performance.

These leaders will operate with a long-term (at least generational) time-frame, whilst at the same time remaining alert for the immediate impact of activities as well as for opportunities. This is already characteristic of leaders in large Japanese companies such as

Hitachi who think a generation ahead in their research program (see Gross 1992) and the notion is gaining currency in the rest of the world economy.

A tolerance for diversity in individual staff, groups of staff and ideas is required if the necessary room for new ideas is to become part of the new eco-learning culture. The style of this (if not the substance) is well summarised by Arne Naess, referring to his personal philosophy:

> I have a somewhat extreme appreciation of diversity: a positive appreciation of the existence of styles and behaviour which I personally detest or find non-sensical (but which are not clearly incompatible with symbiosis); an enthusiasm for the 'mere' diversity of species, or varieties within a genus of plants or animals (Naess 1993:216).

Because changing an embedded growth oriented culture is a difficult and long term process the eco-learning leader will also require persistence. New organisations provide an exciting and immediately rewarding opportunity to set up and embed an eco-culture, but in a world economy with almost all organisations anthropocentric and growth oriented a gradual re-orientation over perhaps a generation is required to turn an organisation around. Eco-leaders must be skilled as well as patient, a matter to be further discussed shortly.

Leadership Style

Burns' (1978) distinction between transactional and transformational leaders provides a useful start to discussion. Transactional leaders clarify goals, provide work assignments, allocate rewards and generally maintain an effective status quo. Transformational leaders energise and change followers, appeal to their imaginations, excite them. They are belief, value and goal focused, changers of world views.

Because truly eco-sensitive organisations operate in advance of and in partial contradiction to the dominant view of the world economy leaders need to be transformational, in order to create and communicate the 'different' vision of eco-sensitivity for people. This point applies notwithstanding the already argued point that there is a trend in many organisations for gradual transition towards eco-centric practices; eco-sensitive managers push this process along, thereby taking advantage of the social and cultural space and commercial opportunities presented by this evolution.

The guiding vision must be one which describes an eco-sensitive future state related to organisation capacity, performance and shape. Ideally it will be one recognising the components of eco-sensitive organisations discussed in preceding chapters. An effective eco-sensitive vision also sets out the future state as unambiguously as possible (given the realisation that it will constantly be changing) and covers the organisation as a whole.

A transformational leader is one committed to this vision and capable of communicating it enthusiastically and effectively; pulling rather than pushing people along (see Bennis 1984). This will happen partly because of the public actions of leaders, and transformational leaders of the future are therefore likely to be ever

more effective users of the mass media as the power of the letter to communicate in a seemingly personal fashion grows. It is most effective though, when interpersonal, as leaders such as Anita Roddick of Bodyshop demonstrate. She visits retail outlets frequently, speaking to staff about the vision and the business, and successfully seeks to inspire workers.

This focus on individuals is characteristic of transformational leaders. They tend to hold a positive view of human nature as well as a faith in their own ability to influence it. Subordinates of such leaders have enhanced self esteem and confidence (Dunphy and Stace 1992:172) since the communicated vision provides a framework of meaning in their lives. Interestingly a domino effect may operate as transformational leadership at one level in the hierarchy is repeated in the next (Bass, Walman, Avolio and Bebb 1987)

Whilst being an ecologically oriented transformational leader may already be difficult enough, the discussion so far fails to fully encompass the complexities of leading eco-sensitive organisations. A key variable altering leadership tasks is organisation life-cycle, with a simpler task facing founder leaders of new organisations to that of leaders of those in mid-life/maturity. The following discussion allows development of these points, taking a cultural lens to the matter.

Organisation Life-Cycle and Eco-Sensitivity

Founder-leaders have the opportunity to establish the 'climate' of an organisation, which will, by virtue of 'culture-embedding' mechanisms, become manifest in organisation culture and identity. In Schein's (1992) analysis these mechanisms include a range of formal and informal processes that allow overtly eco-centric organisations such as the UK based Body-Shop and the USA's Ben and Jerry's Ice Cream to develop an appropriate culture (see Hawken [1994] and Saunders and McGovern [1993] for analysis of these and a range of other eco-sensitive organisations, and Roddick [1993] for a description of the Bodyshop specifically).

Powerful culture embedding processes are evident when leaders pay attention to particular things on a regular basis, include them in plans and decisions, measure them, count them, and discuss them. Leaders systematically paying attention to biodiversity matters, for example, ensure organisation attention to such matters. When staff disagree and are brought into line messages are reinforced and become part of the culture. In these processes the language used by leaders is particularly important because of its contribution to organisation knowledge and discourse. In the early years of an organisation an eco-sensitive leader can effectively create an 'ecologically literate' work force by ensuring inclusion of a useable ecological vocabulary into the everyday conversation of staff.

These lessons are reinforced and made more obvious in the way leaders handle crises. As Schein (1992:237) points out, these are 'especially significant in culture creation and transmission because the heightened emotional involvement during such periods increases the intensity of learning.' A major accident in a new production facility, for example, is an opportunity to demonstrate the founder's commitment to worker safety, just as the discovery

that a threatened species is endangered by company activities provides an opportunity to demonstrate commitment to biodiversity. (The role of crisis in culture change is again considered in later discussions of change in mature organisations.)

The observed criteria used in creating budgets also operate as a powerful signal of intention in a commercial organisation. For staff who share the for-profit assumptions of the world economy a leader who is willing to budget for an expensive voluntary survey of the biodiversity of a possible new factory site sends out a clear message of organisation intention.

Organisation founders can also exercise considerable influence through deliberate teaching and role modelling, not only inter-personally but also via videotapes, computer messages and in-print media.

The criteria used to recruit, select, reward, promote, retire and, using Schien's word, 'excommunicate' (fire or give meaningless work to) staff are fairly obvious means of embedding culture. Founders have the ability to surround themselves with people who already think the same way as them about issues, to promote those who think most like them, and marginalise or dispose of those who don't.

In addition to the 'primary' embedding mechanisms already discussed, 'secondary' mechanisms also exist. These indicate formal statements of values and mission; legends about people and events; rites and rituals; systems and procedures; and design of physical space. In the early stage of organisation life each presents choices that can be directed or heavily influenced by a leader or leaders. They are 'secondary' in the Schein (1992) system because they work as embedders only when consistent with primary mechanisms and whilst in the early period of an organisation they are highly visible,

they may be difficult to interpret without insider knowledge obtained from observing a leader's actual behaviour (Schein 1992:245).

The message that founder leaders can provide powerful direction towards eco-sensitivity is clear in this analysis. They have the greatest possible chance of being transformational because the task of founding an eco-centric organisation necessarily involves the taking of a transformational stance. The power of culture-embedding mechanisms is such that a new organisation with an enthusiastic eco-centric leader can be established as eco-sensitive even if placed within a generally unsymphatetic social and economic environment. This is nevertheless a difficult process because the culture exerts continual and often contradictory influence on staff and business activity generally, thereby creating an ongoing challenge to a different (eco-centric) organisation culture.

Ben and Jerry's and Body-Shop, both of which are relatively new organisations, demonstrate two aspects of this. In the former, leadership succession created a major problem. When the founders and leaders decided to retire, they advertised for a new leader, but because they had established a limited pay differential policy within the company culture and had therefore restricted their own CEO salary the advertised position was advertised at a similarly low pay level. It attracted little interest from outside the company, revealing a lack of qualified people in the employing pool sharing their assumptions.

The Bodyshop situation is one in which attacks have come from two 'sides' of the environment debate. The organisation uses environmental awareness as the basis of its advertising and in 1994-1995 attracted significant criticism from environmentally minded critics who challenged the validity of such claims, creating such

interest it was the subject of a formally highlighted debate at the annual conference of the Academy of Management in 1995. At about the same time the organisation was under a financial challenge in London as financiers continued criticisms of its financial stability.

· These examples point out problems as eco-centric organisations head towards mid-life, become larger, and lose some of the initial excitement and drive of first years. Activities necessarily become routinised as commercial operations that are culturally distinct continue. Organisations are also linked to an established labour market and, however unwillingly, to the conventional requirement to grow, make profits and market products. The conventional processes of transactional leadership are required to keep an increasingly complicated organisation operating effectively and the transformational aspects become less important. The role of an eco-sensitive leader becomes one of defending an established culture rather than building a new one, a leader who is battling against a gradual (and in its detail unpredictable) drift towards the broad culture's values.

