

SOCIAL ECOLOGICAL ECONOMICS

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Social Ecological Economics

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ABSTRACT

This paper introduces and explains how ecological economics has developed as a modern movement with its roots in environmentalism and radical environmental economics. Divisions and conflicts within the field are explored to show why material claiming to fall under the title of ecological economics fails to be representative of progress or the vision which drove socio-economic specialists to interact with ecologists in the first place. The argument is then put forward that ecological economics, as a social science engaging with the natural sciences, is a heterodox school of modern political economy.

Keywords: ecological economics, methodology, ideology, politics, history

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INTRODUCTION

Ecological economics has developed as a modern movement since the late 1980s. This movement has gathered together a variety of perspectives and interests concerned to address the modern environmental crisis. A crisis because environmental degradation—species loss, long range transport of air pollutants, contamination of soil and water, introduction of synthetic chemicals, desertification, deforestation—has only belatedly been recognised as integrally linked to the way the economy is run.

In economics appearance of environmental problems has been minimal and undertaken by sub-disciplinary areas which are easily sidelined and disregarded by both micro and macro economists. Even amongst heterodox schools, where a voice might have been more readily expected to be heard, there has been little or nothing eg. post-Keynesians, critical institutionalists, neo-Marxists. Economists of all schools have generally been able to ignore the evidence of environmental problems as having anything to do with their work. That 'real' economics' is about things like unemployment and inflation meant working on the environment could be easily dismissed as consigning oneself to irrelevance. So what has changed?

The environment is now a headline issue and controlling pollution is big business, eg. the European emissions trading scheme had an estimated worth of US\$51 billion in 2007 (European Commission, 2008: 21) and US\$80 billion in 2008 (Kantner, 2008). Since the early 1990s Nobel economic prize winners (eg. Arrow, Kahneman, Sen, Solow, Stiglitz) have been found imparting their wisdom on environmental matters,² and some have even associated with ecological economists

² Kahneman is perhaps the most consistent having been associated with the work of environmental economist Jack Knetsch from his time in Vancouver at the University of British Columbia 1978-1993

(eg. Arrow, Sen). The engagement of economists, or more accurately their stated interest, has risen sharply. Thirty years ago the magazine *The Economist* published few articles on the environment and those which appeared were relegated to its science section—not anymore. The high political profile given to human induced climate change and neo-liberal support for multi-billion dollar carbon trading markets would seem to have had something to do with this new found interest within the economic establishment.

Unfortunately increased popularity does not necessarily indicate serious engagement with the subject matter even from the most hopeful sources. For example, Amartya Sen appears a thoughtful writer on economics who has expressed ideas critical of orthodox economics and offered insights on development,³ poverty and gender issues. In a rather overlooked book, he highlighted the role and importance of ethics in economics (Sen, 1987). All this fits well with arguments for value pluralism as found in ecological economics. Yet he gave a plenary at the International Society for ecological economics (ISEE) Conference in 2006 which was not only disappointing in offering little of substance specifically on the environment, but also finished-up expressing support for the monistic global cost-benefit analysis of the report by Stern (2006) on human induced climate change. He later endorsed the published report with its placement of the issue within a pro-growth strategy. This support would seem in stark contrast to his ideas on economic development as opportunity, writings on problems with welfarism in economics, and general criticisms

(Kahneman and Knetsch, 1992b). He also contributed to early debates on contingent valuation (see Cummings, Brookshire and Schulze, 1986). Arrow and Solow were involved on opposite sides of the Exxon Valdez oil spill legal case for compensation and the ensuing National Oceanic and Atmospheric Administration panel on the use of the contingent valuation method for natural resource damage assessment (Arrow et al., 1993). Sen (1995) also wrote commenting on contingent valuation. Arrow and Stiglitz were authors for the Intergovernmental Panel on Climate Change third assessment report (Arrow et al., 1996a; Arrow et al., 1996b).

³ He has been attributed with inspiring the multiple criteria approach of the Human Development Index (HDI). Note, this actually ignores environmental factors.

of using growth as a measure of well-being. Sen, unlike some in his audience, was apparently unconcerned by, or perhaps unaware of, Stern's underlying expected utility model, standard discounting approaches and use of GDP growth as means for justifying human action, or inaction, on this major environmental issue (see critique by Spash, 2007). At the ISEE conference he seemed oblivious to any debates in ecological economics of direct relevance to his own work or the ways in which his own work might relate to environmental issues.

