

SURVEY

Planning for sustainability as a learning concept

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**Abstract**

The major theme of the following discussion is the importance of a transdisciplinary approach to guide sustainability-related planning and management activities. The proposed approach involves much more than the usual interaction between partners from different disciplines. A revised process is needed to allow real cooperation in sustainability planning. This process will require a more open recognition of the subjective priorities that become the framework of sustainable development issues of various interest groups and disciplines. The sustainable development agenda should be more geared towards learning processes than projected future outcomes. Learning is enhanced through a participatory framework inclusive of stakeholder interests. Insights from a broad range of disciplinary areas including the science of complexity, sociology, philosophy, law, economics and management are presented to support this position. The conventional stranglehold of disciplinary thinking in policy circles limits the capacity of our decision makers to unravel the complexity of all real world environmental policy and management problems. Policy making needs to embody respect for that complexity and allow flexibility to promote perpetually evolving learning. As a fundamentally transdisciplinary framework, ecological economics has some prospect to represent these interests in a purposeful and necessarily pragmatic way. © 1998 Elsevier Science B.V. All rights reserved.

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**1. Introduction**

Sustainability-related concerns and issues are assuming an increasingly prominent place in pol-

icy discussions throughout the world. Government, industry and community groups use the term with ever accelerating vigour. The vision statements of corporate and public sector organisations continue to expand sustainability-related objectives. The broad set of concerns embodied within the sustainability debate has entered the

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culture of contemporary thinking. As with most cultural developments, one's interpretation of the merits or otherwise of individual attempts to address sustainability depends on the subjectivist priorities of the interpreter. In broad disciplinary terms, ecologists, economists, industrial leaders and environmental activists are all likely to diverge in their interpretation of and recommendations to address specific sustainability issues. The persistence of divergent views and interpretations is likely to prolong outstanding problems through lack of consensus on policy direction and mechanisms.

The aim of this paper is to outline the merits of a transdisciplinary perspective to facilitate the reconciliation of currently divergent opinion and policy processes that constitute the contemporary sustainability debate. In essence, much can be gained through developing a 'learning environment' context for the debate. Participants are facilitated away from the need to defend individual perspectives and view-points towards a more healthy willingness to listen to and participate in the evolution of more generally shared insights. Before a claim of hopeless idealism is attributed to this goal, lessons from systems thinking, learning organisation management and the science of complexity are suggestive of some potential in this regard. The task is to extract those critical success factors underlying the achievements of learning organisation approaches to the consideration of issues in the corporate world, and apply them to the wider context of the 'environmental debate'. The result would be an accelerated rate of progress within this most important policy agenda.

## **2. Dimensions of the sustainability debate**

An important impetus within the general sustainability debate is the concept and mechanisms for addressing sustainable development. This is not readily achieved due to the lack of agreement on what sustainable development actually means. Pearce et al. (1989) have listed over 20 possible meanings of sustainable development. Many have proposed that sustainable development is, in fact, an oxymoron. Commentators such as Flannery

(1994) and Cocks (1992) have suggested that the human population is already beyond the carrying capacity of the global ecosystem. Recent work by Rees (1992) on the 'ecological footprint' concept emphasises an ecological focus for the sustainable development debate. In contrast, much of the work by international agencies such as the OECD continues to maintain that economic growth is necessary for financial resources to be available to address environmental problems (see van den Bergh, 1996, p. 8). The United States President's Council on Sustainable Development (PCSD, 1996), on the other hand, implies that the agenda for economic development needs to be set within the limitations of a more carefully managed ecosystem. The Council was drawn from a broad range of business, academic and civil society. At the heart of the Council's recommendations is the conviction that economic, environmental and social equity issues are inextricably linked and must be considered together.

Given the differing reactions to and interpretations of sustainable development, it is not surprising that little consensus exists with regard to operationalising sustainable development policies. The sustainability debate has not paid sufficient attention to developing a context for a workable definition and approach for promoting integrated sustainability. There are many insights to be gained from current business management, the science of complexity, contemporary philosophy, sociology, law and ecological economics to develop processes for considering and managing the complex problem of sustainable policy and management. As will be noted in this paper, much can be achieved in the search for suitably transdisciplinary processes by taking stock of developments in fields usually on the periphery of environmental policy or even in those territories considered to be unrelated in the minds of disciplinary thinkers.

In this regard, ecological economics is very much about placing any environmental management or policy issue in a broad context that integrates human behaviour within ecological and economic systems. This approach recognises the need for contextual information. The major focus becomes a search for processes that enable the systematic exploration of development issues and

policy in a transdisciplinary way. Ecological economics is really a learning process. The transdisciplinary nature of ecological economics demands a broader approach to recognise the societal context of the scientific and economic debate.

### 3. Sustainability in context

Few concepts have been applied with less precision and consistency in policy circles than ‘sustainability’. The concept is now espoused at all levels of government and industry throughout the world, though rarely in a uniform way. This has been noted by some, including Gell-Mann (1994), who suggests that, while “today many people are busy writing the word ‘sustainable’ in pencil, the definition is not always clear” (p. 347). Additionally, Costanza (1994) asserts that “to a large degree the sustainability concept is not internalised and the ramifications of internalisation are poorly understood” (p. 392).

