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Ecological, Heterodox and Neoclassical Economics: Investigating the Differences

by

Clive L. Spash and Anthony Ryan*

Abstract

How heterodox are ecological economists and how ecological are heterodox economists? How do both differ, if at all, from neoclassical economists when addressing environmental problems? In 2009 we probed such questions by conducting an international survey at economic conferences on the environment and sustainability. This paper reports on surveys conducted at conferences of the European Society for Ecological Economics, the European Association of Environmental and Resource Economics, and the Association of Heterodox Economists. A key aim was to gain insight into the extent to which ecological economics can be described as a distinct field of research from orthodox environmental and resource economics. Conflict within the field has meant a prevalence of neoclassical articles and thought mixed in amongst more heterodox work. The question then arises are those participating in ecological economics ideologically and methodologically similar to those schools of thought falling under the heterodox economic umbrella or the orthodox? In addressing this question problems are identified with economic understanding of environmental problems and the lack of communication across schools and disciplines. Suggestions are made as to how we might, as a community of concerned scholars and activists, move forward.

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1. Introduction

Human interactions with the natural environment have become major political and economic issues. Over some fifty years, the sub-fields of resource and environmental economics have developed within a neoclassical frame to address the continuing and growing problems. Inadequacies in these orthodox approaches led to the emergence of ecological economics, in the late 1980's, as a new research field which seemed to be headed in the direction of an environmental political economy (Spash, 1995). Simply noting the drive for a significant change from the prevalent mainstream thinking, recognised as necessary to get environmental action, might lead to the conclusion that ecological economics must be heterodox. However, the ecological economics movement has also involved the combination of natural sciences with economics and as a result a less clear rejection of mainstream methodology and ideology. Indeed, within ecological economics the socio-economists have often been in conflict with those, non-economists (e.g. some key ecologists), who decided to ally themselves with neoclassical environmental and resource economists (Röpke, 2005; Spash, 2011b).

So, the extent to which ecological economics is actually substantively different from the mainstream remains unclear for many, especially those outside the movement. Certainly the journal of that name has published numerous orthodox articles and often neglected a more heterodox political economy approach. Entire issues have appeared which fit comfortably within the orthodox frame (e.g. adopting mathematical models of optimising behaviour, assuming micro-economic axioms, regarding humans as self-interested utility maximisers, pricing externalities and conducting trade-offs). Also common has been the uncritical use of cost-benefit analysis, along with benefit transfer and more simplistic calculations for claiming a money value can be attached to ecosystems goods and services. Nature has been described as capital which can be traded-off for other types of capital. Mainstream regulatory tools,

such as tradable permits, also seem to be uncritically accepted by many. Yet, the whole idea of establishing ecological economics in the first place was due to discontent with the mainstream and the failure of environmental economics to achieve its promise of a revolution in economic thought, at one time expected to be equivalent to that of Keynesian macroeconomics (see the introduction to Bohm and Kneese, 1971). The forgotten promise was a change and challenge to, not accord with, dominant neo-liberal market structures. At a time when supposed ecological economists can be found putting their names to pricing biodiversity, ecosystems and carbon, whether ecological economics has anything interesting to say outside the orthodoxy is then a reasonable question.

In this paper we probe the extent of differences between ecological and neoclassical economists and whether the former contains a serious heterodox core group. The approach employed attempts to characterise methodological and ideological positions within ecological economics and hypothesises that clear divisions should arise if there are distinctions to be drawn. We then empirically test for such divisions using a survey instrument specifically designed for the purpose.

In the next section an historical overview sketches the rise of ecological economics. This provides the background for describing some key expected differences from orthodox and other heterodox approaches, which might be expected to be prevalent amongst ecological economists. Next the survey method is described and results reported from three European conferences organised by ecological, heterodox, and resource and environmental economists respectively. The sample is narrowed down to contrast heterodox with neoclassical (orthodox) positions via respondent self classification. The conclusions suggest barriers, challenges and ways forward for knowledge integration to improve cooperation in developing an interdisciplinary political economy approach to the environment. At the same time we suggest where lines need to be drawn on cooperation by ecological economists with others.

2. The development of economic thought on the environment

Economics has generally been a slow and reluctant field in addressing environmental problems seriously within the core of its disciplinary teachings. Despite basic concerns relating to human interactions with the environment having been reflected in classical and neoclassical thought of the 1800s, the general approach and development of economics in the 1900s sidelined resource constraints, environmental degradation and, what might be termed, general limits to ever increasing material and energy throughput. An economics literature from the early 1900s can be identified as developing concerns about conservation issues related to agriculture (e.g. soil erosion) and a theoretical approach to non-renewable resource use (i.e., optimal depletion) which is still fundamental to neoclassical resource economics (Spash, 1999). However, such topics had already moved from being the concern of central figures in economic thought to specialists in agricultural and resource economics.

The resource economists of the 1950's regarded the environment as a source of materials which required some specialised management and conservation due to characteristics which differentiated them from manufactured goods (e.g., Ciriacy-Wantrup, 1952). In the 1960's and 70's environmental economics appeared in the USA as a distinct sub-discipline concerned with the growing pollution problems which were becoming evident to the general public, even if previously ignored by the academic community (Bohm and Kneese, 1971; Kneese and Bower, 1968). The recommended economic approach employed cost-benefit analysis to calculate optimal pollution control and so led to the development of a range of methods in monetary valuation e.g., travel cost, hedonic pricing, contingent valuation (Hanley and Spash, 1993).

The problem with traditional environmental economics was how it became nothing more than an extension of mainstream thought without having any impact on mainstream

thinking. Within a decade the promise of 'revolution' had receded into preoccupation with method (i.e., mathematical modelling) over substance and teaching the same via well controlled (e.g. excluding history of thought and methodology) doctoral programmes, pioneered in North America. These built on agricultural and resource economics but defined new territory in regulatory approaches to pollution and application of monetary valuation to 'inform' decisions involving environmental change. The rise of political and environmental discontent in the 1960s and 70s had failed to impact on economics, but other disciplines were less fearful of identifying environmental problems with the way socio-economic systems were being operated.

Natural scientists played a key part in the growing recognition of problems relating to interactions between the natural environment and human economy. The idea that pollutants became inert if diluted or spread widely was fundamentally revised by the realisation that ecological systems connected diverse elements of the environment through material, chemical and energy flows. Dispersal of sulphur and nitrous oxides via large chimneys, in an attempt to avoid local health impacts, created acidic deposition, an international environmental and political problem with widespread damages (Yanarella and Ihara, 1985). Bio-accumulation of chemicals in the food chain brought home the fragile pinnacle upon which humanity stands (Carson, 1987 [1962]). The susceptibility to human intervention of supposedly stable self-equilibrating systems led to alternative ecological approaches. Change and uncertainty became part of understanding rather than exogenous shocks to be externalised or neutralised (Holling, 1986).

Ecological economics then appeared as an emergent property of disparate and chaotic elements in a socio-economic and politic stew, seasoned by learning from the growing awareness of human-environment interactions and given a good stir by academic reflection. Yet, any pretence of a consensus on action or direction would seem highly misleading.

Ecological economics combined some disparate elements of discord and gave them voice. Two strong but conflicting positions then soon appeared dominant (Spash, 1999).