This situation is more obvious in established mid-life organisations. Schein suggests these have 'had at least two generations of general managers and [are] publicly owned.' Structures, norms and processes are by then well established and culture is embedded. In this situation culture defines leadership more than leadership defines culture.

An eco-sensitive leader in this situation will therefore tend to come from outside and must be capable of leading change. Instituting scenario style planning, using systems thinking, introducing new ideas from science and economics and appreciating the 'shape' of an

eco-centric pattern of management are part of this. Transforming mid-life and mature organisations also requires an appreciation of basic change strategies and a particular view of the organisation.

Dunphy and Stace (1992:82) suggest that change can be managed in organisations with one of four strategies:

- 'participative evolution', that is incremental change through collaboration with high employee involvement
- 'charismatic transformation', large scale change led by transformational leaders
- 'forced evolution', incremental change by coercion, which is manager driven
- 'dictatorial transformation', large scale transformation by direction

This integrative model incorporates both the human resources/organisation development theorists who favour planned consultation/collaboration, and the power/political theorists who argue for direction and coercion. It is situational, suggesting that different strategies are required depending on prevailing circumstances.

In their analysis participative evolution is suitable for situations in which the organisation is basically in fit with its environment and needs only minor adjustments in a situation in which key interest groups are in favour of change.

This may be the case when leaders seek to 'nudge' an organisation further towards eco-centricity, particularly when broad social and cultural changes indicate more eco-sensitive operations are required, for example when recycling programs or new pollution control processes are set up. The organisation development literature is replete with advice on how this can be handled, emphasising activities such as team building, workshops, consultations, and survey feedback, a process in which questionaries are used to elicit responses on matters such as values and group cohesion before

consultants ('experts') meet with them to develop strategies to handle problems identified in the data (see Nadler 1977, French and Bell, 1990 for coverage of these and other techniques).

These ideas are consistent with a Quinn-style incrementalism, pacing changes so that new information can be gathered and assimilated by staff. They are gradualist in nature, 'fine-tuning' rather than being oriented towards significant change, and therefore will not push organisations much ahead of the requirements of current orthodoxy. That said, another value for them comes in defending an established eco-sensitive culture.

Much of the current best practice in environmental management can be classified into this category. The activities may be complex and their impact far-reaching as companies strive to keep pace with, or (as with sections of the European car industry discussed in Fischer and Schott 1993) stay ahead of changes in stakeholder expectations and government regulations. Dechant and Altman (1994), for example, list five elements of such best practice; 'a vision statement and corporate values that promote environmental advocacy'; 'a [structural] framework for managing environmental initiative'; 'green' product/process design; 'environmentally-focused stakeholder partnerships'; and 'internal and external education initiatives' (pp. 9-15).

This is a formidable list of structural and cultural initiatives which includes an indication of more profound changes that may accrue in the future, but falls short of major organisation change. It is classifiable as a 'can-do' program without backing from a holistic and fundamental view of organisation change and environmental leadership which incorporates conscious changes to deep aspects of organisation culture.

'Charismatic transformation' is of use when major change is required and transformational leaders energise and sweep people along, breaking old world views and creating new ones. Eco-centric leaders of new organisations certainly fit this mode, and its core ideas of envisioning, exciting people and carrying them along are arguably those required for any leader seeking to keep staff on side as they change organisations to fit major new challenges. A purely transformational style is, however, unlikely to be available to leaders seeking to turn established cultures radically towards eco-sensitivity because this involves a shift away from fundamental aspects of both organisation and broad culture, aspects deeply embedded and rarely examined. Charismatic change in commercial organisations, as Dunphy and Stace point out (1992:89), 'becomes a more viable approach when there is an acceptance on the part of key organisational stake-holders of the need for large scale transformation'. This sort of acceptance is unlikely in a mid-life commercial (or government) organisation because of the contradictory nature of a basically eco-centric approach. Incremental change in line with a changing orthodoxy is necessary and change slightly ahead of this is possible, but transformational change is unlikely.

This does not mean that the eco-leader can afford to neglect the key interpersonal messages of the charismatic style, as 'selling' an unorthodox message requires energy, imagination and excitement.

Coercive change through 'forced evolution' is applicable when minor adjustment is required but key internal groups are opposed. For example, new information and communication technology and new organisation structures may be part of moves to make the organisation more co-operative. Change to more effective (but difficult to operate) pollution control equipment and compulsory use of new and unfamiliar sources of information are examples of

eco-leaders operating this way. When a culture of an organisation and the broad culture within which it is located are opposed to new eco-sensitive ideas, as they will often be when a TNC wishes to operate in advance of local ideas, coercive change is part of the eco-leader's role.

Dictatorial transformation is appropriate when the organisation requires major change but there is no support for it within the organisation. It is a style required when established practice and culture come into conflict with the need to move organisations forward in a changing world economy. Dunphy and Stace (1992) provide the actions of Australian Lend-Lease corporation after take-over of MLC life as an example. They reduced the workface by up to 40 per cent in some areas, culled middle management, changed the organisation structure, eliminated some departments and changed technology. The result was a more competitive organisation.

This mode of change relies on a clear mandate from significant stake-holders, typically majority owners. When established organisations are purchased by individuals or groups with clear eco-centric expectations this may be the mode chosen by the new leader (de-facto an eco-leader). Such a person will require a clear idea of what processes, world view and practices constitute the mandate version of eco-sensitivity and can then implement them. This will however, rarely be the case in a profit and growth oriented world economy.

Analysis so far has followed the Dunphy and Stace (1992) change strategy model, whilst retaining the cultural lens used in earlier discussion of transformational leaders and the opportunities afforded founder-leaders. What is missing though, is a strategy category which includes the type of long term cultural and world view changes that result from instituting scenario-planning, systems
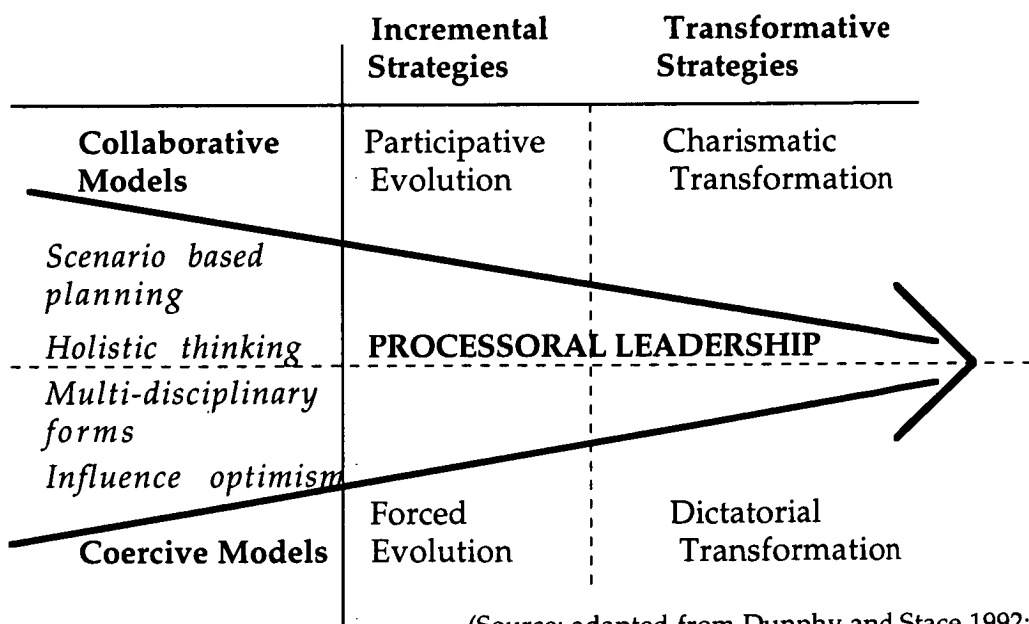
thinking, use of new risk ideas, new science and new economics. These will be in part collaborative because some aspects will be agreed to by staff, and because their use is justifiable in terms of orthodox pursuit of profit and survival terms. They may be coercively introduced, far more often because of commercial rather than eco-sensitive reasons, but nevertheless with a longer term benefit for the natural world. They may be part of a directive program, aimed at some wider agenda of corporate re-direction. In any case if they are to be successfully adopted they must be instituted with the energy and vision characteristic of transformational leadership.