It is useful at this point to review some of the more considered articulations of the sustainability concept. Definitions can be classified in either positivist or normative terms. Keynes declared that a “positivist science may be defined as a body of systematised knowledge concerning what is; a normative or regulative science as a body of systemised knowledge relating to criteria of what ought to be” (Keynes, 1890, p. 34).

#### 3.1. Normative interpretations of sustainability

Probably the normative interpretation most widely quoted is that expressed by the World Commission on Environment and Development (1987). Sustainable development is described as 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, 1987, p. 8). This statement demonstrates clear concern for both social justice and ecological health, emphasising the need to encompass more carefully defined goals for economic activity. However, this definition’s popularity is probably attributed to its ambiguity, appealing equally to those with a focus

on the regenerative capacity of the environment and to those who focus on the potential for technological progress to adapt to changing conditions.

Another important contribution towards clarification of the sustainability concept is that of Costanza (1994), who states that “sustainability entails maintenance of (1) a sustainable scale of the economy relative to its ecological life support system; (2) a fair distribution of resources and opportunities between present and future generations, as well as between agents in the current generation, and (3) an efficient allocation of resources that adequately accounts for natural capital” (p. 392).

Additional clarification was provided by Herman Daly (quoted in Prugh, 1995, p. 47) who recommended the adoption of three criteria for sustainable development: “1) for renewable resources (fish, trees, etc.), the rate of harvest should not exceed the rate of regeneration; 2) the rate at which we allow economic activity to generate wastes that must be passed into the environment should not be allowed to exceed the environment’s ability to absorb them; 3) the depletion of non-renewable resources (oil, coal, etc.) should be offset by investment in and development of renewable substitutes for them”.

Further advice was provided by Hawken (1993), who suggests that sustainability is an economic state where the demands placed upon the environment by people and commerce should be met without reducing the capacity of the environment to provide for future generations. He also expressed this as his simple golden rule for the restorative economy: “leave the world better than you found it, take no more than you need, try not to harm life or the environment, make amends if you do”.

Goodland et al. (1991) argued that it is no longer the availability of resources that sets limits to growth but the availability of sink functions, such as the atmosphere, the oceans and the forests that absorb such wastes as greenhouse gases. The evidence presented points towards the clear need for a shift in emphasis towards increased efficiency and productivity of natural and cultural resources. This is not well accommodated using

gross national product (GNP), the conventional measure of growth. GNP does not make allowances for cultural diversity, social cohesion and improvements in environmental quality. Goodland et al. then suggests this points to the need to determine a package of alternative measures or indices to support a broader goal. This sentiment echoes earlier sentiments by the World Commission on Environment and Development (1987): "...once satisfactory definitions have been found, indicators for measuring progress towards achieving sustainable development should be defined" (p. 244). The implication here is that there is a truth, a goal, an end point which needs to be determined. Ten years after Brundtland (World Commission on Environment and Development, 1987), there is still little consensus on indicators and definitions (see Brugmann, 1997; Rennings and Wiggering, 1997).

Luhmann (1989) suggests that prescriptions of the kind outlined above are not hard to supply. All that is necessary is to consume fewer resources, reduce gas emissions and produce fewer children. Luhmann (1989) maintains that "whoever puts the problem in this way does not reckon with society, or else interprets society like an actor who needs instruction and exhortation" (p. 133). It is the view of the authors that it is now time to move beyond the need for consensus on the normative meaning of sustainable development and to focus instead on practical process. This is in fact the major activity area of the New England Ecological Economics Group (University of New England, Australia) which is currently working with various public resource management agencies to develop new processes of cooperative sustainable resource management (e.g. Gill, 1997a,b). A key aim of this paper is to outline some underlying themes that need to be made explicit to support the development of a more consistent and shared interpretation of sustainable development.

### 3.2. *Positivist interpretations of sustainability*

In evaluating the positivist contribution to the interpretation of sustainability (or sustainable development as the policy orientation of sustainability), it is important to look not only at some of

the significant scientific findings but also briefly to critique the dominant positivist decision-making criteria of neoclassical economics. The degradation of the natural environment is extensively documented. Important scientific publications provide evidence of land degradation and declining agricultural productivity (World Resources Institute, 1992, 1994), greenhouse gas emissions (Energy Information Administration, 1993) and loss of biodiversity (Wilson, 1992). The scientific evidence has prompted political attention toward a broad range of environmental issues. The concept of sustainability has gained greater international attention since the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June 1992 with the ensuing program for action on sustainable development, Agenda 21 (UN, 1992). Now most governments, national and regional, are sponsoring the scientific documentation of ecological degradation.

However, there is still a lack of consensus regarding replenishment and assimilative capacity. The complexity of biological, environmental, sociocultural and economic systems hinder conventional processes of scientific verification. This was highlighted by Ludwig et al. (1993), in which the authors proposed that there will never be scientific consensus on the precise implications of human activity on the natural ecosystem. Further, Hutchcroft (1996), p. 221, claims that scientific positivism cannot adequately address the political and cultural issues concerned when designing action for sustainable development.