Ecologists of a practical or 'pragmatic' political philosophy sought to link ecology with economics. For them the type of economics was irrelevant and indeed many seemed blissfully unaware of any distinction between economic schools of thought. The world was to be understood by natural sciences which then needed to inform socio-economics which could communicate the findings. This "ecology and economics" approach sought political advancement of core messages via key journals and collaboration with establishment figures. This led to a linking of models rather than a fundamental challenge to them. The methodology was inherently multi-disciplinary, despite the rhetoric of interdisciplinary or trans-disciplinary thinking. Under this approach, ecologists were no more expected to question the economics than economists were expected to question the ecology.

In contrast, ecological economics also attracted a combination of older academics, disenchanted with the failure of environmental economics, and younger socio-economists seeking new ideas. They were looking for interdisciplinary interactions with open minded natural scientists and others. This social ecological economics grouping wanted new theory within economics, not just some political realisation that the environment was as important as economic goals. The point was that economics could not be conducted without understanding the environment and this fundamentally changes the way economics should be conducted both in theory and practice. This might be regarded as the desire for a paradigm shift and a change in the institutional arrangements whereby daily life is conducted.

This second grouping might be thought of as the revolutionary and ideological branch while the aforementioned, ecology and economics approach, represents the pragmatic and strategic. Yet, while these are distinct and important positions for understanding ecological economics, there is always the danger of over simplification and simple dichotomies tend to

conceal as much as they reveal. The complex interactions of ecologists, economists, political scientists, engineers, conservation biologists, and so on, seem likely to have produced an array of positions. The question, in the current context, is whether key modes of thought on the environment are discernable from this historical background (for more on the history of and divisions within ecological economics see Røpke, 2004; 2005; Spash, 1999; 2011b).

3. Schools of thought on economics and the environment

The rise of ecological economics from a discontent with mainstream economics and in particular neoclassical microeconomics separates it from environmental and resource economics. At the same time there are those within ecological economics who care little for such divisions and regard any economics which highlights environmental problems as a good thing. Then there are those within resource and environmental economics who question the approach but are reluctant to move outside the comfort of the theoretical structure. While this explanation sounds initially complex it also reveals something of the dividing lines affecting how economists characterise environmental problems and chose the methods they perceive as relevant.

Neoclassical theorists have given economics a technocentric optimism which environmentalists fear has distracted from the need for fundamental change in human behaviour (Spash, 1999). The approach can be summarised as follows. If the economy is constrained by a lack of resources then technology must provide the solution via exploiting new substitutes and accessing new deposits. If the environment is polluted then technology must be developed which will clean it up, but only once we are rich enough to afford such a luxury. Development then requires exploitation of resources and environmental degradation in order to achieve technological advance to get back the environmental quality lost in the process of development. Humans themselves struggle with one another to meet their needs,

wants and desires. This justifies the emphasis on growth of resource and energy throughput as a necessity to meet human demands. Environmental concerns are then portrayed, including by the popular media, as modern and/or rich country and luxury preoccupations.

Despite being a pure fallacy, ignoring history and human dependence on Nature (see Martinez-Alier, 2002), this characterisation, or establishment discourse, enables some common elements to be maintained across those schools of economic thought which relegate environmental issues to the sidelines. Such elements include believing that growth is an unquestioned end, economics should be preoccupied with how to achieve growth, consumption is a good and increasing it raises well-being. A series of implicit environmental assumptions underlying this approach go unquestioned. Instead, economic discourse concentrates upon how to achieve and maintain growth and full employment, avoid destabilising business cycles, encourage productivity and innovation, and generally conduct human affairs. Ownership of the means of production, wealth and income distribution, property rights and more generally institutional arrangements can all be debated without basically questioning the interaction of the economy with the environment.

Both orthodox and heterodox economists are then observed ignoring the environment. Resource and environmental economics became the sub-disciplinary field for those who wanted to study economics and had a concern for the environment. Meanwhile mainstream economics developed theories assumed to operate independently of either the natural resource base or the environment and so further marginalised environmental concerns. Amongst heterodox schools (e.g., post-Keynesians, critical institutionalists, neo-Marxists) little or nothing has appeared addressing the environment. Georgescu-Roegen (1975) claimed that mainstream and Marxist economists alike have held to a thesis that the power of technology is without limits. Certainly economist of all schools have generally been able to ignore the evidence of environmental problems and limits to growth as having anything to do

with their work. This has been described as due to the treatment of environmental issues as special cases of more general theoretical constructs in mainstream economics (Spash, 2011b). The establishment discourse then dominates the economic debate.

Heterodox economics serves as an umbrella term to cover the coming together of sometimes long standing, separate projects or traditions. This includes the post-Keynesians, critical institutionalists, feminists, Marxists, Austrians and social economists (Lawson, 2005). The hypothesis we put forward is that despite differences over such things as government intervention, or the abilities of the market to coordinate human affairs, the underlying approach to the environment is one held in common with the mainstream and naive in conception (e.g. based on growth and technological fixes). Ecological economics is then seen as a distinct breakaway from this tradition.

Why then should ecological economics, as an environmentally aware political economy approach, have any particular allegiance with heterodox economics as opposed to orthodox. Where ecological economics can be seen as sharing aspects of heterodox economic thought is in the ontological preconditions. For example, in a comparison with post-Keynesian economics the state of the world is seen in common as one involving strong uncertainty, social indeterminacy, emergent properties and historical dynamic process (Holt, Pressman and Spash, 2010; Spash and Schandl, 2009). This is something which can be seen in terms of shared ontological presuppositions of heterodox versus mainstream (or neoclassical) economics (Lawson, 2005). The mainstream can be seen as treating individuals as passive agents in a static closed system with an ontology of isolated atomism. This justifies the formulation of social reality as one typified by regularities so allowing the methodology of deductive reasoning and mathematical modelling. In contrast, ecological economics, like other heterodox traditions, accepts the transformative power of human agency with emergent properties arising from a dynamic interconnected process of multi-

layered social interactions. Mainstream economics is then identified as having watered down or changed interdisciplinary research and heterodox concepts in order to make the results fit within and conform to its ontological and methodological approaches (Lee, 2009). This can be viewed as a form of mainstream economic imperialism. An interesting example is given by Earl (2005) with respect to economic psychology. Modern heterodoxy is then distinguished from the mainstream by allowing theory and method to be informed by insights into social reality. As Lawson (2005: 497) states:

"The fact that heterodox economists resist the mainstream reformulation of their concepts of uncertainty, evolutionary developments, care, institutions and history, etc., reveals that heterodoxy is not so much committed to the latter categories per se, as that it insists on their possessing the ontological properties of openness, processuality and internal-relationality, etc."

In order to distinguish the heterodox from mainstream we might therefore look to the understanding and importance given to key concepts representative of these distinct understandings and the resulting approaches.

Bringing the elements of the discussion so far into a more coherent frame then requires conceptualising the role of the orthodox and heterodox along with the mix of natural and social science which constitute ecological economics. Building on Spash (2011a) we identify three approaches within the ecological economics movement.

First, there is an historical root within ecological economics going back to neoclassical theory (Spash, 1999). There are agricultural, environmental and resource economists all trained in the neoclassical tradition who have chosen to associate themselves with various forms of ecological economics (at least in name) while maintaining a strictly orthodox outlook. For example, Carl Göran Mäler, an environmental economist, and Partha Dasgupta, a resource economists, were both part of the rebranding of the Beijer Institute as a

research centre in ecological economics. Along with economists other neoclassically minded economists, such as Charles Perrings, they pursue a mainstream mathematical optimisation and modelling approach. Their focus is on merging old resource economics with discussions of sustainability, resilience and environmental policy, while mostly avoiding direct valuation work. This branch forms the New Resource Economists (NRE).