That eminent figures in the economic establishment talk to but not about the environment is seriously problematic and brings into question the considerable rhetoric of environmental concern amongst economists. The continued neglect of the environment as a core economic issue can be seen as deriving from the two ways in which it is approached. First, is the treatment of environmental issues as special cases of more general theoretical constructs in mainstream economics. This allows (both mainstream and heterodox) economists who are embedded in an establishment discourse to maintain their own preoccupations without needing to pay much attention to the specifics raised by environmental problems. Second, is the recognition that serious attention to environmental reality leads to the need for a totally new approach based in political economy and interdisciplinary learning. The former is thus the preferred approach for most economists. The *raison d'être* of ecological economics is the latter. Thus, work by ISEE Presidents Joan Martinez-Alier (2002), Richard Norgaard (1994) and John Gowdy (1994) have addressed the social and political as much as the economic, while emphasising the need to learn from interactions with ecosystems. A perhaps inevitable struggle has then been on-going between this social ecological economics approach and those engaged-in

legitimising economics as an objective technical approach for engineering social efficiency while treating the environment as something external to the economy.

This paper explores that struggle and some of the resulting confusion it has created for understanding the meaning and content of ecological economics.⁴ In order to be treated seriously ecologists have felt the need to adopt orthodox economic models and make alliances with figures from the mainstream. The central contention of the current paper is that the environment and the economy are intertwined and neither can be meaningfully analysed independent of the societal context. The importance of social, political, ethical and institutional factors is something which ecologists are not trained to detect and economists are trained to neglect. The aim of this paper is to outline the discourse underlying the work which has been appearing as ecological economics and to explain how some is inappropriately classified. Meanwhile there is other work dispersed across a range of fields which could easily be included within the bounds of relevance.

In the next section I give a brief historical outline of the development of ecological economics. This sketches the claim to deep historical roots but clearly identifies the modern movement as arising from late 20th Century environmentalism. Environmental Economics is then seen as an earlier failed attempt to challenge economic thinking. This background shows how ecological economics was born into a divided and contested world. Section 3 then explores specific divisions and conflict. Examples are employed to explain how the movement became partially entrapped by an orthodox economic dialogue. Rather than denying the relevance of these divisions I aim to clarify their causes and Section IV outlines these as both ideological and methodological. The paper concludes that the only progressive way

⁴ Some sections of this paper are based on the general introduction to Volume One of Spash (2009).

forward is to pursue social ecological economics as a heterodox movement in political economy.

ROOTS OF THE MODERN MOVEMENT

Ecological economics engages with a range of topics which recur across time and have been debated since the ancient Greeks. As such the subject matter includes the limits to wealth creation, the meaning of the “good life”, how to achieve well-being individually and socially, ethics and behaviour, the epistemology of value, and the psychological and social impact of ostentatious consumption. Threads of reasoning and ideas which are represented in the modern subject can be identified in a range of 18th and 19th Century sources and call upon many topics discarded or ignored by mainstream economists, including: the writings on social motivation of Adam Smith (1982 [1759]); population and poverty in Malthus (1986 [1798]); Jevons (1965 [1865]) on non-renewable energy dependence; John Stuart Mill’s (1848) steady-state economy; Marx (1867) on exploitation, class conflict and capital accumulation; and the evolutionary institutional analysis and ‘conspicuous consumption’ of Veblen (1991 [1899]). The romantic critique of economics is also relevant and most notably the writings of Ruskin (1907 [1862]). In ecological economics some limited forays have been made into this historical context (eg. Becker et al., 2005; Christensen, 1989; Smith, 1980; Spash, 1999), but most notably with respect to the energy-environment interface in the work by Martinez-Alier (1990).

While the subconscious roots may run deep, the conscious ones lie directly in the 1960s and 1970s, although a few economists during the 1940s and 1950s did express ideas in form and substance that are still current in ecological economics. Most notable is K. William Kapp who dedicated himself to exploring the relationship

between economics and the environment. He wrote on history of thought and methodology (Kapp and Kapp, 1963), and produced an extensive empirically based institutional analyses of environmental problems (Kapp, 1950; 1978). He also explored the relationship between science and society (Kapp, 1961). Indeed the reason he is largely unknown is that his critique was so far ahead of its time in breadth and depth. Ciriacy-Wantrup's (1952) work on conservation, land and resource use is also noteworthy, not least for developing the concept of a safe-minimum standard. More generally, there is the work on modern industrial society of Polanyi (1944) and Galbraith (1969 [1958]; 2007 [1967]) covering the rise of self-regulating market economies and the corporation, respectively. Both at points link their thesis explicitly to environmental degradation. Like Kapp, these authors offer classical institutional critiques of the economic process. So, while few contributed at this time, some powerful ideas emerged which remain highly relevant to our understanding of environmental problems.