## 4. **A critique of conventional decision frameworks for addressing sustainable development**

The recognition that there are significant, indeed life threatening, problems to be addressed has inspired the attention of policy decision makers and communities towards concerted action in many parts of the world. In most cases, the framework underlying public policy response has tended to remain with the conventional neoclassical wisdom of economists. Tools such as benefit–cost analysis (BCA) have appealed to the

prevailing cultural need for apparent objectivity, quantitative precision and theoretical rigour. The reality of these claims for precision and objectivity, however, is less concrete than usually implied. When due accounting of complex interrelated ecological economic and sociocultural considerations is matched with the goals of the conventional neoclassical resource economist's tool box, the fit is always found to be, at best, a useful approximation. At worst, the veneer of false confidence implied in an analysis may well be part of the problem, not the solution.

The axiomatic foundation of seemingly objective BCA and its derivatives (e.g. Bennett, 1997) is, in fact, highly subjective. BCA operates through the 'subjective' quantification of project impacts and returns. BCA is therefore a mode of creating and negating entitlements (Samuals, 1989, p. xvi). The project choices that are supposed to represent the output of the objective process of BCA are largely predetermined when the subjective parameters of the analysis are defined. The strong emphasis on using readily quantifiable information in BCA is held up as evidence of a value-free process for objective and efficient analysis. Gell-Mann (1994) asserts that on the contrary, "...it represents the imposition on the analysis of a rigid system of values, favouring those that are easily quantifiable over others that are more fragile and may be more important" (p. 324). Bobrow and Dryzek (1987, p. 126), argue that the conclusions of BCA are rooted in accepted method rather than established cause. The approach of BCA is bureaucratically successful because the output is centrally achieved and easily translated among tiers of administration (see Pusey, 1991).

Invariably, what is considered relevant in economic analysis is information derived from market values. Intangibles are left out, for example, aesthetic impacts that cannot be translated into market values, disruption to cultural integrity and some sense of distributional disadvantage (Mishan, 1982, p. 29). "The recognition of the usefulness of markets should not blind us to their imperfections, to the need to make policy judgments about their modification, or to the need to rely on other institutions" (Kanel, 1988, p. 431).

Perrings (1987) concludes that "all deductive theory is necessarily limited by what may loosely be called the framework within which the arguments are worked out" (p. 3). From this, the assertion is made by Perrings that the axioms of a theory in a very real sense contain its conclusions.

Unless such defects are explicitly acknowledged, and unless the problems to which these give rise to are resolved, economic calculation cannot continue to retain its credibility (Mishan, 1982, p. 32). Neoclassical economics begins analysis, such as BCA, with a series of givens (see Willig, 1976). To accept these givens as a starting point for analysis is where the dissent begins (see England, 1994). "Initially to take a 'no value position' is in fact to embrace all the values embedded in the status quo, whether this is done explicitly or implicitly" (Klein, 1988, p. 439).

Economic analysis can provide misleading information to policy decision makers when quantified information is presented as a working representation of the whole decision-making picture. What is essential is how the quantified and unquantified elements relate to describe overall system behaviour. Without that larger picture, policy decisions may be made without placing information in context, leading to policies that may be seriously misguided (see De Greene, 1993).

Given the shortcomings in neoclassical models of resource use, we would argue that an alternative basis for resource policy needs to be formulated. Such a stance will need to recognise the feedback interactions of the sociocultural (community) and environmental in economic decision making. "This will be possible only if we move away from the current theoretical controversies and attempt to understand the physics of society and the resource environment viewed together" (Saeed, 1985, p. 322). The subjectivity of conventional neoclassical resource policy is usually hidden from the community and those politicians who make implementation decisions. Thus, the ecological economic community has a major role in encouraging critical introspection of practitioners' methods to prevent policy makers and their advisors from adhering to misplaced conceptual comfort zones.

### 5. Failure of conventional approaches to progress sustainable development: prospects for an inductive (learning) alternative

The Cambridge school of economics, with which Alfred Marshall and A.C. Pigou were associated, regarded as a self-evident maxim of policy that society's objective was to use its economic resources so as to maximise aggregate utility (Mishan, 1982, p. 37). However, given that the traditional concept of utility is based on a number of questionable assumptions, it becomes necessary to develop an alternative process for evaluating the wants of society. Policy makers have had limited success in interpreting the wants of the community with regard to sustainable development.

Indeed, there is a long history detailing the inability of policy makers to implement sustainable development effectively. Reid (1995), in a detailed critique of progress in understanding sustainability, has identified numerous barriers in progressing sustainable development. These include the lack of awareness of the issues, the political unacceptability of most action, the opposition of entrenched interests and the inadequacy of institutional mechanisms for integrating environment and development. In addition, the World Commission on Environment and Development (1987), p. 244, earlier identified the difficulties with expressing the effects of economic development on natural systems in terms that are familiar and persuasive to decision makers (e.g. financial costs and benefits).

Ecological economics, through axiomatic pragmatism, is intended to make the nature of rights and values explicit. "Development begins from the assumption that there is no value free, objective interpretation of society, and that all intellectual, practical and personal actions are guided by values and interests" (Kenny, 1994, p. 17). The aim should be to bring to the surface assumptions in a very introspective way (see Derrida, 1991). Surfacing assumptions should be inclusive of the widest possible audience of stakeholder interests (Thompson, 1993). This becomes the starting point for a process oriented to the achievement of sustainable development. Such an approach is undertaken with the intention to actively encour-

age a general process of learning with regard to issues and problems. Extending the insights of Senge's Learning Organisation thinking (Senge, 1992) to the environmental policy domain is likely to progress the cause of ecological economics as an effective framework for policy.