Ensuring significant transition towards eco-sensitivity therefore may require elements of four models simultaneously. It also requires persistence and because the necessary focus is on cultural change, including change to fundamental aspects of world view and patterns of language, it requires a longer term point of view than conventional change strategies. As well as this it requires considerable understanding of culture by the leader and the ability to manipulate an organisation to those long term ends.

A further essential understanding is that change within organisations is inevitable and continuous. Incremental changes to vision and culture take place irrespective of leadership or stake-holder intention and the role of the eco-sensitive leader is to channel, foster and re-direct this change; in Morgan's phrase learning how to 'change with change' (1986:254). Such realisation of perpetual flux was articulated in early Greek philosophy by Heraclitus: 'you cannot step twice into the same river for fresh waters are ever flowing in upon you' (quoted by Bertrand Russell, 1961:63), and has entered current change theory via English writers such as Morgan (1986) and Pettigrew (1991).

Since permanence lives in process rather than substance the eco-sensitive leader must seek to control processes of change. What can be called a processoral model of leadership is required, in this case one that is exercised by multi-disciplinary thinkers sensitive to the needs of the natural world. Multi-disciplinarity is required because of the range of understandings and knowledge needed to operate as eco-oriented channellers of process, a current understanding again reflected by Heraclitus who suggested that 'Men who love wisdom should acquaint themselves with many particulars' and emphasised the difficulties of the eco-sensitive leader further in his remark (here echoed in chapter four) that 'nature loves to hide' (both quotes in Bly, Hillman and Mead 1992:379). Again, this stance is compatible with a branch of European change theory, as Dawson's description of the essence of 'contextual theory' suggests: 'The approach is often multi-disciplinary...drawing on a range of perspectives and methods such as the business historian, the corporate strategists and organisation theorists ... and is concerned with a detailed examination of organizational transition' (1994:23).

Figure 22: Processoral leadership

	Incremental Strategies	Transformative Strategies
Collaborative Models	Participative Evolution	Charismatic Transformation
Scenario based planning		
Holistic thinking	PROCESSORAL LEADERSHIP	
Multi-disciplinary forms		
Influence optimism		
Coercive Models	Forced Evolution	Dictatorial Transformation

(Source: adapted from Dunphy and Stace 1992:90)

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The four Dunphy and Stace strategies become contextual in this model, used as required in the process of continual eco-vision directed change. Other tactics will also be used as the range of understandings that can be mobilised by the eco-sensitive leader become relevant to current challenges. Such tactics will vary, as the following brief discussion of some additional generic change strategies indicates. Following this discussion it will be possible to draw the argument together, with a further model of processoral eco-leadership emphasising the holistic nature of change and the role of deep values in defining possibilities.

Further Strategies for Change

In all the situations to be discussed the strategies are designed to increase tension within the organisation, battling autopoietic inertia by creating doubt and injecting new ideas for change. The process can best be conceptualised as dialectical, the thesis and antithesis made up of the autopoietic organisation 'net' and elements of tension respectively, with change the synthesis.

Strategies specifically designed to create organisation tension must deal with organisations who battle to stay the same so that they can continue to use their old answers to the challenges posed by the world economy. Miller points out the results of such inertia:

> The fabled Icarus of Greek mythology is said to have flown so high, so close to the sun, that his artificial wax wings melted and he plunged into the Aegean sea. The power of Icarus's wings gave rise to the abandon that doomed him. The paradox, of course, is that his greatest asset led to his demise. And that same paradox applies to many outstanding companies today: their victories and their strengths often seduce them into excesses that cause their downfall. Success leads to specialization and exaggeration, to confidence and complacency, to dogma and ritual (1990:3).

The Miller image is Icarus, whilst an appropriate eco-sensitive image is that of Pheonix, reborn out of the fire of the world economy in a new shape led by someone (or perhaps some group) who reflects not only the understandings described earlier but also wide knowledge and alertness to the nuances of organisation activity. Such alertness is required in order to maximise the chance of taking advantage of changes of an eco-centric type within the unpredictable, non-linear feedback systems that make up organisations. Non linearity means that minor changes may have major consequences and nuance alertness is therefore an important part of the eco-leader's operating style.

Cultural understandings remain integral to success in processoral mode, and extend to use of the sub-groups within all medium to large organisations. These may be differentiated by factors such as function (for example engineering or accounting); location (for example Asian or Australian branches); products (for example washing machines or tractors); merger or acquisition status; and joint ventureship status. Each presents the likelihood of a sub-cultural variation from the majority organisation culture, one related to significant differences in task, location or history and 'defined' in the same ways as all organisation cultures/identities, and each provides an opportunity to create a more eco-centric culture than that which characterises the organisation as a whole.

A diversity of sub-cultures creates obvious challenges in defining an overall eco-centric culture but also opportunities for a leader intent on change who can selectively promote people from a favourable sub-culture into other sub-cultures in order to spread ideas. This process presents great possibilities for change in trans-national corporations which of necessity already possess the linkages that make cross-group promotion possible. In this way, for example, influence from one of the nine Tioxide paint pigment factories can

spread to all as promotions proceed, thereby transferring new ideas into four continents. From there it may spread to other companies that are, like Tasmania's Tioxide plant, part of ICI's global holdings.

Sub-groups that are allowed to operate eco-centrically in contrast to a broad organisation pattern can also contribute to wider change by first establishing then modelling the benefits of such practices. Schein (1992:317) calls these 'parallel learning systems' and points out that they allow organisations to test new assumptions without anxiety, thereby providing 'psychological safety' to the organisation as a whole. The process of change will take, he suggests, anywhere from five to fifteen years (1992:317-8), and requires planning and conscious management by leaders. These structures apply to eco-leaders who are, after all, testing and trying to change deeply held values.

Leaders intent on the difficult process of deliberate change to embedded cultures may also take advantage of a crisis that is significant enough to challenge established world-views. Processes of gradual evolution of organisation culture in line with changes to prevailing social culture have already been described in chapter five of this discussion: in the case of a disaster such as Bhopal, Chernobyl or Exxon Valdez the potential for sudden and more dramatic change is presented. In such cases established assumptions and practices are made clear and people examine their own behaviour. A leader may step forward with new ideas and deliberately manage change, taking the opportunity to act that is presented by a crisis that can be defined so as to unlock existing value systems.

This is related to the media-focused change to organisation culture and identity following a crisis discussed in chapter five. In that case the process was non-directive, but is nevertheless the result of an organisation's links to broad culture and society.

At the same time as they operate as identifiable leaders of change the process of leadership-facilitated learning within the organisation continues. A leader may operate as a behavioural model for the optimism, tolerance for ambiguity, and enthusiasm outlined as central to eco-learning in earlier discussions, and will also control participative planning systems, as well as set up flexible organisation structures that encourage discussion and allow time for workers to learn.

An irony is contained within this position: the eco-leader is a learning leader who must also have the capacity to use directive/coercive tactics. Perhaps unfortunately, organisation cultural change containing ideas in advance of the dictates of broad cultural orthodoxy will often require such strategies. The pure learning leader 'pulls' but an eco-learning leader of large and mid-life organisations also has to 'push'.

Stacey (1992,1996), who seeks to use chaos theory to yield insights about organisation change offers a useful development of this line of argument about power and control. He suggests that in order to maximise organisation learning the leader should cease the checking process that ensures adherance to a tightly determined path and allow room for emergent strategies to develop (1992:192-4). An eco-leader, backed by scenario planning processes, systems thinking and language building processes and using a multi-disciplinary background and 'nuance alertness' is well positioned to use this view of control to move further towards eco-sensitivity by facilitating appropriately eco-sensitive emergent strategies.