The Emergence of Environmentalism

In the 1960s a more general and popular awakening to environmental problems arrived with books such as Rachael Carson's (1987) *Silent Spring* on agro-chemical pollution and Paul Ehrlich's (1968) *Population Bomb*. The issue of economic growth was also placed on the agenda (Boulding, 1966; Mishan, 1969). In popular culture, the hippie movement raised the ideal of harmony with Nature, dematerialisation and alternative lifestyles (from self sufficiency to communes). However the popular environmental literature really took-off in the 1970s and only then spread into economic debates. Topics expanded from population growth (Ehrlich and Holdren, 1971), to general limits to economic growth (Meadows et al., 1972), to questioning the means of production (Schumacher, 1973) and social impacts of growth (Hirsch,

1977). Radical environmentalism was being born (Abbey, 1975), and an associated protest movement became institutionalised in non-governmental organisations from Friends of the Earth and Greenpeace to Earth First and Sea Shepherd.

In economics the major factor that helped concentrate minds on environmental issues was the energy crisis (Commoner, 1976; Tanzer, 1974). While this crisis was created by oil producers restricting supply leading to price increases, the general idea of economic dependence on finite non-renewable resources was brought back on the agenda after having been neglected since the 1800s. There was inevitably also a backlash against environmental concern and defensive arguments from mainstream economists. For example Beckerman not only attacked those raising concerns over finite natural resources (Beckerman, 1974), but also Kapp's environmental work (see the reply to Beckerman by Kapp, 1978: 305-318).

Such economists were and remain out of tune with public concern and the growing awareness of pollution as a techno-industrial threat to life on Earth. The link of DDT to non-human and human birth defects was a starter. Similar consequences were feared due to nuclear fallout from weapons testing. In 1959, contamination of the food chain became evident when radioactive deposits were found in wheat and milk in the northern United States. The result was to move testing underground, although France and China persisted with above ground testing and global pollution (eg. Simpson et al., 1981). The new nuclear power industry, which supplied weapons grade plutonium, provided another environmental concern. The threat of accidents and pollution became increasingly real from the reactor scare at 3 Mile Island in USA to the radioactive releases from the UK's reprocessing plant at Windscale (renamed Sellafield in a rebranding exercise). Fears of a major reactor

accident were ultimately realised with the catastrophe at Chernobyl in the 1980s and the resulting global nuclear fallout.

Scientists debated the idea that air pollutants could be transported internationally. This was contested into the 1980s and persistently denied by countries (eg. UK and Germany) responsible for large scale emission of sulphur dioxide and nitrous oxides from coal fired power stations. Confirming the sources of acidic deposition impacting Scandinavian ecosystems became a political issue and an international research project. Meanwhile, the aircraft industry's proposal for large fleets of supersonic aircraft, as the future for international travel, raised the spectre of polluting the upper atmosphere and affecting global climate (d'Arge, 1975). Another global pollution problem to appear was the depletion of stratospheric ozone connected to the use of aerosol propellants, mainly chlorofluorocarbons at the time (Cumberland, Hibbs and Hoch, 1982). In a few short years pollution moved from being regarded as localised smog from domestic fires to international and global with numerous sources and seriously threatening consequences including genetic mutation and irreversible damage to ecosystems and their functioning.

The Rise and Fall of Environmental Economics

Environmental economics arose, along with the growing public awareness, as a direct response to such problems (see for example Kneese, 1971). The promise of material wealth for all and post World War II optimism in the abilities of science and technology were faltering. Boulding (1966) characterised the economy as being run like the wild west populated by cowboys exploiting resources, chucking their waste on the ground and riding away to infinite horizons where lay the promise of fresh resources and new environments to exploit; this was contrast with Earth as a closed system like a spaceship. Economic growth was seen as positively misleading in

terms of the consequences for human society (Mishan, 1969). The challenge was for a new approach to economics.

Environmental economics then appeared both innovative and progressive, if not downright revolutionary. For example, Bohm and Kneese (1971: ix-x) introduced their edited volume, *The Economics of the Environment*, stating that this was “a profession rethinking, extending, and revising its concepts, and finding new applications for them.” They drew a parallel with “the ferment in the profession when the Keynesian revolution was in progress” and claimed history was in the making. The reality was a little different.

Any serious challenge, by such key figures of the time, which might have been posed to orthodox economic methodology, its theoretical models, or even its non-environmental preoccupations, was muted. Indeed, besides some passing rhetorical comments, time was mostly devoted to developing mainstream economic thought and applying this to environmental issues. Materials balance theory brought in the laws of thermodynamics, but for compatibility with the mainstream this needed to fit within a general equilibrium framework (Kneese, Ayres and d'Arge, 1970). Pollution was seen as all pervasive (Hunt and d'Arge, 1973), but this needed to fit within an optimal control framework (d'Arge and Kogiku, 1973). The environment was seen to involve a range of values neglected by and outside of economics (Krutilla, 1967), but these had to fit within cost-benefit analysis and a welfare theoretic framework (Kneese, 1984).