A key to the learning organisation framework is the integrated involvement of an organisation's entire stakeholder community in decision making. When extended from the business to the environmental management and policy domain, the stakeholder community becomes that entire section of society with interests in the relevant issues. The first task is for policy managers to facilitate the surfacing of assumptions and the development of shared mental models of the issues and problems at hand. The focus is to promote the development of a more unified and shared impression of those underlying processes of cause and effect that describe the issues and problems under investigation. 'Expert' and citizen alike can be instrumental in the general learning process. This general consultative process is proposed as an alternative to the more exclusive, fundamentally 'expert'-driven and certainly less learning-oriented decision-making framework of neoclassical economics. Many of the arguments highlighting the shortcomings of neoclassical economics are not new and indeed are well recognised inside the discipline. However, the continuation of the status quo in conventional policy processes suggests some reluctance, or possibly even cultural conditioning, to limit departure from an outmoded positivist epistemology.

#### 5.1. *Some philosophical insights*

Key attacks on the positivist tradition commenced in earnest in the 1960s and include the criticisms of Hanson (1958), Kuhn (1962), Popper (1963, 1968), Feyerabend (1970), Lakatos (1970), Toulmin (1970), Laudan (1977) and Newton-Smith (1981). Their insights describe the cultural foundations of knowledge and progress in thinking. Their approach is aimed at stressing context in an inquiry (May and Sellers, 1988). Kuhn (1962) popularised the idea of a scientific paradigm where a positivist science operated

within a given set of normative beliefs and values. He postulated that judgemental choices, shaped by the social practices of the scientific community, were associated with a paradigm shift when the axioms of scientific theory are increasingly questioned. These themes have been convincingly pursued by Barnes (1983), Clark (1989), Guba (1990), Long and Long (1992) and Natter et al. (1996).

A focus on the cultural foundation of established disciplinary thinking would support the notion that technological and institutional innovation progress most amenably through consistency with ‘conventional wisdom’. This cultural focus suggests change occurs more disruptively, though probably more effectively, through a process of deep conceptual challenge. Clark (1995) argues that traditional development models relating expert knowledge to social need are increasingly unable to cope with the demands of a complex world. Further, he suggests that in a world where rapid structural change is the norm, knowledge is context dependent. This stance is supported by Munro-Clark (1992) and Papadakis (1996) who argue that this necessitates the inclusion of the perceptions and interests of stakeholders in development planning. Mitroff (1983), p. 177, points out that a complex issue is viewed differently by parties with varying vested interests. Mitroff asserts that each holds different assumptions about what is true or untrue, important or unimportant. The essential first step then is to introduce process to address assumptions. Wheatley (1994), p. 63, points out that it is difficult to develop a new sensitivity to the fact that no form of measurement is completely objective. The need for processes to utilise available information is well documented and is largely attributed to the success of the Japanese economy (Freeman, 1991; Kaplinsky, 1994). The lack of such processes for the flow of information and provision for adaptive learning has been identified as a major source of policy failure by Borins and Brown (1986).

By focusing on process, problem solving is then not a matter of starting from certain theoretical or methodological axioms: it is a matter of starting from understanding the problems and issues and then perceiving which methods and theories will best help to address them (Eagleton, 1986, p.

210). Process assists in bringing to the surface the relationships between value and fact, scientific theory and fact (see May and Sellers, 1988; Thompson, 1993). This orientation recognises that the ‘subjective’ perspective of the scientist will influence the collection of ‘objective’ data (see Hanson, 1958). The explicit recognition of this ‘data collection problem’ in facilitating sustainable development emphasises the need for participatory processes.

May and Sellers (1988), p. 401, assert that the criticisms of positivism have been sufficiently effective to relegate the methodology of positivism and the positivist tradition to the archives of intellectual history. Moreover, their position further encompasses the exposure of the weakness of the cartesian system that underlies positivism and its forced separation of fact and value, normative and positive.

“What is perhaps most important for the construction of a policy science is the ability of its practitioners to address existential problems of concern to the public” (May and Sellers, 1988, p. 403). To address sustainable development more effectively, the policy development approaches of ecological economics needs a greater emphasis on process. The transdisciplinary nature of ecological economics allows approaches to transcend the positive/normative debate so that effort is focused on facilitating institutional frameworks to operationalise sustainable development. “Institutions may be conceived of as social forms of contextualised information” (Clark, 1988, p. 529). Ecological economics is the only generic environmental policy framework to take account of people. Sustainable development as a concept in context applies to a participatory process for problem solving.

## 6. Insights from a transdisciplinary framework

Traditional development planning is driven by the need to achieve a pre-determined goal that requires adaptation to a given environment. Decision makers use prescriptive control mechanisms to plan and install appropriate behavioural systems for goal achievement. The focus is on the

manipulation of negative feedback (through planning, monitoring, reviewing and taking corrective action) in an attempt to produce patterns of behaviour consistent with stability or equilibrium. The process works through a deterministic view of the world in keeping with the standard scientific traditions of conventional science and economics (Stacey, 1990, p. 14). Nonlinearity and positive (destabilising or growth producing) feedback are largely ignored.