Stacey's view on power is also compatible with that already offered. He suggests (1992: 1994-6) that complex learning is maximised when power is sometimes used, sometimes withdrawn, thereby creating the tension required for change. This is consistent with a leader who is open to challenge and also presents ambiguous and difficult challenges to staff (see Stacey, 1992:201-5). This mode of operation is useful for the eco-leader who can present eco-centric ideas for debate and also set up difficult and ambiguous challenges of an eco-centric type for people (perhaps those in a targeted sub-culture). The resultant processes of languaging in themselves - irrespective of any tangible result of either type of challenge - will hasten moves towards eco-sensitivity.

The range of 'further strategies' offered suggests the need for a different view of the eco-leader model. The Dunphy and Stace 'generic strategies', together with further strategies and various elements of eco-learning style, become strategic alternatives exercisible within a space constrained by the processes described in Figure 23.

Figure 23: The context of leader-driven strategy
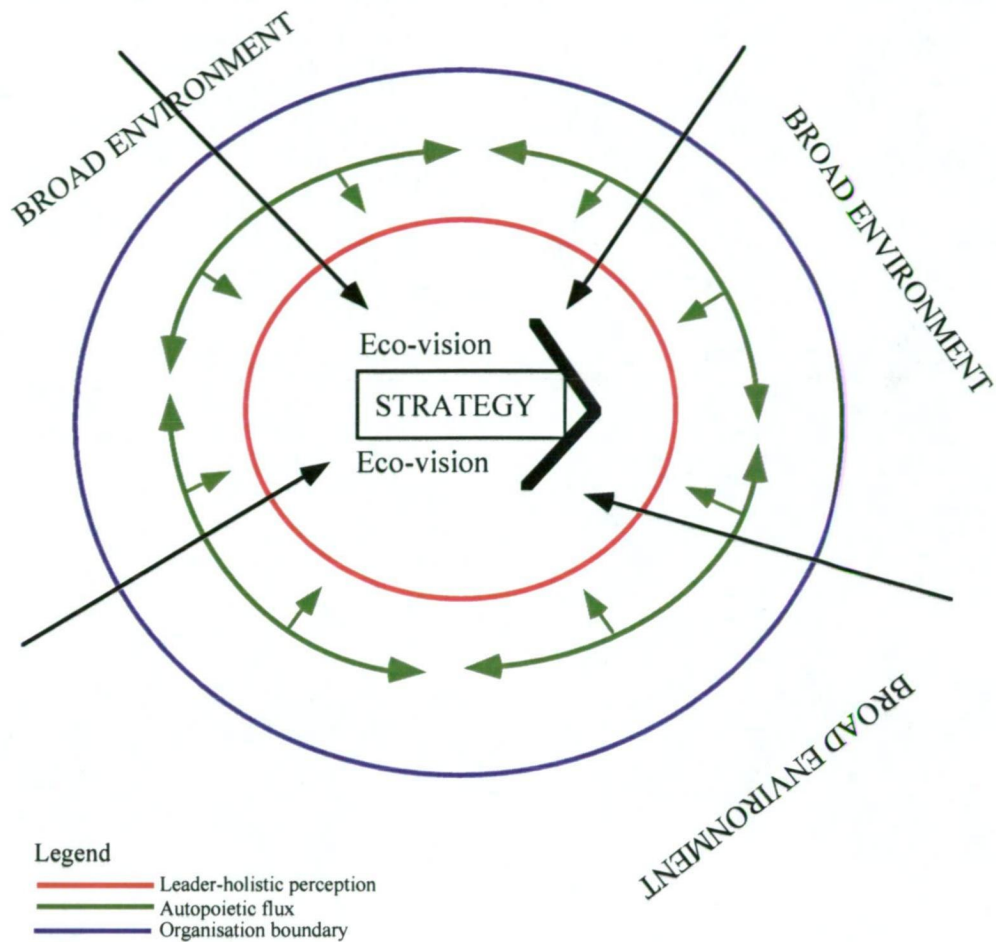
The outer boundary of the model represents organisation boundaries, solid as reflecting of their autopoietic nature. Within that, autopoietic flux, the continual change that operates and is reflective of the non-linear feedback characteristics of the system, is represented by a further circle . The final circle represents the leader's holistic perception of the organisation, required if the totality of possibilities for change is to be understood. The size of this circle is limited by the leader's world view, knowledge and skill. 'Eco-vision' is represented by an arrow, a forward developing vision that changes as strategies are implemented and it is altered as a result.

All this is the crucible within which strategies are developed. The mix of strategies must take account of autopoietic flux (using nuance alertness); the need to increase tension *within* the organisation; the need to incorporate appropriate influences from the broad environment; and the use of coercive/co-operative strategies.

The basic influence of the broad environment is on the organisation as a whole, pushing it slowly along, but leader-perception (the inner circle) and eco-vision may also be affected directly, with altered strategy a result.

Over time the organisation will 'shift' as new deep seated values, new organisation self and culture develop. The process is reflected in Figure 24 which shows a 'spiral' of new 'organisation contexts'.

Figure 24: Changing organisation contexts for leader directed strategy
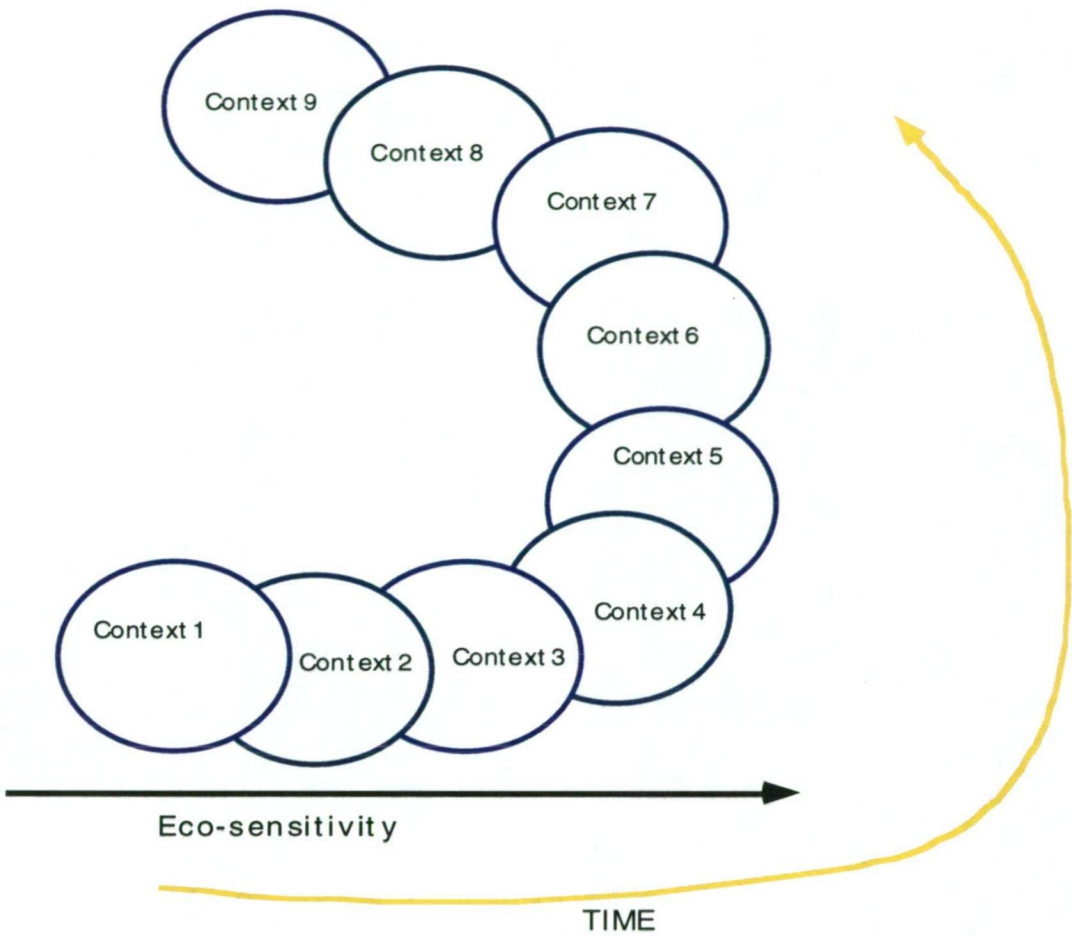
Two axes are presented. Time is indicated by the length of the spiral measured along the bottom axis. Eco-sensitivity is indicated by a continuum on the top axis, and, in the example provided, the possibility of a shift 'backwards' along the eco-sensitivity continuum is presented - eco-centric strategies may not always work, or autopoietic flux may lead to moves backwards.