Despite this innovation certainly did occur. Environmental valuation in cost-benefit analysis introduced new methods such as travel cost, hedonic pricing and contingent valuation. The travel cost method was the earliest to be more fully developed (Clawson and Knetsch, 1966), while contingent valuation followed later

opening a whole new research agenda (Cummings, Brookshire and Schulze, 1986). Primary data collection from face to face interviews gave results that questioned the economic model of human psychology and motivation, and for some created interdisciplinary interactions (Spash, 2008a). The theory behind values expanded from pure use to option, existence and bequest values (Krutilla, 1967; Krutilla and Fisher, 1978). This contributed to discussions over the ethical basis of economics (Kneese and Schulze, 1985; Schulze and Brookshire, 1982; Schulze, Brookshire and Sandler, 1981). Climate change and the treatment of future generations were also topics on the valuation agenda (d'Arge, 1979), which raised ethical concerns (d'Arge, Schulze and Brookshire, 1982; Spash and d'Arge, 1989).

Working inside orthodox economics—preference utilitarianism, optimal control modelling, discounting, a monistic value system, and mathematics as a doctrine of rigour—heavily constrained criticism, innovation and the ability to address environmental and social problems. For example, in the early 1980s a key workshop on contingent valuation was run by Cummings, Brookshire and Schulze (1986) bringing together a range of people including psychologists. Those advocating the use of attitude-behaviour models from social psychology were extremely critical of their reception: “We certainly underestimated the barriers to interdisciplinary communication. Our proposal that economists consider the attitudes-behaviour literature has met with indifference or hostility. CBS are no exception.” (Bishop and Heberlein, 1986: 141). A second example is the experience of Jack Knetsch. Despite being a pioneer of travel cost and hedonic pricing Knetsch has also been highly critical of valuation practice (eg. Knetsch, 1994; 2005), and in particular its failure to learn from empirical evidence with respect to loss-gain differences (Knetsch, 1985; 1989; Knetsch and Sinden, 1984). His work with Daniel Kahneman

provoked strong and defensive reactions, especially their paper on embedding (Kahneman and Knetsch, 1992b) which refers to willingness to pay under contingent valuation as the purchase of moral satisfaction rather than an exchange value. Getting the paper published in the main environmental economics journal proved problematic and it received some special critical treatment.⁵

Here then are the roots of dissension which would lead to ecological economics. While some economists raised, but never answered, various questions, others followed arguments to their logical ends. Those ends raised issues which just could not be addressed within the orthodox economic frame. The entire thrust of the work towards a new and challenging research agenda seemed to be denied. For example, long-range transport of multiple air pollutants from dispersed sources had been and remains a major topic of environmental concern. Yet environmental economists persisted in teaching a characterisation of pollution as a local problem between two actors, easily corrected as a one-off market failure, or worse as optimal due to transactions costs (a problem noted early on by Mishan, 1971). By the mid-1980s university education in the area was mainly limited to North America where the approach to topics was controlled and the curriculum restricted (eg. post graduate education excluding methodology and history of thought). In this atmosphere ecological economics emerged as a challenge to the orthodoxy.

ECOLOGICAL ECONOMICS AS A CONFLICTED MOVEMENT

Those economists voicing strong environmental critiques in the 1970s generally found themselves and their ideas marginalised within a decade. The criticisms were

⁵ After a protracted review process the article appeared simultaneously with a critique (Smith, 1992), commissioned by the Editor, and a reply by the authors (Kahneman and Knetsch, 1992a). When a second critique was published the editor (Ron Cummings) refused the authors an opportunity to reply despite their concerns that they be allowed to defend their work. Jack Knetsch personal communication June 2004 and January 2006. Ironically this soon became the most highly cited article in the journal and has remained so, by far.

just too revolutionary. Kapp (1970a; 1970b) was pointing out the basic failure of a system which pushes costs onto others and characterises them as 'externalities', as if these were minor aberrations from outside an otherwise perfectly efficient system. Georgescu-Roegen (1971) wrote a major thesis on the importance of entropy for the economy which basically concluded that economic growth was infeasible over the long run and as a result policy needed fundamental reform. His reasoning led to questioning human society from the size of population and the pressure placed upon systems, to the time allowed for change and the rate at which human systems impose change. Economic systems were then inseparable from ethical judgments both concerning others currently living and future generations. Herman Daly (1977; 1992) came to the conclusion that the best option in the face of entropy laws and critiques of growth was to aim for a steady-state economy.