The interest of ecological economists in complex issues such as sustainability has stimulated investigations outside traditional boundaries. This has included interest in nonlinear, dissipative or adaptive self-organising systems. ‘Complexity theory’ is the label given to an on-going multi-disciplinary research effort into the nature of complex systems. The research focus has been on the development of mathematical systems of representation that incorporate agent learning and self-organisation. This research questions the potential of active control mechanisms to produce predictable paths for complex systems. Unpredictability is a universal property of complex systems. Rosen (1987), in articulating the behaviour of complex systems, suggests that “such systems deviate from the behaviour predicted on the basis of any dynamical approximation; the deviation grows in time, eventually the deviation grows so great that the original dynamical approximation must be replaced by another” (p. 133). The possible evolution of a system to alternative and qualitatively different states is regarded as emergence.

The apparent potential of these approaches to assist with interpreting real world problems is gaining momentum in the ecological, economics and management areas (see Kay, 1982, 1986; Nelson and Winter, 1982; Sheldrake, 1988; Arthur, 1989, 1990; Stacey, 1990, 1993; Clark and Juma, 1992; Clark et al., 1995; Goldstein, 1994; Morecroft and Sterman, 1994). Flexible institutional arrangements and management strategies that promote continual adaptability and learning are identified as traits with the greatest potential to guide systems towards intertemporally sustainable outcomes. These insights suggest a radical departure for the traditional role of management. Now the achievable focus becomes to manipulate or

apply leverage to feedback relationships to move a system in a desired direction as opposed to the management of perturbations from some preconceived optimal target or goal. Mainzer (1993) argues that the learning organisation movement has been inspired to develop this new way of thinking through reflection on the success of high-technology industries which have ridden with rather than removed positive feedback processes within their industrial environment.

### *6.1. Insights from systems thinking in management*

Conventional planning methods founded on the philosophies of neoclassical economics imply confidence, in the absence of complete information. The associated optimising approach inspires confidence only with those who do not acknowledge the unrealistic simplicity of the underlying assumptions. The continued support for optimising approaches occurs amid claims of the absence of any viable alternative for policy and management decision making. “The belief has been that the clearer the image of the destination, the more force the future will exert on the present, pulling us into the desired future state” (Wheatley, 1994, pp. 53–54). While the heritage of ‘command and control’ management can claim some successes (particularly for ‘simple’ planning scenarios), Senge (1992), Stacey (1993), Morecroft and Sterman (1994) and Wheatley (1994), among others, have claimed that the cost is an unnecessary constraint on the adaptive ability and creativity of an organisation or economy.

For economic planning, Parker and Stacey (1995) argue the insights gained from complexity result in problem-solving approaches that are interactive, that generate information, that enable agents to learn and adapt as they go along and that encourage entrepreneurial innovation and institutional change. Where organisations or systems display limited hierarchical relationships, self-organising capacities exist. Self-organising capacities exist for sustainable development approaches which always relate to complex systems embodying complex interrelationships. Here notions of complete knowledge and control are per-



ceived to be unacceptably unrealistic. Change in sustainable development planning scenarios is driven by disequilibrium, such as structural change in communities, in urban/environment relationships, heterogeneity of values and changing values, non-linear relationships and technological innovation. These are the very things that conventional planning procedures based on neoclassical economics assume constant or assume away.

## 6.2. Insights from 'New Science'

As with conventional economics and management, the scientific community has also served as fertile ground for profound introspection and the re-engineering of traditionally unassailable concepts and processes. These activities have in effect created new sciences of quantum physics (Gribbin, 1984; Herbert, 1985), holistic biology (Sheldrake, 1988; Kauffman, 1992), complexity (Davies, 1989; Gregoire and Prigogine, 1989) and chaos (Kamminga, 1990; Wiggins, 1990). Here, "...the underlying currents are a move toward holism, toward understanding the system as a system and giving primary value to the relationships that exist among seemingly discrete parts" (Wheatley, 1994, p. 9).

The study of complexity moves conventional science from a focus on prediction and control towards one on explanation and learning (Gleick, 1987). In addition, Gell-Mann (1994), p. 33, asserts that any definition of complexity is necessarily context-dependent. This is reinforced by Zohar (1990), who says that the quantum world view emphasises the importance of relationships to provide context for understanding system behaviour. Waldrop (1994) documents the development in understanding of complex adaptive systems and the concept of chaos, emergence, and self-organisation in natural and economic systems. Mainzer (1996) asserts that sustainable development may require institutional change to reckon with complexity by stating: "...individual freedom of decision is not abolished, but restricted by the collective effects of complex systems in nature and society which cannot be forecast or controlled in the long run" (p. 315). The evidence from these and numerous other

sources points to a major reworking of the Newtonian or reductionist/mechanistic foundations of conventional science (see Prigogine and Stengers, 1984).

This argument against deductive logic is eloquently elaborated by Sheldrake (1988), who claims that: "we can no longer ignore the possibility that creativity is real; everything may not be given in advance; new patterns of organisation may be made up as the world goes on. Everything new that happens is possible in the tautological sense that only the possible can happen. But we need not attribute to these possibilities, which are unknowable until they actually happen, a pre-existent reality transcending time and space" (p. 309).

These insights point toward an inductive orientation for thinking to better understand complex relationships.