Second, ecological economics has an identifiable grouping of natural scientists whose primary motivation appears as aiming to achieve policy ends via their interaction with the social sciences and primarily economics. At the same time social scientists may aim to do likewise via their association with natural scientists. This group may range from activists to academics. As political goal orientated individuals they are pragmatists in that they are primarily concerned with judging the success of methods by their outcome. In order to avoid confusion with the American school of philosophy called pragmatism, they are termed New Environmental Pragmatists (NEP).

Third, there are those seeking an heterodox approach to economics who reject the fundamental theory of neoclassical economics. They see the explanations offered by externalities and optimisation of behaviour as part of the problem not the solution. Unlike the pragmatists they are concerned about rigour of explanation and not merely achieving policy oriented goals regardless of by which means. For example, rejection of monism leads to value pluralism and so means concepts such as 'total economic value' are rejected regardless of their political acceptability. Their aim is to revolutionise economics to both correct the way in which the environment is addressed but also to address a range of other associated societal problems (e.g. poverty, inequity, discrimination, sexism, myopia, hedonism, materialism). Taking a political economy approach, power relationships and the social structure are regarded as totally integrated with and within economic systems. Social

problems are regarded as important as environmental ones. This group is referred to as Social Ecological Economists (SEE).

There is some potential for these positions to be held simultaneously or in a variety of combinations. Thus, some SEE might adopt aspects of pragmatism or vice versa. Indeed, Richard Howarth, editor of *Ecological Economics*, has argued in favour of a position he calls the "big tent", where we could imagine all three positions would combine (Howarth, 2008). Although there seem likely to be problematic aspects to combining such diverse ideological and methodological positions, this might be regarded as a form of methodological pluralism. The question then is whether anyone actually populates these hypothesised positions and if so do they form a significant grouping?

III. Method

A key aspect of the preceding discussion concerns the differences between orthodox and heterodox economists in the way they perceive and address environmental problems, and the influence of these positions within ecological economics. In order to address this, we administered a structured survey at the following conferences.

- European Society for Ecological Economics (ESEE), "Transformation, innovation and adaptation for sustainability: Integrating natural and social sciences." 8th International Conference, Ljubljana, Slovenia, 29 June-2nd July 2009.
- Association for Heterodox Economics (AHE), "Heterodox economics and sustainable development, 20 years on." 11th Conference, London, United Kingdom, 9-12 July, 2009.

- European Association of Environmental and Resource Economists (EAERE), 17th Annual Conference, Amsterdam, The Netherlands, 24-27 June 2009.

The survey was designed for self completion by respondents. This involved six sections. The first was designed to classify respondents by their heterodoxy and ecological economics research grouping (based on the three categories: NRE, NPE, SEE). The second probed for knowledge of and agreement with ten key concepts in ecological economics in order to look for core theoretical understanding. Section three, which is not reported in this paper, involved respondent reaction to a set of summarised journal articles in the field. Section four, administered three environmental belief scales. Section five concluded the interview by requesting socio-demographic data.

Indication of heterodoxy was asked by a direct question but also via a request for the respondents three most often read journals. The key design feature in section one was the classification of the three ecological economics camps or groupings. These can be regarded as involving both ideological and methodological positions. The study design involved establishing summary statements of the main positions characterising each group with which respondents would be asked their closest affiliate. Respondents were informed that “Environmental research and policy is a broad field of inquiry that encompasses a number of different theoretical approaches”. They were then provided with three statements that were described as characterising “three broad schools of thought on how environmental issues should be addressed”. The three camps were summarised as follows:

(A) New Resource Economics

We should base our efforts upon the basic tenets of accepted economic theory such as the axioms of consumer choice and model of the individual as a

rational agent. The most important role for research is to inform policy makers as to the efficient use of scarce resources

(B) New Environmental Pragmatism

The natural sciences provide objective information which should be the primary basis for informing policy, but we face a communication problem.

The most important role for research is to be pragmatic and employ whatever approaches are effective to inform the policy community about environmental problems and their solution.

(C) Social Ecological Economics

Environmental problems are complex, can be viewed from multiple perspectives and involve values which are often incompatible. The most important role for research is to understand different disciplinary perspectives and develop institutional approaches and social processes to address the interface between economics, science and policy.

These positions were presented without the titles. In addition, respondents were informed that “some or all of these approaches can overlap”. A Venn diagram was presented that showed the three distinct approaches as well as the potential overlap. Participants were instructed to “use the Venn Diagram to indicate which BEST describes the approach or mix corresponding to YOUR research approach”. They could then indicate that they assessed their research approach to be reflected by any one of the three statements or they could indicate that their research approach reflected any combination of the statements. Thus, a respondent could chose any pairing, or all three positions or any one position. This allowed them to describe their research philosophy in seven distinct ways (i.e. NRE, NEP, SEE or a combination of these approaches).

In section two respondents were asked to rate the importance of ten key ecological concepts for addressing environmental problems on a seven point scale. The ideas selected were: (1) steady state economy; (2) cost-benefit analysis; (3) ecological footprint; (4) incommensurability; (5) post-normal science; (6) green accounting (e.g. ISEW); (7) ecosystems as goods & services; (8) social multi-criteria analysis; (9) small group deliberation; (10) non-utilitarian ethics. The concepts were drawn from Spash (2009). Participants were asked to rate each concept on a 7-point Likert scale (1 = “not at all important; 4 = Moderately important; 7 = Extremely Important). As not all the participants were expected to have heard of all the concepts they were also provided with the option of a “don’t know” response.

Section four was set-up to explore environmental beliefs. Three scales were based upon the findings of Milfont & Duckitt (2004), who used an exploratory analysis to simultaneously assess several previously published environmental belief scales. An additional item was added to the ecocentrism scale which otherwise only had a single item. The three environmental belief scales were:

Technological Optimism scale (5 items): A high score on this scale indicates that the respondent believes science and technology can solve environmental issues.

Ecocentrism scale (2 items): A high score on this scale indicates that the respondent believes humans should stop developing the natural environment and wilderness locations.

Anthropocentric scale (5 items): A high score on this scale indicates that the respondent believes nature should be actively used to increase the welfare of human communities.

Respondents used a 5-point Likert scale (1 = strongly disagree; 3 = undecided; 5 = strongly agree) to rate the items. For a full list of the items used for each of the three scales see Appendix I.

4. Results

Attendance figures are approximations give by the conference organisers at the time. The ESEE and EAERE were much larger than the AHE conference. A majority of full participants attending the AHE conference completed the survey (N = 44); organisers estimate 80 attending all 3 days while others came and went (approximately 20). Attendance at the ESEE conference was estimated at about 200 delegates, and about half (N=95) completed the survey. Only about 10% of attendees at the EAERE conference, which was the most well-attended conference, completed the survey (N=45). The reason for this low participation rate was that, unlike the other two conferences, the organisers refused to allow the survey to be advertised, handed-out or distributed, and refused to announce or let researchers announce the survey at any conference sessions or plenary talks. This was despite prior permission having been sought to allow the survey to be administered at the conference.

The first survey question asked respondents to nominate their primary research discipline. The self-definition of heterodox versus neoclassical was undertaken by respondents who reported their primary field as economics. As some economists may disagree with being classified as either heterodox or neoclassical, a category of 'other' was also an option. This allows a division of the sample into non-economists, and three categories of economist (heterodox, neoclassical and other). Results broken down by conference show no neoclassical economists attending the AHE conference and only a few at the ESEE. The EAERE conference sample has half neoclassical but, perhaps surprisingly, a

quarter define themselves as heterodox. The ESEE sample is distinct from the other two in having a large proportion of non-economists.