The arrival of ecological economics in the late 1980s offered the potential of picking-up on such neglected literatures. That at least became the hope of socio-economist, for if the field were no different from the mainstream sub-fields of resource and environmental economics the entire exercise would be a rather pointless repetition of what had gone before. However, developing a heterodox interdisciplinary research field with a distinct methodology and approach to society-economy-environment interactions was not on everyone's agenda and has involved conflict.

In an in-depth study, involving interviews with several noted ecological economists, Ropke (2004; 2005) found the international movement started by forming an uneasy alliance of divergent ecological and economic opinions on the basis of some very broad common concerns. In general terms, the unifying positions might have been no more than the environment matters to the economy, the

environment is being degraded, ecology has important messages for economics which are being neglected. Ecologists came forward who were passionate about connecting ecological understanding with socio-economics in order to better address environmental problems in the public arena. Any economist prepared to talk to an ecologist concerning the environment was a bonus. These ecologists then appear to have been largely (often wilfully) ignorant of differences between types of economist, and many remain so. Yet such ecologists filled key roles running the ISEE and its journal.

The result was substantial involvement by economists supporting core neoclassical methodology and ideology. This was further encouraged by the strategy for popular recognition and headline breaking articles in *Science* or *Nature*. The bigger the name in the field the better for getting the environmental message across, and as far as economists are concerned that would clearly favour the orthodoxy. A core group of ecologists—including Bob Costanza, Brian Walker, Paul Ehrlich, David Pimentel and Carl Folke—chose to associate with mainstream economic theorists such as Ken Arrow, Karl-Groan Maler and Partha Dasgupta. The ISEE's journal, originally controlled by Costanza, had mainstream economists placed on its Board and increasingly published much falling well within neoclassical thought, including the mechanistic equilibrium models and preference utilitarianism which so constrained the earlier endeavours of the more heterodox environmental economists.

David Pearce, a noted UK mainstream environmental economist and advocate of all pervasive monetary valuation, was an early Associate Editor of the journal who became increasingly hostile to anything heterodox. He is particularly remembered for a 1996 plenary to the European Society for Ecological Economics

(ESEE) Conference in Saint Quentin en Yvelines where he questioned the reason for ecological economics as anything distinct from neoclassical thought (Røpke, 2005: 271), and went on to point at Charles Perrings and rhetorically questioned his presence. Pearce was not separated from the journal for another two years.

Perrings, later an ISEE President, has himself pursued abstract modelling in the mode of resource economics (Perrings, 1987). This confines ecological economics to optimal control models despite all the ensuing contradictions of squeezing and remoulding concepts to make them fit the method (see his collected works Perrings, 1997; and the review by Spash, 2000b). This can be seen as following a line of reasoning—common amongst mainstream economists—that equates rigour with mathematical formalism; an argument flawed even within mathematics itself (see Dow, 2003). So mainstream economic approaches were from the outset brought into ecological economics, although the aim for many had been explicitly to move away from this orthodoxy (eg. Söderbaum, 1999; 2008).

The potential for divisiveness was apparent to some early on. In 1990 the Swedish Beijer Institute was rebranded under ecological economics with a Board mixing orthodox economists (Dasgupta, Maler, Pearce, Zylicz) and ecologists (Ehrlich, Holling) with one heterodox economist (Daly). The Institute was headed by Maler, the Board chaired by Dasgupta and two research programmes were directed by Perrings and Costanza. As has been documented by Røpke (2005: 272) the decisions made by Dasgupta soon drove Daly to resign, which allowed the Beijer to concentrate on traditional mainstream economics with models linked to ecology. The attempt to capture what was fast becoming a successful new field relates to power in academia and the potential for wider political influence. As Daly (quoted by Røpke, 2005: 272) has stated with respect to his experience at the Beijer: “I felt it

was a kind of take-over—here is something called ecological economics, it is beginning to get a little following, it might get in the way some day, let's just take it over.”