## 7. Inductive inquiry as a learning concept

Arguments supporting an inductive mode of inquiry emphasise learning as the key prerequisite for the development of management solutions and policy. Here, learning refers to the accumulation of insights into system cause and effect by all those with interests in a decision or issue. Learning is regarded as a never-ending process and is always transdisciplinary in focus. The need for a learning focus can be generalised to inquiries relating to all complex adaptive systems and has been widely accepted as the essential part of the innovation process in the organisational and management literature (e.g. Senge, 1992). Stacey (1993) argues that effective learning involves not only discovery and adaptation but also the need to understand the assumptions or mental models of the decision makers. Assumptions can be culturally embedded, and as such, may be particularly difficult to know and articulate. Nevertheless, the need to surface and facilitate collective introspection on assumptions is an essential part of the learning-oriented planning process. Learning processes facilitate stakeholders away from the defense of subjective positions by surfacing assumptions, and this leads towards a

more common understanding of the problem at hand.

Argyris (1990) and Jin (1994) have identified numerous ways that traditional planning approaches block learning and therefore innovation. Freeman (1988) asserted that the main weakness of neoclassical economics has been inadequate attention to social learning processes. Goldstein (1994) emphasised the need to understand the dynamics of the system for effective learning. Handler (1988), p. 1046, identified an inability to compare the consequences of different solutions to problems for social planning as a lack of capacity to learn. March and Olson (1988) attributed the increased interest in organisational learning in science and economics with the recognition of the limitations on rational calculation, planning and forecasting as a basis for intelligence. Clark (1985) argued that technological change is the driving force in the structural evolution of economic systems, and therefore, in order for society to keep abreast of rapid technological change, it must also be prepared to endorse rapid organisational change.

As learning proceeds and an appreciation for the underlying complexity of any sustainability-oriented planning situation develops, the focus for policy making will shift towards the development of suitably flexible, inductive rather than deductive policy or management processes. Wheatley (1994) asserts that “participation, seriously done, is a way out of the uncertainties and ghostly qualities of this non-objective world we live in” (p. 64). Clark and Juma (1992) argue it is how effectively information is contextualised as relevant knowledge that really determines the pace and pattern of technological (and therefore economic) changes. In addition, these changes are very often dependent on the parallel development of appropriate institutional structures. The focus on dealing with change in a policy setting is echoed by Nelson and Soete (1988) who argue that this involves, in the first instance, abandonment of the traditional normative goal of trying to define an ‘optimum’ and the institutional structure that will achieve it. In the second instance, there is a need to accept the more modest objectives, in relation to dealing with problems, of articulating possible improvements.

### 7.1. Participatory decision making

Ecological economics stresses that markets operate within an “institutional or societal framework which determines and directs the behaviour of producers and consumers” (Folke et al., 1994, p. 9). Berkes and Folke (1994) assert that a more complete conceptualisation of the interdependency of the economy and the environment requires attention to social, cultural and political systems. Berkes and Folke coin the term ‘cultural capital’ to include collectively factors such as social and political institutions, environmental ethics (world view) and traditional ecological knowledge in a society. Human-made capital (arising from economic activity) and natural capital, while highly interdependent for the production of goods and services, rely on cultural capital for the manifestation of this relationship. The understanding of cultural capital and its impacts are an essential element in articulating the governance of sustainable development.

Berkes and Folke (1994) undertake an exhaustive review of the common property rights literature because of its relevance to self-regulatory systems. From this, it is claimed that, conceptually, it is not surprising to find self-organising capabilities in social systems. In socio-economic systems this occurs when individuals detect and build up support for an issue. This self-organising process is enhanced through more explicit attention to the interdependencies existing in a system. (For more detail on self-organising processes in economic systems, see Gill (1993), Stacey (1993) and Parker and Stacey (1995).)

For effective process it is essential that decisions be made by those who will bear the main consequences. This will ensure proper scrutiny of the processes involved and will promote the greatest holistic appreciation for the possible consequences. An important question is the determination of stakeholder representation. Frequently, elected officials, political party members and experts claim their exclusive involvement in policy decision making as a substitute for more extended stakeholder involvement. The political representation system is claimed as justification to limit public involvement to the mechanisms of

public inquiry processes rather than the more involved processes advocated by learning organisation proponents.

The public inquiry process, though, tends to limit if not preclude general cross stakeholder learning. Interaction between different interest groups is limited to the filter of some centralised policy decision makers. Interaction with those policy makers is also distinctly ‘one-way’ which tends to assert the hegemony of the expert in decision making. Decisions are imposed from ‘above’ rather than ‘developed from below’ as would be the case through a properly constituted learning approach to decision making. Adopting genuinely community consultative approaches to resource policy making need not be unacceptably expensive or unwieldy; again, the key is for appropriate processes and there are many insights to be had from the learning organisation movement in business management to assist with this. Gill (1997a) provides a detailed account of a possible learning process model in relation to the resolution of a major controversial public resource use issue in Australia.

### **8. Ecological economics as a transdisciplinary framework: articulating a process for sustainability**

The pursuit of sustainable development is essentially the facilitation of a social process. This requires ongoing management based on understanding the feedbacks driving ecological and economic interactions. No end point is achieved and progress can only be measured in retrospect due to the uncertainty of current actions on future outcomes. Sustainability is not a fixed state; van den Bergh (1996) portrays sustainable development as “a balanced adaptive process of change in a multi-dimensional complex integrated system” (p. 5).