Operating in such a context and controlling such a process of change may seem beyond the scope of any leader. Certainly it is difficult, but not impossible. Pascale, discussing major changes in large organisations, demonstrates that comparable patterns of thought are already required in conventional for-profit organisations:

> Change did not find its way into Honda, Ford, and General
> Electric through quick fixes. It happened when each company's
> leadership adopted new ways of thinking. Fujisawa's,
> Peterson's, and Welch's contributions were in direct proportion
> to their personal development. The concept is straightforward
> on an intellectual level, but is hard to live with (1990:252).

Organisations are already experiencing directive change as a result of
new ideas from leaders. Eco-centric ideas may be focussed at the
level of deep values but it is not impossible to effect change at this
level, and leaders with the appropriate skills (if not values) are
increasingly common. Any leader-directed or manipulated change
towards eco-sensitivity will, however, involve consideration of
organisation structure, a matter discussed in the next major section
of this chapter.

Structure

Organisation structure is the final element of the system making up
the transition towards an eco-sensitive organisation style to be
discussed. To this point it has been argued that many transitions
along elements of the total system are necessary for an eco-centric
'style': change towards amiable anthropocentricism within
organisation culture; new organisation self; new concept of risk; use
of holistic world views and application of systems thinking; scenario
based incrementalist planning; learning organisation assumptions;
an eco-leadership style; and attitudes of influence optimism.

Such transition suggests requirements for an organisation structure.
It must facilitate communication and the 'languaging' that leads to
significant cultural change and changes to discourse. It must
facilitate organisation learning and the entry of new forms of

knowledge, hence information flow must be flexible in order that changes in planning and policy can be quickly implemented as new information about specific environmental problems becomes available.

With this as background discussion can turn specifically to structure, defined broadly as 'the key co-ordinating mechanisms within organisations' (Mintzberg 1983). This provides an obvious focus in management writing because it is 'perhaps the most malleable and visible of management tools' (Nohria and Berkely 1994:75). In such writing structure is commonly coupled with strategy, so change in one requires change in the other. In Mintzberg's words:

> .... structure follows strategy as the left foot follows the right in the walking. In effect, strategy and structure both support the organisation. None takes precedence; each always precedes the other, and follows it, except when they move together, as the organisation jumps to a new position (1990b:183).

More recent research, whilst retaining the idea of mutual influence that Mintzberg argues for, suggests a weighted relationship, with strategy a 'much more important determinant of structure than structure is of strategy (Amburgay and Dacin, 1994:1446).

Structure also reflects broad national culture. Ouchi (1980) and Clegg (1992), for example, identify a 'clan' system associated with Far-Eastern traditions of family based organisations featuring high levels of trust, loyalty and co-operation. Another structure related to a specific broad culture is evident in Italy where a successful model of 'diffuse industrialisation' has proved successful. It is based on networks of small specialised firms, each specialising in one phase of the total production process, and routinely co-operating to produce goods for international markets (see Inzerilli 1990, Ritaine 1990).

Both the Japanese and Italian systems provide contrast with conventional corporate models which are mostly based on the western cultures of USA and Europe.

At the same time structure tends to reflect stage of economic development. As discussion in chapter one indicated, the industrial revolution and modern world were coupled with the growth of bureaucracies, hierarchies and formal control systems. Post industrial society however creates new possibilities. Facilitated by the new information technology that allows instant communication across great distances and the ready storage of and capacity to manipulate and recall huge quantities of information, it features a much wider range of structures that were extensively debated in the late 1980's and early 1990's (see, for example, Rouleau and Clegg 1992, Jackson and Carter 1992, Burrell 1994, Kreiner 1992, Cooper and Burrell 1988, Clegg 1992). Heyderbrand offers a general but representative opinion of post-industrial (alternatively post modern) organisations, in doing so bringing together some ideas that are of use in a quest for an eco-centric structure:

> .... it would tend to be small or be located in small sub-units of larger organisations; its object is typically service or information, if not automated production; its technology is computerised; its discussion of labour is informal and flexible; and its managerial structure is functionally decentralised, eclectic and participative, overlapping in many ways with non-managerial functions (1989:327).

At the time it was written this was a more predictive than descriptive view, but one with, as we shall see, a strong element of accuracy as it applies to business organisations of the mid 1990s.

Before discussing this though, the uneven nature of change in broad patterns of organisation structure must be stressed. New types of organisation structure may emerge as organisations attempt to change in accordance with their commercial environments, but

these will tend to co-exist with older forms. Rigid bureaucracies will therefore persist in the post-industrial societies of the western world. In Eastern cultures the clan-like structures discussed by Ouchi (1980) and Clegg (1990) will also persist, perhaps amended as information technology facilitates ever wider and more immediately linked family based networks.

Mintzberg's (1983) typology of organisation configurations, developed from 24 structural variables, demonstrates the variety of forms existing in the 1970's that will continue to proliferate in the industrial and post industrial worlds, because each is adequate to its task. The first are the 'simple structures' featuring 'direct supervision' which will continue to suit small organisations, for example the family shop. The second is the 'machine bureaucracy' featuring standardised routines, roles, work and procedures. It will continue because it suits many government organisations and also situations such as small to medium industrial centres producing simple goods for stable markets. It also suits situations in which workers are considered to be relatively unskilled and it is interesting to note that many TNCs use 'machine bureaucratic' structures in their third world factories. The third is the multi-divisional form, a more complicated bureaucratic system than the machine bureaucratic that allows co-ordination of large multiple unit organisations. In its various manifestations (Hitt, Ireland and Hoskisson, 1995, for example, discuss co-operative and competitive forms) it will continue because it allows co-ordination of large TNCs with a wide range of products produced in many different geographic areas.

Mintzberg's fourth and fifth configurations centre on knowledge. The 'professional bureaucracy' is made up of specialists who control their own activities, co-operating with colleagues and providing services to clients. These will persist in legal and health areas, with

the movement towards service based economies adding to their number. The final group, 'ad-hocracies' are flexible, changing as work requirements change (see Mintzberg 1983:255). Mintzberg's examples come from the American Space Program, but more recent examples can be found in the fluid arrangements in the world software industry where teams form and dissolve as projects are initiated and completed.

It should be stressed that the structural adaptation stance taken in this section of the argument falls short of the population ecology view, which suggests that new organisation forms emerge to fill environmental niches via processes of 'blending, random drift' and 'selection' (see Hannan and Freeman 1986, also Young 1988). The autopoietic view, presented in earlier arguments, suggests a significant degree of organisation inertia, with a capacity for organisations to defend established patterns. Organisation forms therefore persist because organisation culture and identity defend them, as well as because they are appropriate for particular commercial challenges. The autopoietic view not only means that environmentally related change is slow, it also suggests that deliberate change to structure must take into account the cultural dimension, and that it too will tend to be a slow process.

With these insights as background, the structural configuration best suiting an eco-centric management style can be outlined.

Eco-Centric structures; a process approach leading to a network orientation

In any discussion of organisation structure the temptation is to focus on the design of the system rather than on the processes that must be facilitated. Nohria and Berkely (1994:70) refer to ' the misguided search for concrete representations of [a] new management philosophy' which leads to complicated pictorial representations, for example Handy's 'shamrock' and the Eastman-Kodak 'pizza' organisations. The orientation in this discussion is, in contrast, towards action; facilitated communication; free information flow; and flexible response capacity.

As Heyderband's (1989) predictive comments on the nascent 'post-industrial form' indicated, there have been authoritative accounts of new information based, technology facilitated, informal, participative organisations emerging in the world economy. Change in the 1990s bears out this trend. Flexible manufacturing systems, cheap personal computers, and new and ever cheaper information technology have allowed small to medium firms to achieve economies of scale that facilitate successful entry to the world economy.

Because they are small they can respond quickly to changes in the market place, exploiting opportunities as they arise. It is also easy for them to develop effective internal communication channels which spread new ideas quickly, and allow discussion of innovations with ultimate developments in organisation culture.