As the field has matured these divisions have remained strong and resurfaced on occasion. In 2002 the incoming journal Editor, Cutler Cleveland, expelled from the Board the more heterodox European representatives (including an Associate Editor, and both the founding and then current ESEE Presidents). This went unnoticed by most people. In 2004 a more public controversy occurred over the award of the ISEE prize in the name of Kenneth Boulding. The recipients were Dasgupta and Maler. In the Society newsletter (distributed at the biennial conference) Perrings, then ISEE President, rejoiced in this as signifying a change towards the approach of the Beijer Institute i.e. mainstream economic formalism. However, the award came as something of a shock to many when announced at the opening session of the biennial ISEE conference. It was debated and contested by the membership at the Society's business meeting (Røpke, 2005: 284-285; Söderbaum, 2007: 212-213). Neither Dasgupta nor Maler had previously engaged with the wider community (eg. never attending the European conferences) nor been (nor are) members of ISEE. Their work was felt by many to be incongruent with the developing field and Røpke (2004: 309) notes Maler's dislike of socio-economics. Obviously those making this award had a different perspective and active involvement with the Beijer Institute appears a unifying factor.⁶

⁶ Three ecologists D.J. Rapport (Canada) Chair, Brian Walker (Australia), Buzz Holling (USA); one environmental scientist Kerry Turner (UK) and two economists Clem Tisdell (Australia) and Charles Perrings (UK now USA) ISEE President at the time of the award.

IDEOLOGICAL AND METHODOLOGICAL DIVISIONS

A core group of ecologists writing on environmental policy issues have worked within the rhetoric of the economic orthodoxy despite their own heterodox backgrounds. Of course ecology in some guises is an optimising and maximising discipline with deterministic mathematical equilibrium models. In other guises it is dynamic questioning disciplines which push the boundaries of accepted knowledge. Modelling can be part of the latter, although in a rather different fashion than the former approach assumes (eg. Holling, 1986). Yet treating environmental issues as just a technical or modelling problem, for economic and ecological scientists to solve is far too reductionist and mechanistic.

Economics must be redefined as achieving sustained human well-being on the basis of the maintained health and functioning of Earth's ecosystems. There is then a dynamic and evolving interaction between human activity and the environment which is central to understanding the development of economic systems. Mainstream thought is resistant to the idea of economic systems as dynamic evolving structures, something recognised long ago by Veblen (1898). Physics rather than biology has been the dominant comparator and methodological influence. In contrast a methodology is necessary which moves away from a simple belief in mechanistic cause-effect relationships as explaining social interactions, something that was criticised by both Kapp (1978: 281-301) and Georgescu-Roegen (1979). Interactions with ecology have then revived interest in biological concepts and metaphors within ecological economics.

Most prominent amongst the biological/ecological concepts are ideas of sustainability, resilience and co-evolutionary development (Gowdy, 1994; Norgaard, 1981; 1987; 1988). In an evolving system concepts of equilibrium are abstractions

for convenience to describe specific states on a path of change. This can be linked to ecosystems understanding in terms of cycles of energy and materials organisation, accumulation, destruction and release (Holling, 1986). Managing and attempting to maintain systems in perceived equilibrium states can then prove disastrous, eg. preventing small fires in forests eventually resulting in large scale catastrophic fires. At the same time not all attempts to merge economics and biology are accepted and in particular those of the Chicago school have been rejected by prominent Ecological Economists (eg. Gowdy, 1987). Amongst the alternative approaches within ecology and biology the non-reductionist strains are favoured.

Rejecting atomistic and mechanistic explanations as universal truths also leads to opening-up the black box of the individual. Rather than regarding the human as some essentially irreducible atomic structure, which should remain unquestioned, the realm of motivation is revealed. Psychology can then offer tremendous potential for insight into behaviour, but only if economists are prepared to learn from, rather than dominate, the subject (Earl, 2005). Dropping the focus on self-interested utility maximisation leads to a rich array of possibilities. Lexicographic preferences no longer appear as a strange exception to the rule of gross substitution but a relatively normal approach to choice (Spash, 1998; 2000a; Spash and Hanley, 1995; Spash et al., 2000), which may be motivated by non-utilitarian ethics, strong uncertainty, or satisficing behaviour. Needs can be differentiated from positional affluence. Social norms provide a link between individual and societal motivators and connect with the role of institutions as explored by classical or critical institutional economists (as opposed to the neoclassical 'new' institutional economists). Social organisations are then seen to involve perceptions as to power,

trust and control which impact how people respond to requests and incentives for behavioural change.

These various insights have direct relevance for how economic growth is perceived to operate as a means for improving the human condition. The ecological economics literature addressing consumption has connected critiques of consumer manipulation by corporations (Galbraith, 2007 [1967]; Kapp, 1978: 224-247), to the psychological and social roles material consumption plays in a modern market economy (Reisch and Röpke, 2004; Röpke, 1999). The psychological treadmill of material throughput also raises concerns over the scale of growth (Daly, 1991; 1992). Growth as a driving objective is firmly related to the literature arising from thermodynamics and energy use with its implications for the physical functioning of systems (Georgescu-Roegen, 1971). Specialist interest in this area has been expressed through the development of industrial ecology (Ayres and Ayres, 1996).