Sustainable development calls for a greater emphasis on process through strengthening the quality, representativeness and resources of policy decision makers. Holmberg and Sandbrook (1992), p. 34, stress the necessity to make more use of the knowledge, ingenuity and organisa-

tional capacity of citizens themselves. An attempt to “understand the social, economic, technical and legislative conditions under which a specific pattern is generated also helps to identify pressure points for intervention for evolutionary change” (Saeed, 1994, p. 4). To address these problems, economic decisions must be made locally, by the people concerned, and this translates into decentralised, participatory democracy (Clark, 1989, p. 357).

Stacey (1993) observes that “the environment which managers respond to is not a set of independently given, scientifically observable facts but rather a set of perceptions that they have” (p. 16). From this he maintains that conventional planning attempts to map a comprehensive strategy for the future and, in so doing, fosters ritualistic behaviour. This is so often the case in resource management where quasi-representation makes or creates the illusion of participation, resulting in largely predetermined outcomes (see Schmid, 1989). Planning decisions are usually based on information that has not taken explicit account of the relevant sociocultural context (see Nonaka, 1993). This invariably results in community non-compliance and anger as the participants have no adequate structure for rational debate (see Hetherington and Piotrowski, 1996).

Sustainable development is a complex issue and there will always be a gap between current understanding and that necessary to address evolving environmental management issues comprehensively. An appropriately facilitated learning process will most adequately fill the gap (Argyris, 1993). A participatory process is required to evolve stakeholder perceptions and values through learning. The development of evolutionary institutional arrangements is as much a part of the facilitated learning process as the development of added insights into the underlying causes of issues of problems.

Perceptions and values are, in effect, treated as structural preconditions for social change (Papadakis, 1993, p. 14). They are, however, amongst the most difficult of all factors to change through deliberate effort. Hayden (1988), p. 416, identified some entrenched culturally embedded values as impediments to institutional progress: (1) an an-

thropocentric inclination to dominate nature; (2) a predisposition towards atomistic conceptualisation; (3) extensive hierarchical relationships; (4) flowing or linear time concepts; (5) dualistic thought; and (6) dynamic expansiveness (proclivity for growth).

Hayden emphasised the need to understand these values as a precondition for any attempt to influence social change. “Changes in values and political skills have had major consequences for politics and society and have influenced the style of political participation, leading to new challenges to elites by movements that stress participation and specific policy issues” (Inglehart, 1977, p. 14). These changes have allowed for the possibility of explicitly dealing with embedded values (see Inglehart, 1990). We would maintain that any attempt to directly deal with embedded values is consistent with our vision for ecological economics.

As social participation increases in decision making, a strong emphasis on the sociocultural context provides a necessary recognition of the importance of attitudes, perceptions and values in driving the economic and institutional relationships that form the fabric of a functioning society. Yankelovich (1991) describes this as a partnership between judgement and information: “Judgement is not a substitute for information but a separate and independent variable playing a different role in the decision making process than information does” (p. 192). This position is supported philosophically by deBono (1993), who argues that “there are people who believe that if you get enough information then the information will do your thinking for you, however it is the concept through which we perceive the information that gives it any value” (p. 118).

To facilitate this kind of process requires a forum for rational discussion. Jurgen Habermas (1987), a prominent philosopher from the ‘Frankfurt School’, defines rational communication as the ability of people to reach mutual understanding even when interests and cultural frameworks conflict. The outcome of this communication is for people to understand each other well enough that common goals are possible. Yankelovich (1991) describes this as “a vision of democracy

that involves those who wish to be involved and that recognises that the highest expression of human rationality is not nuclear physics or econometric models but ordinary people speaking and reasoning together on issues of common concern” (p. 240).

Several fields of contemporary legal studies support the theme that complex social problems require participatory processes in which people can solve problems through reference to relevant contextualised values and interests. These jurisprudential themes include: Legal Realism and its contemporary heir Critical Legal Studies, Feminist Jurisprudence and reflexive law developed by continental theorists (see Handler, 1988). These branches of law studies take the stance that rather than resolving conflicts through abstract rules, the facilitation of institutional processes should be promoted with discourse rooted in context. It emphasises that values cannot be applied abstractly and mechanically; “they must be applied at the ground level, by the parties themselves in their own relevant context” (Handler, 1988, p. 1049).

The forum for rational discussion is increasingly being termed dialogue. Dialogue is a group activity in which participants’ discussion is as much about the internal group dynamics—assumptions, values, motivations—as the seemingly normal topic of discussion. Bohm and Peat (1987) assert that “a key difference between a dialogue and an ordinary discussion is that, for the latter, people usually hold relatively fixed positions and argue in favour of their views as they try to convince others to change” (p. 241). Bohm and Peat suggest that at best this may produce agreement or compromise, but it does not give rise to anything creative.

“The notion of dialogue is pivotal both to describing the process of the effective implementation of policies and to prescribing a distinct approach” (Papadakis, 1996, p. 4). In reviewing and attempting to identify a common theme in contemporary philosophy, Bernstein (1983) points toward what he calls ‘dialogism’. The positions reviewed include those of Hans-Georg Gadamer, Jurgen Habermas, Richard Rorty and Hannah Arendt. His objective is to flag a synthesis in

thinking that moves beyond the cartesian split focused on the positive/normative debate to ground human rationality in dialogue.