At the same time large firms started to imitate the small pattern. The increasingly sophisticated bureaucratic forms they had developed in the post world war II years allowed for growth with control. But circumstances changed. Welch, CEO of industrial giant General Electric, provides a first person account:

> We had constructed over the years a management approach
> that was right for its time, the toast of the business schools.
> Divisions, strategic business units, groups, sectors - all were
> assigned to make meticulous, calculated decisions, and move
> them smoothly forward and upward. The system produced
> highly polished work. It was right for the 1970s, a growing
> handicap in the 1980s, and it would have been a ticket for the
> boneyard in the 1990s (in Ghoshal and Bartlett, 1995:88).

The problems with these systems are manifold: divisions tend to
fragment the organisations as they become powers in themselves;
their top management tend to keep new ideas and entrepreneurial
responsibilities for themselves, defending their positions; co-
ordination is difficult as divisions compete; layers of management
within the total company and within divisions make it difficult to
implement ideas quickly.

In many organisations the initial response to these problems
amounted to a 'sidestep' that solved part of the problem while
retaining the same basic structure. To encourage entrepreneurialism
companies set up 'skunkworks', small ideas groups empowered to
work outside the bureaucratic system, a technique pioneered in
California's 'Silicon Valley'. Many organisations also entered into
strategic alliances with smaller and innovative firms, or
systematically acquired new ideas as soon as they hinted at
commercial advantage. (This process shifts ideas from all parts of the
periphery towards the large corporations at the core, explaining, for
example, the shift of promising new technologies from the
peripheral economy of Australia towards the core of economy of the
USA.)More public responses included 'downsizing' in which large
numbers of workers were dismissed, and 'delayering', in which the
number of levels in the hierarchy are reduced. For example, Toyota
went from a nine level system to three. Both measures are designed
(amongst other things, such as straight-up savings) to increase
flexibility and speed of decision making and implementation.

This points the way to the small pattern which nevertheless involves more fundamental changes to structure. Asea Brown Boveri (ABB) provide the best example. This trans-national (Swiss based) electrical contractor and manufacturer of electrical equipment has reorganised into 1300 commonly owned little companies which operate world wide. The ABB system includes three different types of 'profit centres' with individual financial responsibility, all interacting with competitors and buying and selling with and from one another. In each country in which ABB operates they also have a locally-based subsidiary whose aim is to become the largest local electrical producer and manufacturer. Major ABB plants are also separate profit centres. Finally, specialists for each profit group are responsible for the global marketing of products (Miles, Coleman and Creed 1995:139; see also Ghoshal and Bartlett 1995). The complexity of this network is surprising, just as its success in the world market-place is compelling.

Other major companies as diverse in product focus as Xerox, General Electric, 3M, Harley Davidson, Hewlett-Packard and the American retailing giant Rubbermaid are also restructuring around small units. The basic idea is to ensure flexible responses to local conditions and to push decision making down into the smaller units of the organisation.

In structural terms the common element in all these patterns of change is 'networking', where smaller units are linked via communication technology so they are able to complete complex co-ordinated processes. A range of four such network types has been discussed by Hinterhuber and Levin (1994).

ABB is an 'internal network', maximising responsiveness and flexibility in a large organisation and emphasising communication and a common culture in order to tie the organisation together. 'Vertical networks' are created when firms co-operate to produce goods and/or services. The Japanese Keiretsu system of alliances and the Italian pattern of diffuse industrialisation demonstrate this at a general level. At a more specific level the 'modular firm' that outsources all but its core functions while retaining strategic control is a vertical network. Free from the need to make big investments in capital equipment and able to make use of the best people wherever they are such firms can grow quickly, as Nike and Benneton, the large fashion manufacturing organisations, demonstrate.

'Diagonal networks' are based on exploiting synergies between different companies. Dess, Rasheed, McLaughlin and Priem refer to these as 'virtual organisations', 'a continually evolving network of independent companies - suppliers, customers, even competitors - linked together to share skills, costs and access to one another's markets' (1995:10). There is no overall strategic control in this system but rather an interdependence. Corning, the $3 billion/year ceramics manufacturer, illustrates this pattern, actually defining itself as a 'network of organisations' (Sherman 1992).

The final Hinterhuber and Levin (1994) network type is that of the 'horizontal alliances between similar firms in similar markets in order to develop and/or exploit a particular technology or penetrate a geographical market segment' (1994:47). The European and North American airline industries have formed such alliances, though with little effect.

Many large firms simultaneously pursue aspects of several networking patterns. Apple Computers illustrates this. They have horizontal alliances with IBM and Motorola. They also operate

vertical networks, for example, they outsourced almost all of their important 'Newton' electronic organiser/computer project to Sharp. Internally their different divisions also operate as networks (see also discussion of alliances in chapter three).

Every type of network offers specific advantages for the organisation involved, and as the Apple example demonstrates, a single firm can benefit from several sets of advantages. In all network types however, the core requirements are free flows of good quality information and cooperative action with shared goals. Satisfaction of this 'core' maximises flexibility so that the organisation has the capacity to respond quickly to challenges and implement new ideas readily.

The same generic requirements for eco-centric organisation structure were identified at the beginning of this discussion of structure. An eco-centric organisation must facilitate the languaging that builds changed world views and must therefore highlight communication. It must also place great emphasis on collection, storage and dissemination of good information. A generic network structure satisfies these requirements.

The brief discussion of different network forms is therefore significant in an assessment of the extent of transition towards eco-centric management. It suggests that direction of change for many organisations is favourable for eco-centricity because structural facilitation is already in place. In this case, Mintzberg's 'left foot' (structure) is ahead of the 'right foot' (strategy). From an eco-centric point of view, however, this is a serendipitous situation since there is no deliberate eco-centric intent behind the changes discussed. For their full import to be realised, changes towards eco-centric strategy

and culture are required, and the weighting given strategy by Amburgay and Dacin (1994) therefore remains, but with an interesting twist.

Despite a positive direction of change to structure by no means all organisation forms are 'ready' for eco-centric strategies. Mintzberg's machine bureaucracies present as a major organisation configuration, and the enormous variety of multi-divisional bureaucratic patterns used by large TNCs demonstrate the continuing appeal of that configuration. It is, after all, a sophisticated reflection of the emphasis on formal control and hierarchy characteristic of the industrial age, with sidesteps such as 'skunkworks' allowing organisations to cope with some of its inherent problems. The professional bureaucracy and ad-hocracy configuration will also continue, but in these cases the central emphasis also offers much for eco-centricity, with the former based on information, the latter on the need to be flexible.

With these conclusions about the favourable direction of broad change towards generic network structures in mind, discussion can turn to a more detailed level - how could one specific eco-centric organisation be structured? It is worth stressing that what follows is only one of many possible eco-centric network structures that are made possible as technology and ideas change. All however, would facilitate the same process rather than design to orientation.

To this point structure has been defined as a system of 'co-ordinating mechanisms' with later emphasis on unit or group size adding another dimension to the concept. It can now be further extended. In the Narayan and Nath (1993:305) analysis, structure also includes 'allocation of tasks and responsibilities' and 'formal reporting relationships'. That the eco-centric organisation should be a network organisation has already been established. Irrespective of total size it

will be made up of units small enough to respond flexibly to new information, for example, news that a new population of an endangered species has been located on company land. There is no tight rule about the exact size, but as a general guide the practical experience of Gore and Associates, who established a limit of around 200 people per unit in order to maximise innovation and communication, is persuasive (see Bateman and Zeithaml 1993:353). As units creep above this level the social element in communication becomes more difficult to maintain and more bureaucratic elements may be seen as necessary to hold the group together.

Co-ordinating mechanisms in this eco-centric structure are based on information technology that allows instantaneous communication both within and between units, complemented by a generally participative leadership style (although, as earlier discussion indicated, the eco-leader may need to be directive when establishing or defending an eco-sensitive culture).