That economic growth creates harms as well as goods is heavily downplayed in mainstream economics. Signals of failure are clear in the persistence of distributional inequity, global poverty and the imposition of pollution and environmental degradation on the poor. A popular response has been the call for new measures of economic development to address the failure of economics to improve well-being. However, measuring the rate of environmental degradation seems to substitute for actually doing something about it. On one side there seems to be a hope that the 'right' indicator will show things getting better (or at least no worse), and on the other that suddenly politicians will take action because a newly refined indicator disagrees with their ideologically preferred old one (GDP).

Measurement and value issues in fact are high on the agenda of ecological economics. This is because of the various attempts to get old messages into new

bottles to attract the economic and political audience. For some, mainly ecologists and conservation biologists, large monetary numbers, regardless of their theoretical foundation, are all that is required. For others physical numeraires of environmental impact are sought and ecological footprints proposed. Yet others believe environmental economists were basically right all along and we just need more cost-benefit type studies extending into ecosystems services (eg. Daily, 1997). Hence a mix, or muddle, of literature has appeared claiming to fall within the bounds of ecological economics. None of the above have addressed the basic problem of developing a coherent theory of value, nor learnt from the experience in economics. Traditional value systems in economics have failed, hence the effort to produce new measures and measurements in the first place.

Economic value theory is derived from Benthamite utilitarianism converted into preference theory—a move which supposedly divorces choice from ethics. In fact the basic philosophy remains utilitarian but now preference utilitarian as opposed to Bentham's theory of total utility.⁷ What is found within the practice of environmental cost-benefit analysis is actually an implicit value theory based upon consequences telling what is right and the value of outcomes being measured in money as shorthand for welfare based upon individual preferences. More than this, while preference theory and 'new' welfare economics claim to be based only upon ordinal preferences, the way in which money is used to aggregate and make decisions means it is being implicitly converted into a cardinal measure for interpersonal comparisons of well-being. Yet such concerns are apparently too abstract for the new environmental pragmatists making-up numbers, and transferring them (see Spash and Vatn, 2006), on grounds of convenience and political impact.

⁷ Polanyi (1944: 119) states that Bentham failed to make the link between value and utility.

The clearest area of failure is then exposed when future generations are considered. The paucity of argument and debate by economists here would be laughable if it were not taken so seriously and at such high levels. Discount rates are meant to be observable objective determinants of how society should treat the future. That is, economists claim, how future generations should be treated can be determined by observing a few factors such as rates of return on capital and consumption growth. The result is a fruitless waste of time arguing over rates rather than addressing the fundamental issue which is fair and just treatment of the unborn and what should determine undertaking or denying actions with long-term impacts. Unable to move outside the narrow confines of mathematical formalism economists, from Nobel laureates down, then write-off the future on the basis that they are being empirical and objective while merely following what is efficient.

That efficiency has come to dominate economics as a goal is interesting in itself and is ideologically driven (Bromley, 1990). The insufficiency of such a goal is often remarked upon by economists themselves before venturing to ignore everything else and making all their policy recommendations on the basis of supposed efficiency analysis. One thing ecology contributes is the realisation of alternative requirements arising from the non-human world. Thus, concepts such as sustainability and resilience have appeared as strong independent goals not achieved by economic efficiency (eg. Common and Perrings, 1992). However, there is also need for caution in learning from other disciplines. There has been a tendency to take ecological concepts as new overarching goals which are universally applicable and from there make a jump to policy conclusions. The unquestioning faith expressed in new guiding principles (eg. sustainability, resilience) then bears a parallel with the belief in natural laws, during the late 1700s and early 1800s, by

economists who wished to match the apparent progress of the natural sciences in discovering universal truths. Sustaining something or increasing its resilience does not answer the fundamental questions of why and what for?

Hence the rise of post normal science (Funtowicz and Ravetz, 1990), as one means by which to rethink the science-policy interface and engage the technocentric establishment with wider public values (van der Sluijs et al., 2005). Well-being in society, and social decision processes, require institutions which allow for the expression of different types of values. This may be described as the need for value articulating institutions (Vatn, 2005). Indeed the general hope amongst the various institutional options that might be developed is for a more inclusive participatory approach to governance which would allow deeper environmental values, than those prevalent in daily western life, to come to the fore. Ecologists, or economists, simply plucking monetary numbers from the air to claim importance for ecosystems actually undermines this whole discourse and treats ecosystems as if some artefact for trading in a market (Spash, 2008b).