Dialogue occurs where both parties are looking for solutions that will benefit both sides, where parties attempt to develop an empathetic understanding of divergent viewpoints or of divergent goals and where this understanding involves goodwill, the willingness to listen and discretion (Papadakis, 1996, p. 4). The dominant alternative approach supported by reductionist, linear and deductive logic promotes an adversarial approach that operates in rigid and absolute terms where positions are viewed as either right or wrong. The heart of philosophy's quarrel with objectivism is its claim that it is the only valid form of knowledge "...brushing aside forms of knowledge based on judgement, values, insights and norms" (Yankelovich, 1991, p. 199). Handler (1988) suggests seeking conditions to break down hierarchy, to introduce values, commitments and intuitions explicitly into the discourse of action, and to create the institutional conditions whereby people talk to each other. Without this opportunity, Papadakis (1996), p. 8, suggests that the more imaginative and constructive policies are ruled out of political debate. Political issues then tend to be presented in terms of exclusive choices.

Ecological economics is an attempt to transcend the binary coding of these self-referential systems. Binary codes are used to simplify choices in complex environments. "New ideas on methods to address intractable problems or to improve the current way of doing things, has meant at times, that people have to detach themselves from traditional ways of conceptualising social systems and from traditional ways of tackling issues (notably the adversarial approach and the adoption of rigid dichotomies and categories)" (Papadakis, 1996, p. 207). To improve public judgement, the adversarial relationship between experts and public must be transformed into a cooperative, mutually supportive one (Yankelovich, 1991, p. 244).

In a discussion of issues arising from the common property resource dilemma, Ostrom (1991) argues that instead of there being a single solution to a single problem, that many solutions exist to cope with many different problems. Instead of

arguing that optimal institutional solutions can be designed easily and imposed at low cost by external authorities, Ostrom argues that getting the institutions right is a difficult, time-consuming, conflict-invoking process. It is a process that requires reliable information about time and place variables as well as a broad repertoire of culturally acceptable rules, many of which are contained in the notion of dialogue. This position is supported by the United Nations program for action on sustainable development, Agenda 21 (UNCED, 1993), which states that one of the greatest challenges posed by sustainable development is the need for institutional change. In addition, Tuxworth (1996), p. 286, identifies that Agenda 21 is explicit in its requirement that sustainable development be founded on democratic participation.

To operationalise sustainable development requires moving from literary or scientific definitions toward a process that recognises diversity of perspective. Numerous sources have articulated the role of culture in driving our behaviour toward the environment (Prigogine and Stengers, 1984; Hayden, 1988; Papadakis, 1993, 1996; Quinn, 1994). To attempt to facilitate subjective practices does not require hard and fast definitions. While these definitions may be useful for disciplinary application, making them a starting point in debate acts as a barrier to evolving civil society to address sustainable development.

While many definitions describe symptoms or desired outcomes, they do not address the underlying structure that has led to the current approaches. By developing a process that more clearly articulates a shared understanding of sustainable development, it will be easier to identify leverage points for action, and subsequently the realisation of collective goals. Recognising and integrating diversity of perspective will always be a difficult though a key part of the process towards the realisation of genuinely holistic sustainability. This anticipates an evolving process where learning leads to a greater level of understanding of the complexity of the problem. This will require more fluid institutional structures to accommodate change.

### 8.1. *Articulating an alternative definition for sustainability*

At this point, it would be instructive to attempt a reworking of the sustainability concept; one that captures the essence of the arguments presented above and which would provide a foundation for purposeful attention in a transdisciplinary context.

Sustainability describes a state that is in transition continually:

(1) The objective of sustainability is not to win or lose and the intention is not to arrive at a particular point.

(2) Planning for sustainability requires explicit accounting of perspective (world view or mindset) and must be involving of broadly representative stakeholder participation (through dialogue).

(3) Success is determined retrospectively, so the emphasis in planning should be on process and collectively considered, context-related progress rather than on achieving remote targets. A key measure of progress is the maintenance of a creative learning framework for planning.

(4) Institutional arrangements should be free to evolve in line with community learning.

(5) The new role for policy makers is to facilitate learning and seek leverage points with which to direct progress towards integrated economic, ecological and sociocultural approaches for all human activity.

This describes a move away from a culturally inappropriate, exclusive epistemology of positive and normative definitions to a process that facilitates reflective insight and the genuine sharing of ideas.

## 9. Conclusion

The evidence from various quarters of science, sociology, philosophy, economics and law suggest that the conventional normative/positive focus of the sustainable development debate is an outmoded epistemology. The alternative is to develop a process to better understand the socio/cultural context of the environmental and economic information and judgement underlying development scenarios.

This necessitates a very different epistemology from the current dominant approach in sustainable development planning, to one that requires and benefits from transdisciplinary participation. Effort is then focused on understanding the interrelationships in development planning, which leads to improved understandings of the dynamics of change, rather than quantitatively measuring parts of the economy or environment at particular points in time and making predictions about future states. There is a need to be cautious of prescriptive goal-oriented decision making which makes assumptions about the ability of policy makers and resource managers to control systems under their jurisdiction. The lack of understanding of the systemic, structural nature of our problems, is most likely the single important failure of policy. If policy is process oriented, decisions are led beyond 'policy twitching' to instead facilitate real change. Ecological economics with a focus on sustainable development and a transdisciplinary foundation, is ideally placed to articulate learning-oriented process for sustainability planning.

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