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Table 1 Orthodox vs. Heterodox Economists

	Conference		
	ESEE (%)	AHE (%)	EAERE (%)
Heterodox Economist	42	80	24
Neoclassical Economist	2	0	53
Other Economists	23	18	20
Non-Economists	33	2	2
Total %	100	100	99
	<u>N</u>	95	44
		44	45

Note: may not add to 100 % due to rounding errors

The Role of Formal Education

Further insight into these divisions is gained from information gathered on the training of participants. All had university education and 95-96 percent post graduate degrees. Classification of degree training by heterodoxy and conference attended is shown in Table 2. The impact of combining economics with another subject is indicated by the total absence of any neoclassical economists with such training. This implies that broadening an individual's perspective can play an important role in their breaking away from the narrow confines of neoclassical thought. In contrast having a straight economics education does not seem to mitigate against being heterodox. Specialised environmental economics training is a minority background for participants amongst the EAERE sample, while some of those with such education, attending the ESEE conference, regard themselves as heterodox. Contrary to expectations, none of those educated as resource or agricultural economists classify themselves as neoclassical, but rather prefer the designation of heterodox.

Table 2 Training and Heterodoxy

University Training		Heterodox Economist			Neoclassical Economist			Other Economists			Non-Economists			Total		
		ESEE	AHE	EAERE	ESEE	AHE	EAERE	ESEE	AHE	EAERE	ESEE	AHE	EAERE	ESEE	AHE	EAERE
Economics (straight)	N	11	17	2	-	-	17	9	1	2	2	-	-	22	18	21
	%	28	50	18	-	-	74	41	12	22	6	-	-	23	42	48
Economics (combined)	N	6	14	2	-	-	-	6	4	1	1	-	-	13	18	3
	%	15	41	18	-	-	-	27	50	11	3	-	-	14	42	7
Ecological Economics	N	5	-	1	-	-	-	5	-	-	2	-	-	12	-	1
	%	13	-	9	-	-	-	23	-	-	6	-	-	13	-	2
Environmental Economics	N	2	-	-	1	-	4	-	-	1	-	-	-	3	-	5
	%	5	-	-	50	-	17	-	-	11	-	-	-	3	-	11
Ag/Resource Economics	N	4	1	4	-	-	-	-	-	1	-	-	-	4	1	5
	%	10	3	36	-	-	-	-	-	11	-	-	-	4	2	11
Ag/Forestry	N	-	-	-	-	-	1	1	-	2	2	-	-	3	-	3
	%	-	-	-	-	-	4	4	-	22	6	-	-	3	-	7
Env Mgt/Human Geography	N	5	1	-	-	-	-	1	-	-	7	-	-	13	1	-
	%	13	3	-	-	-	-	4	-	-	23	-	-	14	2	-
Natural Science	N	2	-	1	1	-	-	-	2	-	8	-	1	11	2	2
	%	5	-	9	50	-	-	-	25	-	26	-	100	12	5	4
Engineering	N	2	-	1	-	-	1	-	-	2	4	-	-	6	-	4
	%	5	-	9	-	-	4	-	-	22	13	-	-	6	-	9
Other	N	2	1	-	-	-	-	-	1	-	5	1	-	7	3	-
	%	5	3	-	-	-	-	-	12	-	16	100	-	7	7	-
Total N		39	34	11	2		23	22	8	9	31	1	1	94	43	44
Total %		100	100	100	100		100	100	100	100	100	100	100	100	100	100

Notes:

Missing data 3 respondents

95-96% of respondents at each conference had postgraduate degrees.

Total % may not add to 100 due to rounding errors.

Other includes at ESEE 2 sociologists, 2 planners, 2 maths/statistics, 1 business; AHE 2 political scientists, 1 business.

Natural Sciences includes 4 ecologists at ESEE

The data show that those without formal university degrees in economics may still regard themselves as economists. Ecological economics appears to attract a diverse range of such people including those educated in environmental management, human geography, natural sciences and engineering. Others, trained as economists, classify themselves as non-economists and so appear to think of themselves as disassociated from the profession. Those with a straight ecological training form only a fraction of the non-economics group attending the ecological economics conference, even amongst the natural scientists (only 4 out of 11). However, responses to stating a primary research discipline revealed 17 ecologists amongst the 31 ESEE respondents in the non-economic group. So again there is divergence between training and personal disciplinary classification. In ecological economics, there is certainly the potential for skill transfer and self-redefinition over time. For example, the presence of those with engineering training may indicate adoption of the industrial ecology approach in ecological economics and/or the transference of mathematical skills to an NRE approach.

Heterodox vs. Neoclassical

Next we narrow down the comparison to focus upon contrasts and similarities between the heterodox groups of economists at the ESEE and AHE and the neoclassical group at the EAERE. The expectation is that the ESEE and AHE heterodox economists should be close in terms of methodological and ideological positions and distinct from the EAERE neoclassicals. However, such differences are not expected across the full range of tests due to the hypothesised divergence of both heterodox and orthodox economists from ecological economists on issues of growth and the environment.

Table 3 displays the demographics for the three sub-samples and reveals several demographic similarities across the groups. All sub-samples consist of a majority of males over 35 with a post-graduate education. The majority were from Western Europe, although

the AHE sample has a good international minority including Americans. The ESEE sub-sample has a quarter Eastern Europeans with the conference being held in Slovenia, and an almost total absence of non-Europeans.

Table 3 Sub-sample Demographics

	ESEE Heterodox	AHE Heterodox	EAERE Neoclassical
Gender			
Male	73%	79%	61%
Female	27%	21%	39%
Postgraduate education	93%	97%	100%
Age > 35	63%	77%	61%
Residence			
W. Europe	73%	58%	87%
E. Europe	25%	7%	0%
N. America	0%	16%	9%
S. America	2%	3%	0%
Asia	0%	7%	4%
Aus./NZ	0%	9%	0%
<u>N</u>	40	35	24

Unifying Journals and Reading Patterns

One way in which academic research communities can be identified is through literature held in common. Respondents were asked to list the three journals they read most often. This allows a network analysis showing the connections between journals. Network diagrams take each participant and depict their choices as a triad of connected nodes. For example, if a participant indicated that they read *Environmental Values*, *Ecological Economics* and the *Cambridge Journal of Economics* their triad diagram would be as represented in Figure 1a. If another participant is then added to the diagram who indicated they read *Science*, *Nature* and the *Cambridge Journal of Economics* the network diagram would be as represented in Figure 1b. The more people who read the same two journals the thicker the font of the line shown in the following figures. The data relate to the samples and sub-samples being referenced and

so caution is required in drawing conclusions about the community of which they are a part, but some strong associations appear representative.

An interesting aspect is then where there are key primary journals acting as hubs or nodes for communication. We defined nodes as follows. If the journal was only mentioned once it was not classified as a node. A tertiary node was where 2 or 3 participants read a journal. A secondary node was read by 4 to 7 participants, and a primary node was read by 8 or more participants.