The tradition of political economy being much stronger in Europe the range of social science interactions has also been much greater there leading to such things as post-normal science. In the ESEE the field has become established as a heterodox socio-economic school of thought bridging the science-policy interface. The aim is very much to be able to address policy problems and environmental issues, not to sustain theoretical constructs for their own sake. At the same time 'scientific' standards of accumulating knowledge and understanding are seen as necessary for progress and theoretical consistency.

CONCLUSIONS

This paper is premised on the basis that clearer lines need to be drawn between what is progressive in ecological economics and what lacks credibility. Ecological economics as a modern movement started at the basic level of trying to combine models from two disciplines. While linking ecology and economics was an interesting initial approach, many soon moved well beyond the narrow confines of model interactions, away from the multidisciplinary and on to interdisciplinary endeavours. Such interdisciplinary learning means combining ideas and mutual reappraisal in the various disciplines. Ecological economics cannot then be treated as a subject without a core social or socio-economic orientation.

For social ecological economists interactions with ecology and biology have raised the profile of evolution in relation to economics. How we understand the world is vastly different if we treat it as a deterministic mechanical system or a chaotic evolving biological system. The future becomes uncertain in a strong sense which denies our ability to predict. This describes the large divide between reality and the technocentric ideological dream, and macroeconomic hope, that enough capital might be accumulated, via compound interest, to enable a leisure society. A politically untenable reality is then that western economies actually reached satisfaction of basic needs long ago, but have persisted with expanding the scale of material and energy consumption which degrades the environment while failing to address declines in human social and psychological well-being or increases in the inequitable distribution of resources.

Social ecological economics then best describes the subject as a field of research with a distinct ideological vision and specific methodological agenda. Ideologically there is a commitment to: environmental problems requiring behavioural

and systemic change, continued economic growth through material and energy consumption being unsustainable and politically divisive, poverty and distribution as major economic concerns, a need for balancing power (eg. individual, group, government, corporate) at different spatial scales (from the local to international), a central role for ethical debate, envisioning markets as social constructs with numerous flaws, political economy, design of alternative institutions, public participation empowerment and engagement as necessary to address the science-policy interface, recognising the importance of 'others' both human and non-human. Methodologically distinct characteristics include: value pluralism, acknowledging incommensurability, interdisciplinarity, empiricism using quantitative and qualitative methods, rejection of mechanistic reductionist approaches, rejection of mathematical formalism and its claimed rigour, acceptance of strong uncertainty (i.e., ignorance and social indeterminacy).

Differences and divisions have in many ways become clearer due to the developing alternative research agendas. The inability of mainstream economists to engage with the ideas of social ecological economics is both ideological and methodological. Such economists typically have various characteristics, for example, championing self-regulating market approaches, accepting the basic tenets of neoclassical theory, regarding humans within the narrow behavioural model of *homo oeconomicus*. Under this system of thought, economics is believed to gain rigour from using abstract mathematical models regardless of their empirical basis or policy relevance. This is despite claims of scientific empiricism and prediction as providing validity. In practice primary data collection is rare, theory is conducted without application or hypothesis testing and evidence contradicting theory is ignored or explained away. In the extreme, arguments which persist are redefined for

incorporation within the existing theory by borrowing the language of other disciplines while neutering the concepts for the sake of conformity with existing belief structures and overall ideological positions. All this mitigates the potential for learning from problem and policy oriented interdisciplinary research.

The desire to combine different heterodox schools of thought—ecological, critical institutional, evolutionary, post-Keynesian—is in direct contrast to the drive for recognition within and by orthodox economics. Ecologists and conservation biologists have then aligned themselves with those whom they believe hold political power rather than paying attention to methodological and ideological positions. Those taking this line may regard themselves as being pragmatic, in the sense of achieving an end by the easiest available means, but actually have created problems for those trying to be far more progressive in terms of changing economic thinking. Indeed much of the ecosystems services valuation work, for example, merely buys into an existing political economy in which no substantive effort is on the agenda for addressing the idea that material and energy growth can continue *ad infinitum*. At the same time this work undercuts efforts to increase public participation and empower the disenfranchised by pretending that producing simple money numbers is a politically adequate response to global environmental problems. The pragmatist argument both fails to achieve its aims and causes much damage along the way.

Ecological economics was established as an outlet for critical thinking on economy-environment interactions, thinking which had been suppressed within the methodology and ideology of resource and environmental economics. However, an orthodox aspect has been confusingly associated with the field due to the influence of two groups: those claiming to be pragmatic in the use of methods and those attempting to subsume the field within the orthodoxy in the tradition of economic

imperialism. I have argued here that understanding the methodological and ideological divisions is important in defining the future direction for economic work on the environment and the only progressive way forward is social ecological economics.

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