The Japanese Kao corporation illustrates the sophistication of communication possible with existing information technology. They use computers to link resources and expertise in laboratories, sales units and factories. What they call Kao VAN (for value-added-network) gives front line-managers and workers access to information on any topic from any part of the organisation. Ghoshal and Bartlett (1995:92-4) describe how it worked in developing a new cosmetics line. Engineers got information from the central data base on technical aspects; marketers got data-base information on consumers but also received incoming data from sales-people and were able to feed this back to engineers; simultaneously a telephone hot-line provided extra information to marketers. All this formed the basis for cross-functional meetings between engineers, marketers and production people. The Kao system is 'transparent', with

computer terminals throughout the organisation accessible to employees who can check up on anything (including the president's expense account). It also features a decision making process which is facilitated by 'decision rooms' on every floor of their central building. These are used for open meetings which can be joined by anyone with an interest in the topic under discussion.

The potential in such a system for eco-sensitive management is obvious. A central store of information which included understandable and current information sourced from all units inside the company and from other organisations outside (including universities), would help ensure the best possible decisions are taken to, for example, preserve biodiversity in a logging operation.

Transparency of information is also important because it helps ensure that decisions are taken openly, and if, for example, a decision was taken that had potential to endanger an eco-system it would, given an eco-sensitive culture, be challenged by others within the relevant unit or group and also members of other units or groups.

An eco-centric organisation would allocate tasks and responsibilities loosely, allowing time for cross-unit collaboration, a range of vertical and horizontal relationships, information collection and discussion and broadly participatory leadership. This is not a utopian ideal unachievable in a commercial environment, but, as the Kao experience indicates, part of the control of a flexible network system that helps ensure commercial survival. It does not mean that there is no hierarchy in the organisation, nor does it mean no work rules. It does however mean flexibility in both and a stress on the worth of the individual, who is entrusted to both foster regard for and behave sensitively towards the natural world.

A stress on language as the key to culture also suggests that debate should be part of everyday life in an eco-centric organisation. If discussion processes include significant, open and informed debate, they will be properly tested and the chances of eco-sensitive behaviour maximised, assuming appropriate values and culture are present. Scheins 'Action Company' is a (real) trans-national engineering organisation used to illustrate aspects of his argument about culture and provides an example of a for-profit organisation with a debate/discussion orientation. He summarises the 'Action Company Paradigm' in the following figure, which brings together several of the ideas just discussed:

Figure 25: Action company paradigm
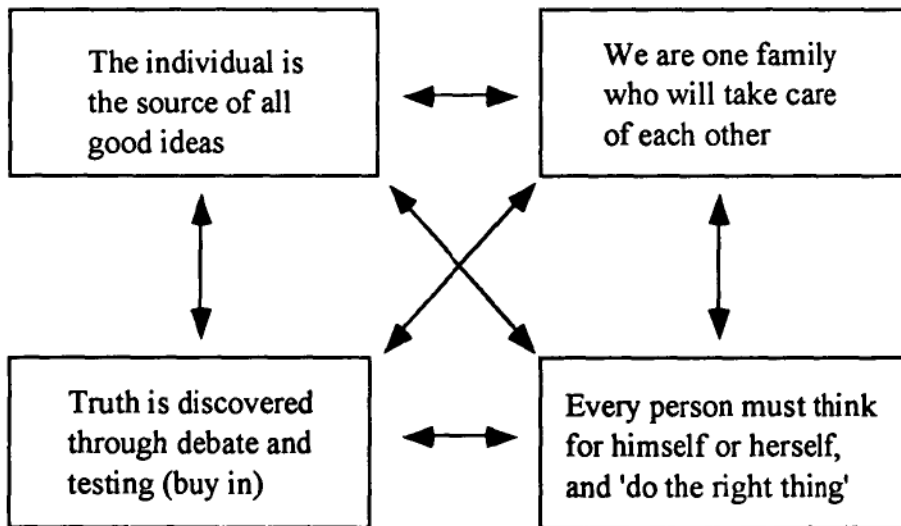
(source: Schein 1992:36)

An eco-sensitive organisation could use this 'paradigm', with each unit operating on this basis and also connected via the Kao style information network. At all levels 'languaging' and discourse development would therefore be facilitated. Once an eco-centric culture has been established in one unit of a network structure there

is also potential for change in other units. This may happen
'naturally' as people transfer from one unit to another, or it may be
the result of leadership deliberately fostering cultural change.

There is tremendous potential for change within a large TNC using
networks in this way. Influence can spread world-wide as the
following diagrammatic representation of units and basic linkages
within NV Philips indicates.

Figure 26: Organisational Units and Linkages within NV Philips
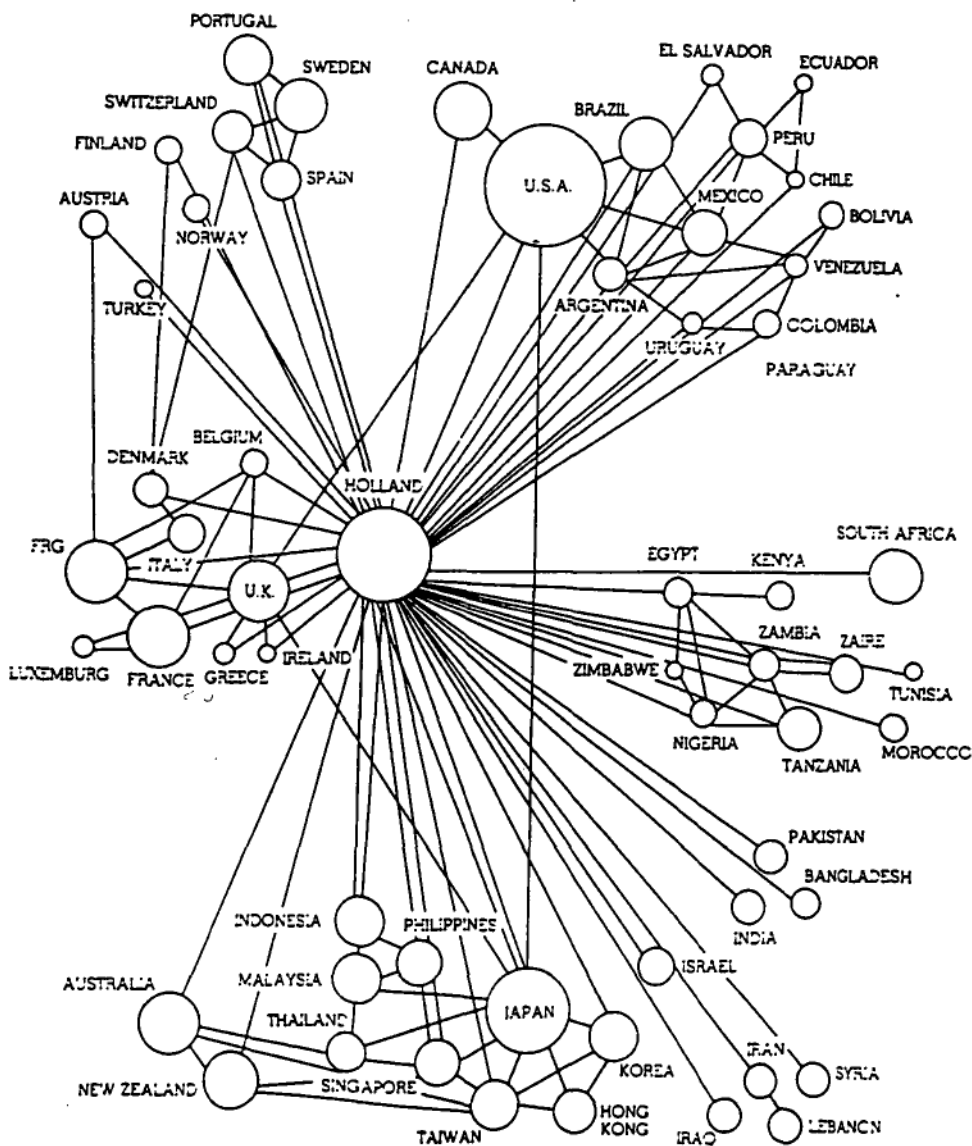
(Source: Ghoshal and Bartlett 1990:605)

In an eco-centric organisation, just as in the Action Company, all decisions are the product of debate and individuals are expected to operate in accordance with the paradigm irrespective of work role or geographical location. The Action company is successful, and whilst the co-operative interactive style is by no means characteristic of the whole of organisation culture, it is an important part of it and 'much of the essence of [it] still operates despite large company size, company maturity, and sub-cultures' (Schein, 1992:35).