Figure 1a. A journal network diagram for a single individual

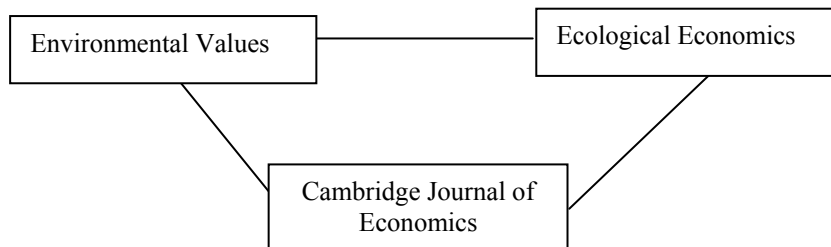


Figure 1b: A journal network diagram for two individuals

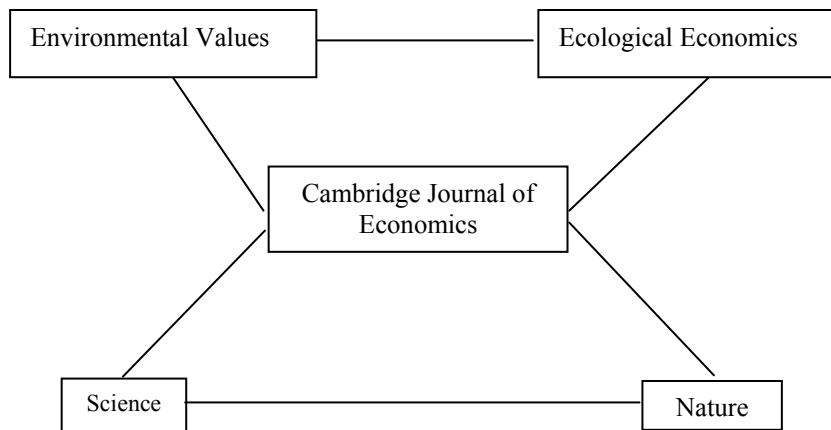
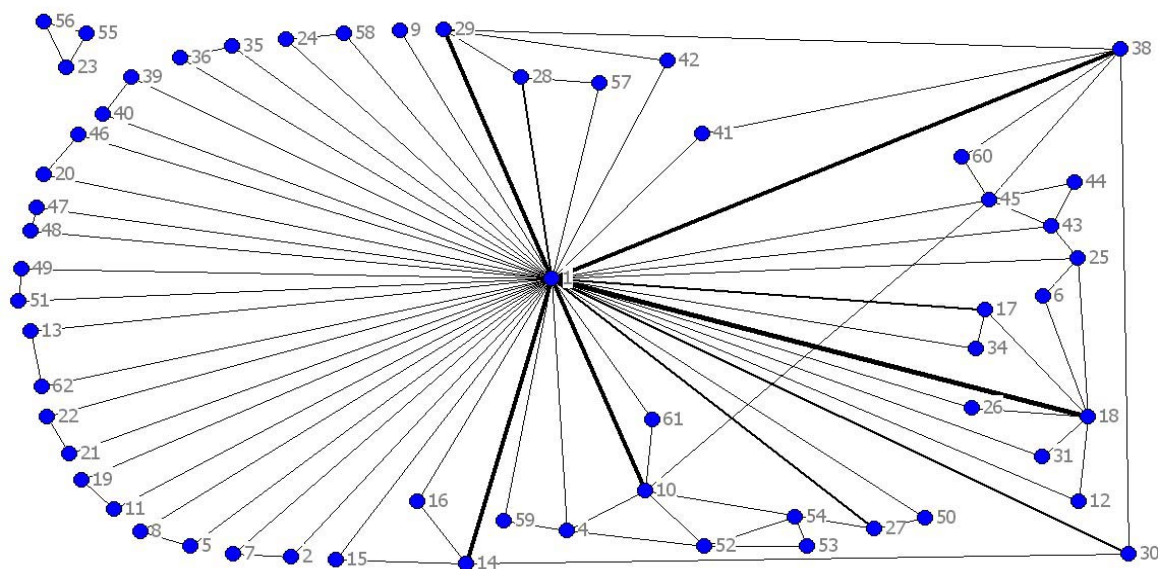


Figure 2 gives the results for the ESEE heterodox sub-sample. Comparison with data for the overall ESEE sample shows the dominant main journal connecting all others remains *Ecological Economics*, which was read by 85% of respondents. In comparison with the AHE and EAERE communities the role of this one journal is far more dominant in bringing

together otherwise separate interests and clearly forms a unifying hub journal for the ESEE heterodox group. In that group, the 40 respondents made reference to 59 different journals, including non-economic journals. Most selected *Ecological Economics* and then a unique pattern for the other two journals. This reveals both great diversity and distinct differentiation as to important source information. A difference between these heterodox economists and the overall ESEE group is the reduced import of the journals *Science* and *Nature*, with the former moving from being a secondary node to no significance. Similarly, the *Journal of Industrial Ecology* drops out from being a secondary node for the total sample. This implies neither the natural science nor industrial ecology perspectives are strongly related to the umbrella of heterodox economics, at least as far as ESEE attendees sampled here are concerned.

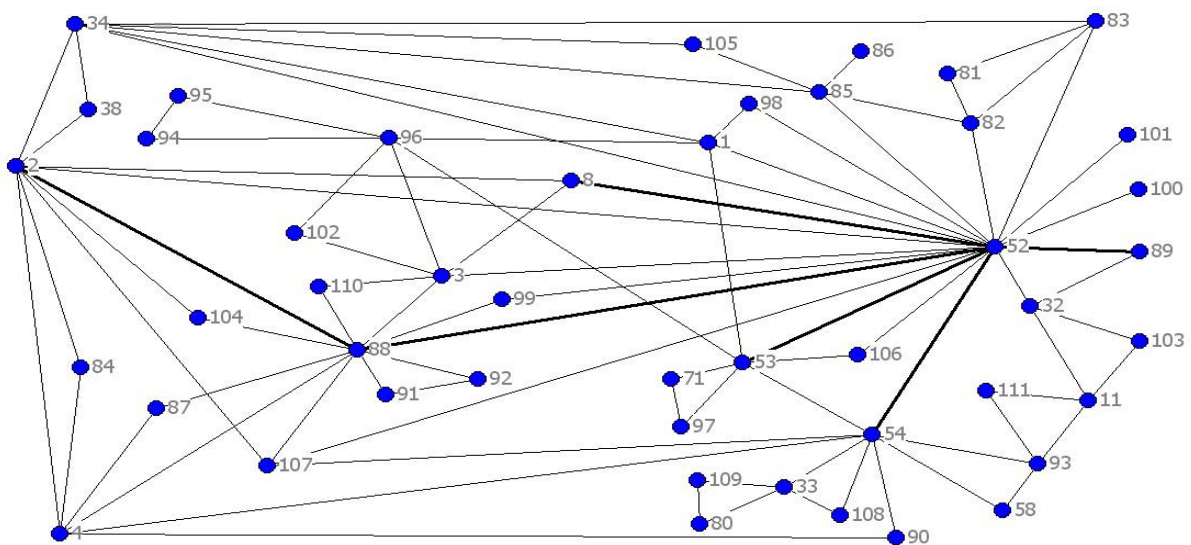
Figure 2: ESEE Heterodox Journal Network



Primary node: (1) *Ecological Economics*

Heterodox AHE respondents are also a diverse group with 33 respondents referencing 47 journals. However, there is also distinct identifiable clustering and an economic and political focus. As Figure 3 shows, the unifying factor is the *Cambridge Journal of Economics*, and without this journal the community would appear to fall back into some identifiable and separate areas of research interest. Lesser nodes occur around journals associated with post-Keynesian economics, Marxism and institutional economics. These heterodox schools have distinct journals of interest to them. The journal *Ecological Economics* appears, but as a low ranking tertiary node for this community.

Figure 3 AHE Journal Network

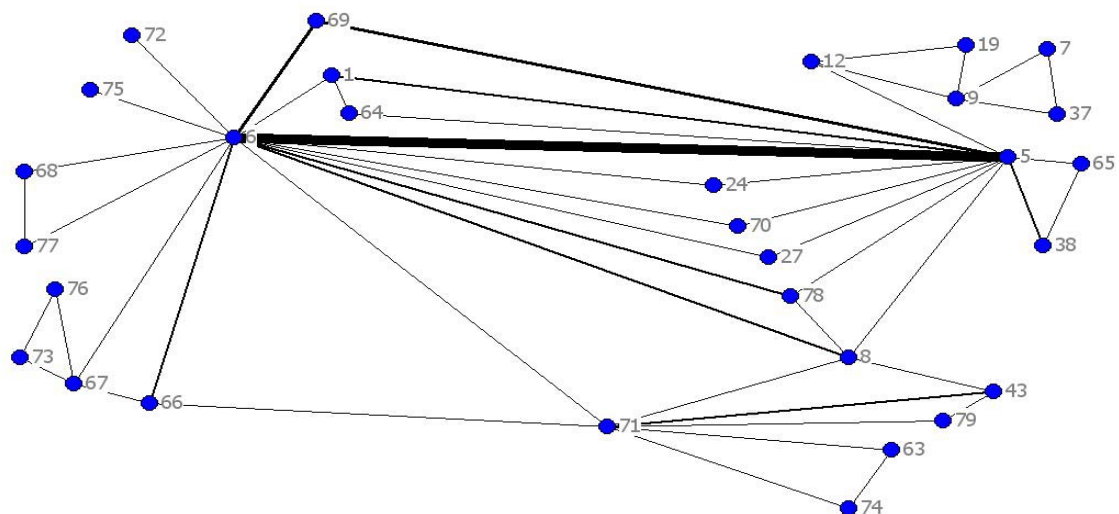


Primary nodes: (52) *Cambridge Journal of Economics* (88) *J. of Post-Keynesian Economics*

EAERE neoclassical economists tend to choose the same journals as the overall group with the *Journal of Environmental Economics and Management* (JEEM) and *Environmental and Resource Economics* (ERE) coming top, see Figure 4. The 24 respondents in this subsample made reference to 30 journals, 54% selected ERE and 58% JEEM with 38% of the sample indicating that they read both. However, for the total sample attending the EAERE

conference, ERE is a secondary node, behind JEEM, and appears equal with *Ecological Economics*. This shows that the latter has established itself as an outlet for the EAERE community but is seen as far less important by the neoclassical economists. Another difference for this group, over the total EAERE sample, is the relative favour given to the *American Economic Review*.

Figure 4 EAERE Neoclassical Journal Network



Primary nodes: (5) *Environmental & Resource Economics*, (6) *Journal of Env. Economics & Mgt.*

Table 4 summarises the journal node results for the three communities. Despite the large number of journals (111 in total, see Appendix II), there is relatively little cross over in readings and that which does occur is often at a minimal level (i.e., amongst relatively few respondents). Only three journals appeared in all three sub-samples: *Ecological Economics*, *Energy Policy* and the *American Economic Review*. The two heterodox groups shared ten journals, while the two environmentally oriented sub-samples shared twelve journals. The

lowest cross-over was between AHE heterodox and neoclassical EAERE with just four journals mentioned in common.

Table 4: Journal Nodes

		ESEE Hetero.	AHE Hetero.	EAERE Neo.
Code	Journal			
1	Ecological Economics	1*	3	3
2	Journal of Economic Issues		2	
3	Journal of Economic Perspectives		3	
4	Journal of Economic Literature	3	3	
5	Environmental & Resource Economics (ERE)			1*
6	Journal of Env. Economics & Mgt. (JEEM)			1*
8	American Economic Review (AER)			3
9	Science			3
10	Ecology & Society	2		
11	World Development		3	
12	Land Economics			3
14	Intl. J. of Sustainable Development	3		
17	Organization & Environment	3		
18	Environmental Values	2		
27	Environment & Planning C	3		
28	Environmental Management	3		
29	Land Use Policy	3		
30	Journal of Environmental Policy & Mgt.	3		
32	Development & Change		3	
33	Journal of Development Studies		3	
34	Review of Radical Political Economies		2	
38	Energy Policy	2		3
43	Quarterly Journal of Economics	3		3
45	Journal of Evolutionary Economics	3		
52	Cambridge Journal of Economics	3	1*	
53	Journal of Economic Methodology		2	
54	Review of Social Economy		2	
63	Economic Theory			3
64	J. of Economic Dynamics & Control			3
65	European Review of Res. & Env. Economics			3
66	American Review of Agricultural Economics			
71	Economic Journal			2
78	Journal of Public Economics			3
80	Economic & Political Review Weekly		3	
82	New Left Review		3	
85	Capital & Class		3	
88	J. of Post-Keynesian Economics (JPKE)		1*	
93	Journal of Institutional Economics		3	
96	Journal of Economic History		3	
107	Review of Political Economy		3	

Node importance: 1* primary hub; 2 secondary node; 3 tertiary node

Knowledge of Key Concepts

The question as to the extent of cross communication and mutual understanding of ideas between these communities is something we probe further by looking at the rating of key concepts. Key concept knowledge shows further distinct divisions between the communities and especially with respect to their perspectives on environmental issues. A striking result is the lack of knowledge and knowledge differences concerning some of the ideas. Overall the ESEE heterodox sample has the best understanding across all ideas and the AHE heterodox the worst. For both the neoclassical and ecological economics samples 90% understand six concepts, but of the remaining the ESEE heterodox group has much better knowledge. The least understood concept is post normal science with no knowledge amongst 18% of the ESEE heterodox sample, 62% of EAERE neoclassical economists and 71% of AHE heterodox. About a quarter to a third of the AHE heterodox sample lack knowledge of incommensurability, small group deliberation, ecosystems as goods and services, and social multi-criteria analysis, and one in five non-utilitarian ethics. The EAERE neoclassical economists also have deficiencies in some of these areas: even more (42%) lack knowledge of incommensurability, while a third small group deliberation and a fifth social multi-criteria analysis. Full results are shown in Table 5. To the extent that post normal science, incommensurability, small group deliberation, social multi-criteria analysis and non-utilitarian ethics are important for understanding the message of ecological economics there appear problems with communicating across the heterodox communities.

Further insight is gained by analysis of the means and standard deviations using a one-way ANOVA for the rating of the concepts, as shown in Table 5. No significant difference in the rating of the importance of the concepts was found for green accounting and incommensurability.