The same would be true in an eco-centric organisation. With an embedded culture that is centred on eco-sensitivity and including the 'Action Paradigm', minor sub-cultural variations in degree of anthropocentricism may be tolerated, but the essence necessary for eco-sensitivity would remain.

An eco-centric structure is therefore relatively easy to envisage, but perhaps difficult to develop. Networks are best held together by common culture (as with ABB and the Action Company) but may be held together by common interests (as with the Corning's virtual company). In the case of an eco-centric structure the most likely situation is one of evolving and shared values of eco-sensitivity. It may also, of course, be unified by some commercial orientation and/or shared assumptions about the worth of individuals or any other powerful set of ideas. As established earlier, it is in fact most likely that these sorts of unifying mechanisms will come before the eco-centric aspect of culture contributes to unity, but in all cases of an eco-centric organisation a fundamental unifying force will ultimately be a culture embedded with eco-centricity.

Conclusion

A list of fundamental questions was presented in the introduction to this discussion and answers have been presented in the nine chapters that followed. The central elements of the argument can be summarised before concluding comments.

The roots of industrial exploitation of the natural world are deep seated because: capitalism is expansionary, exploitative and technologically dynamic. It is associated with an anthropocentric world view epitomised by Cecil Rhodes, founder of what was Rhodesia and is now Zambia and Zimbabwe, who said: 'We must find new lands from which we can easily obtain raw materials and at the same time exploit the cheap slave labour that is available from the natives of the colonies. The colonies would also provide a dumping ground for the surplus goods produced in our factories' (quoted in McMichael 1993:313).

Associated with industrialisation the processes of modernisation proceed, including differentiation of labour and institutions, the commodification of just about every possible object or idea and an expansion of, in Weberian terms, a formally rational world. Associated with this too are 'big science', the legitimation of a rational, quantitative approach to issues, and the growth of the corporatist state.

The global system produced by modernisation is one featuring major inequities between the North and South of the globe, and, fundamentally for this discussion, a natural world that is subjected to unconstrained exploitation. This pattern continues, overlain by the processes of post modernisation and the emergence of re-

organised capitalism. This includes a breakdown of the corporatist state and the unravelling of established industrial networks of power, with a re-distribution of it to corporations, international bodies and social movements (in Beck's [1990a, 1990b] terms 'sub-political' spheres). It also involves an emphasis on knowledge and services work, continual growth in the sophistication of global links and ever more efficient technology.

The juggernaut of progress continues, now spread more globally than ever before. The new world economy remains environmentally unconstrained with no part of nature left unaffected by humankind, and the continual creation of risk, both to people and nature.

In this system business organisations are more numerous and more powerful than ever before. They have better access to the ever growing world financial system and are better able to co-ordinate internal activities and form alliances because of increasingly sophisticated and affordable communication technology. They benefit too, from the 1990s renaissance of market philosophy itself pushed on by the world trend towards privatisation of state assets that is part of the breakdown of the corporatism.

In the exploitation of the nature, science has never been more guilty because it feeds the process of industry, but never more necessary because it holds many of the keys for solutions to environmental problems. Business too, is never more guilty, but perhaps ironically, in view of this sections dynamics and ability to change, never more significant as a factor in the changes in thinking and practice required to turn around the pattern of exploitation.

International requirements, government regulations, pressure groups, public opinion reflected in buyer behaviour and the changing opinions of their own workers are already forcing organisations to behave in a more environmentally friendly fashion. Four eras were identified in the discussion; unwilling agreement; win-win responses (which suggest changed practice is relatively easy); 'enlightened pragmatism' (preparing for future levels of regulation or public opinion); and eco-sensitivity. It was argued that those are part of a continuum, with organisation learning and cultural change in each era preparing the way for further change.

Eco-sensitivity means the presence of eco-sensitive values and the ability to put these into practice. The transition towards this position may be slow, but it was argued that the opportunity is there to contribute to it with the provision of relevant theory. Opportunity is also there, serendipitously, because many of the adjustments to knowledge, practices and organisation culture required for survival in the world economy are also useful for eco-sensitivity.

Transition in 'the world view' of organisations is fundamental to required change because of the deep-seated roots of exploitation within the current world economic order capitalism. Discussion here emphasised the need to change the degree of anthropocentricism evident in approach to nature, moving away from total anthropocentricism towards what has been termed amiable anthropocentrism. Organisation culture and self should reflect this change which is associated with new patterns of language and discourse within organisations. A developing eco-self will therefore involve new content in the discussion of issues, as well as identification with the natural world. It is also associated with holistic thinking and a move away from limited, anthropocentric views of risk, towards consideration of 'risk for nature', a term

which encompasses potential harm to the natural world and re-defines 'decisive action' to include what is affectively a refusal to act in a way that may lead to harm to nature.

These processes will become more possible with the introduction of 'new science', a communicable and issues focused variation on current practices that has the capacity to educate management as well as provide information of direct relevance to specific issues . This is already developing, along with ecological economics, which provides managers with new, multi-disciplinary, issues focused understanding of the economic aspects of environmental issues.

All these processes necessitate organisation and individual learning, and the planning style appropriate for eco-sensitive management is therefore one centred on facilitating such learning. Eco-sensitive planning, it was argued, can best be handled via a variation on scenario planning styles which are already used world-wide.

The eco-sensitive leaders of these systems will need to operate in advance of public eco-centricity and in at least partial contradiction to the expansionist profit-seeking assumptions of the world economy. Reflecting the arguments already offered, they need to be multi-disciplinary, tolerant of a lack of structure in issues, optimistic in the sense that they think they can redress damage to the natural world, and tolerant of diversity in staff and ideas. As processoral leaders they must also be alert for opportunities to enhance and/or defend eco-centricity within their organisation (nuance alertness) and capable of using a range of strategies to further eco-sensitivity. Thus, organisations will be information based and flexible in structure, with a network configuration made up of relatively small units best suited for handling complex ecological issues.

New world views, (including new sources of understanding), new planning practices, eco-leadership and new structure are systematically related and part of a transition towards eco-sensitivity. Given the power of global capitalism this will not happen quickly. It will, however, need to happen if the planet is to survive. Business organisations are too powerful a force to ignore and they remain a cause of massive destruction, but because of this power and because of already evident indications of change they are also a necessary part of the solution to global ecological harm. The juggernaut of exploitation can be turned, but only slowly.

This has been a multi-disciplinary exercise in theory, providing general answers to issues. As such it suggests a range of opportunities for further research. The author's research foci (but not, given limitations of space, details of the research techniques to be used beyond this thesis) include:

- Assessment of the communicability of existing literature in ecological economics. It was argued that commerciability is a key to the policy relevance of the new theory and ecological economics provides an existing body of literature that allows this issue to be investigated.

- Comparison of significant mining ventures in New Guinea. The Ok Tedi mine has been referred to. Nearby, Porgara, a less well publicised mining operation, poses similar ecological problems, whilst across the PNG boarder in Irian Jaya the giant Freeport mine provides further comparative material. Issues of interest include the definitions of 'risk' used, planning styles, stakeholder analysis and change in organisation self. (Work on these issues, using a comparative case studies approach has already started.)

- The 'decay curve' for predicting trends in collection of environmental data (see chapter five) can be further developed using current research trends and political debate in Australia, where major political and community groups are currently debating a major Government research and conservation program. (Work has started on this project.)

- Techniques for measuring organisation eco-self will be developed.

- The notion of eco-leadership will be tested, using a survey questionnaire which investigates the style of the eco-leader.

- A study will be conducted of the extent of multi-disciplinary outputs from major OECD universities. This will further argument about the growth of multi-disciplinarity in academia.

It is clear that much remains to be done. Any future research should be informed by the multi-disciplinary, issues focused approach taken in the preceding discussion, since this stance remains one key to the solution required for the global problems to which these research ideas are related. Focused research projects of the type listed gains full meaning only if issues are focused and provided context by theoretical frameworks such as that provided by this thesis.

The next decade may well be a decisive one for the global environment. This discussion has been one small step towards the solutions required.

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