Table 5: Response statistics for the ratings of the key EE concepts

	No knowledge %	Mean rating	SD	Comparison of means (ANOVA)
Cost-benefit analysis				
ESEE	3	3.00 (N = 38)	1.56	F (2, 92) = 20.18**
EAERE	0	5.54 (N = 24)	1.78	
AHE	6	3.33 (N = 33)	1.90	
Steady State Economy				
ESEE	10	5.20 (N = 35)	1.51	F (2, 87) = 5.34**
EAERE	0	4.08 (N = 24)	1.69	
AHE	11	3.77 (N = 31)	2.29	
Ecosystems as goods & services				
ESEE	8	4.78 (N = 36)	1.69	F (2, 83) = 4.47*
EAERE	8	5.27 (N = 22)	1.32	
AHE	20	3.82 (N = 28)	2.14	
Green accounting				
ESEE	10	4.46 (N = 35)	1.48	F (2, 84) = 1.68
EAERE	8	4.95 (N = 22)	1.43	
AHE	14	5.13 (N = 30)	1.68	
Ecological footprint				
ESEE	5	4.35 (N= 37)	1.67	F (2, 89) = 10.60**
EAERE	4	3.52 (N = 23)	.99	
AHE	9	5.34 (N = 32)	1.49	
Non-Utilitarian ethics				
ESEE	13	5.91 (N =34)	1.29	F (2, 82) = 26.91**
EAERE	8	3.32 (N =22)	1.59	
AHE	17	5.90 (N = 29)	1.45	
Group Deliberation				
ESEE	13	5.29 (N = 34)	1.29	F (2, 71) = 9.40**
EAERE	29	3.35 (N = 17)	1.73	
AHE	34	3.96 (N = 23)	1.99	
Social Multi-Criteria Analysis				
ESEE	8	5.69 (N = 36)	1.03	F (2, 79) = 6.30**
EAERE	21	4.53 (N=19)	1.61	
AHE	23	5.67 (N = 27)	1.21	
Incommensurability				
ESEE	15	5.97 (N = 33)	1.16	F (2, 67) = 0.30
EAERE	42	5.93 (N = 14)	11.07	
AHE	34	4.96 (N =23)	1.89	
Post-Normal-Science				
ESEE	18	5.84 (N = 32)	1.27	F (2, 48) = 7.77**
EAERE	62	3.11 (N = 9)	3.14	
AHE	71	4.50 (N = 10)	2.27	

* < .05; ** < .01

Post hoc tests were conducted on the concept ratings where the ANOVA results revealed significant differences, with the exception of the concept of post-normal science, because the sample size was so small. Levene statistic's revealed significant differences in homogeneity of variance above the 0.01 level for the rating for the concepts of the steady state economy and cost-benefit analysis. Therefore the Games-Howell post hoc test was used for these two concepts. The other concepts were assessed with the LSD post hoc test. Table 6 summarises the results for these post hoc tests.

Table 6: Rating of Concept Importance

ESEE>AHE=EAERE	ESEE=AHE>EAERE	AHE>ESEE>EAERE	ESEE=EAERE>AHE	EAERE>AHE=ESEE
Steady state economy*	Non-utilitarian ethics#	Ecological footprint#	Ecosystems as goods & services#	Cost-benefit analysis*
Small group deliberation#	Social multi-criteria analysis #			

Notes:

> significantly greater than; = no significant difference

LSD post hoc test

* Games-Howell post hoc test

The ESEE sample has a significantly higher rating of the importance of steady-state economy and group deliberation than both the EAERE and AHE samples. There is agreement between ESEE and AHE heterodox economists on rating non-utilitarian ethics and social multi-criteria analysis more importantly than EAERE neoclassical economists. The AHE sample rate ecological footprints higher than the other communities and ecosystems as goods and services lower. The neoclassical EAERE sample had a higher rating for the importance of the concept of cost-benefit analysis and a lower rating for the concepts of non-utilitarian ethics and social multi-criteria analysis. As we move from left to right on Table 6

there is a change from non-mainstream ideas towards those acceptable within a neoclassical frame. Thus, valuing externalities can be applied to ecosystems using cost-benefit analysis and these approaches are most favoured by the EAERE neoclassical economists. On the left hand side are constraints and more political approaches involving plural values and multiple perspectives. Note that treating ecosystems as goods and services is seen as important by the ESEE heterodox sample, but apparently not using cost-benefit analysis.

Environmental Beliefs

Three environmental belief scales were administered to measure commitment to technological optimism, ecocentrism and anthropocentrism. A principal components analysis with varimax rotation was able to clearly differentiate between the technological optimism scale (Cronbach's $\alpha = .73$), the ecocentrism scale (Cronbach's $\alpha = .69$) and the anthropocentric scale (Cronbach's $\alpha = .61$). Each scale was divided by the number of items in the scale, so that the scores for each scale range from 1 to 5. Table 7 displays the means and standard deviations. A one-way ANOVA revealed significant differences for responses to the technological optimism and the ecocentrism scales. A Levene statistics revealed no significant differences in homogeneity of variance of the scales so the least-squared difference (LSD) post hoc test was employed to further probe for differences in the technological optimism scale scores and the ecocentrism scale scores. The anthropocentrism scale showed no differences and is therefore not analysed further.

If we take technological optimism first. A LSD post hoc test revealed that the ESEE heterodox group had a significantly lower technological optimism scale score than both the EAERE neoclassical and AHE heterodox samples. No significant difference was found in the technological optimism score for the AHE and EAERE samples. This suggests that the

ESEE heterodox economists are less optimistic about technology solving environmental problems than the EAERE and AHE samples.

Table 7: Three environmental belief scales

		N	Mean	Std. Deviation	Comparison of means (ANOVA)
Technological Optimism Scale	EAERE - Neoclassical	24	2.82	.76	F (2, 92) = 6.22**
	AHE – Heterodox	33	2.57	.79	
	ESEE – Heterodox	38	2.19	.59	
Ecocentrism Scale	ESEE – Heterodox	39	3.62	.99	F (2, 93) = 6.97**
	AHE – Heterodox	34	3.16	.90	
	EAERE - Neoclassical	23	2.70	.94	
Anthropocentric Scale	EAERE - Neoclassical	23	2.70	.72	F (2,92) = 1.07
	AHE – Heterodox	34	2.59	.66	
	ESEE – Heterodox	38	2.46	.56	

* < .05; ** < .01

1=strongly disagree, 5=strongly agree

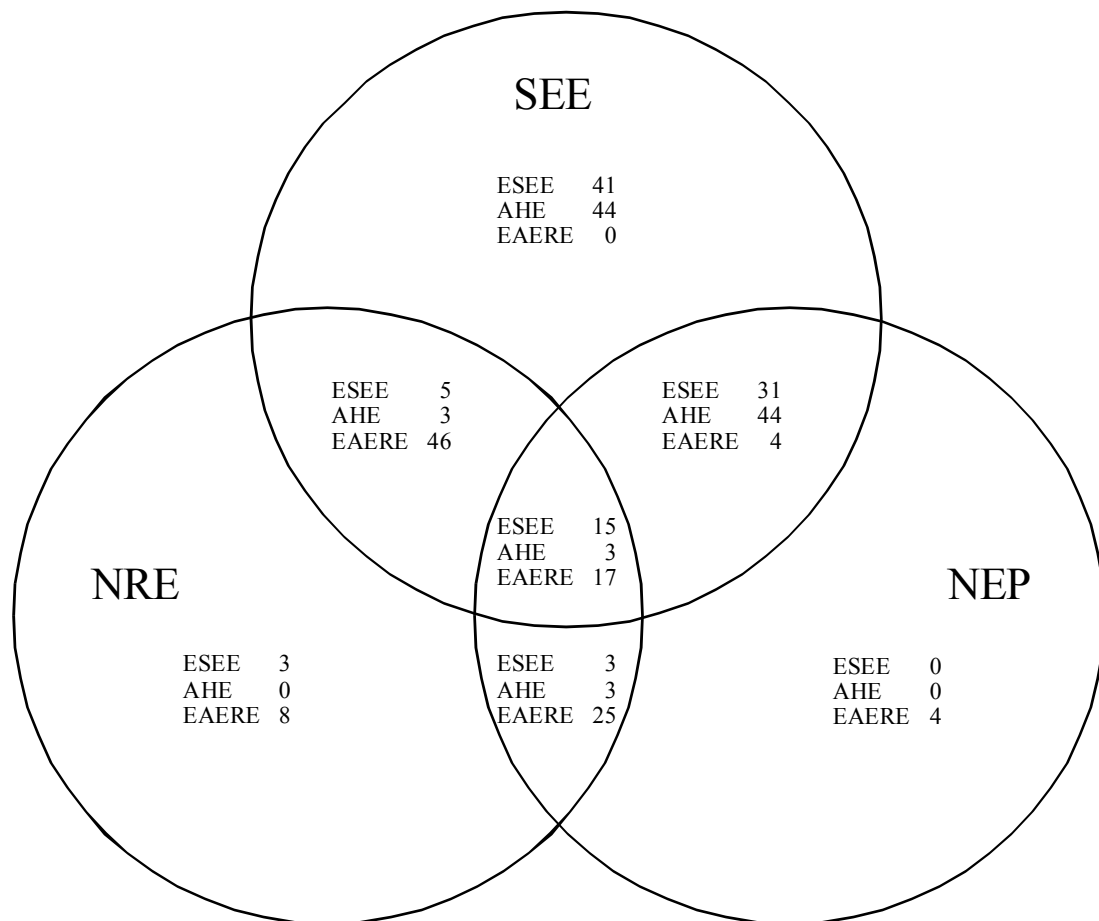
In terms of ecocentrism, an LSD post hoc test revealed that the ESEE group has significantly higher ecocentric beliefs than both the EAERE group and the AHE group. Once again there were no significant differences found between the EAERE group and the AHE group. This suggests that the samples from the EAERE and AHE conferences are more pro-development of natural environments than the ESEE sample.

Research Approach

The last aspect of the survey on which we report here is the self-reported research approach. That is, the ideological and methodological positions characterised under the three categories

of NRE, NEP and SEE. The two heterodox samples from ESEE and AHE have very similar patterns of response as shown in Figure 5. The main difference being the stronger (but not total) rejection of the NRE position by the AHE sample who as a result appear less in the central position (i.e., the 'Big Tent') in which all three approaches combine. Instead they adopt a slightly stronger preference for SEE and SEE combined with NEP. Perhaps surprisingly the pure NEP position has no takers from the ESEE or AHE samples but a small percentage of EAERE neoclassical economists. At the same time all three samples show approximately 50% of respondents include NEP as an aspect of their research approach.

Figure 5: Self-Categorised Research Approach: Heterodox vs. Neoclassical



Notes:

Figures are percentage of sample for each of ESEE heterodox, AHE heterodox and EAERE neoclassical. 2 percent non-response for ESEE.

The major division is then between the EAERE neoclassical sample and the two heterodox samples. The former reject SEE completely along with SEE combined with NEP. This is a total contrast with the heterodox economists where these two positions were adopted by 72% of the ESEE sample and 88% of the AHE sample. The EAERE neoclassical economists do not however reject NEP and SEE totally but favour combining them with the more neoclassically consistent NEP approach. Thus, 63% are found agreeing with the SEE approach as describing part of their research position.

V. Conclusions

This paper has presented information on a sample of ecological, heterodox and neoclassical economists in terms of their formal education, conceptualisation of environmental problems and beliefs about the environment and technology. This can be seen as pulling together some elements by which individual's form their world view. The specific world views of interest here are then characterised under three research approaches: new environmental pragmatism, new resource economics and social ecological economics.

The interdisciplinarity of ecological economics is clear from the education of participants at the ESEE conference. This goes beyond simple variety amongst economists or people holding mixed degrees and shows diverse interaction with non-economists. In contrast both AHE and EAERE draw far more narrowly on those trained as economists.

Our overall conclusion is that there are barriers to these different groups communicating with each other. The conferences samples are reading different journals. There were only four journals that were read in common amongst the top 40 journal nodes across the three conferences. If the different conferences have different reading patterns, this may result in major communication problems across the three types of economists. There

may be metaphors and analogies that are not understood. For example, the diverse reading patterns of the ESEE group may encourage familiarity with such concepts as incommensurability and post-normal science, and greater general readiness to learn. In contrast the narrow reading patterns of the EAERE neoclassical economists, as a community, seem likely to reinforce a narrow perception of reality.

Communication needs some level of unification. The network diagrams suggest that the journal reading pattern of each conference results in a form of unification, but each conference also had a different pattern and therefore a different communication approach to unify the field. The ESEE group were unified in the reading of *Ecological Economics*, while it was also common place for these economists to read other journals that were not widely read by others within this community. The EAERE sample were unified in the reading of two core environmental economics journals, and most other journals read by this group were neoclassical. The AHE group listed a more diverse set of commonly read journals which were held in common by smaller sub-groups while participants also maintained diverse individual journal reading patterns. The common sub-group reading patterns for AHE suggest the presence of economists from specific economic schools of thought, namely: Post-Keynesian, Marxist, institutional and evolutionary.

A major difference then between the heterodox AHE and ESEE groups was the closer contact of the later with non-economists such as (but not only) ecologists. Greater awareness of physical constraints and limits to systems might be one outcome. The interdisciplinary interaction between natural and socio-economic sciences may help explain why the ESEE respondents have: (i) more pessimism about the possibility of scientific solutions, (ii) a higher ecocentrism score, and (iii) a higher rating for the concept of a steady state economy. The network analysis revealed that the ESEE group were strongly linked by the journal *Ecological Economics*. The AHE group on the other had contained a number of journal

nodes from different schools of thought that linked with each other but most importantly via the *Cambridge Journal of Economics*.

The majority of participants in both the heterodox samples were classified as SEE or NEP & SEE which suggests that these researchers, although being economists, are concerned about social research without using the axioms of mainstream economics or holding efficiency as a primary policy goal. The majority of participants from the EAERE conference were classified as NRE & SEE or NRE & NEP suggesting that these researchers are focused on tackling social research or pragmatism using the axioms of mainstream economics. This difference is further highlighted by the EAERE group rating the importance of the concept of cost-benefit analysis as being higher than the heterodox groups, while also rating the concepts of non-utilitarian ethics and social multi-criteria analysis as being lower than the heterodox groups. This finding was further reinforced by the network analysis which found that the majority of EAERE participants were reading a limited selection of neoclassical economics journals.

In summary, heterodox research involves a focus on multiple perspectives and values while a neoclassical approach to the environment is more concerned with applying the basic tenets of consumer choice and the rational agent model. The interest in multiple perspectives is consistent with 92% of the ESEE sample and 97% of the AHE sample selecting a research philosophy that included SEE. In contrast 96% of the EAERE sample selected a research philosophy that included NRE and seem clearly interested in applying the basic tenets of mainstream theory.

An interesting question is then how EAERE neoclassical economists expect to maintain their ideological and methodological commitments when combining with social ecological economics. On the basis of the past interactions between mainstream and heterodox approaches a distinct possibility is domination of the field of ecological economics

with key concepts being watered down or changed beyond recognition in order to conform to an orthodox ontology and methodology. Yet there is still the possibility that ideas may flow in the opposite direction and broadening the horizons of neoclassical economist will lead to their breaking free from their restricted world view. In this regard the finding that no neoclassical economists in the sample held combined degrees is informative, while the presence of those defining themselves as heterodox at the EAERE conference may offer some sign of hope.

However, in terms of addressing economy-environment interactions from an heterodox perspective there are clear challenges. Most heterodox economist appear to lack knowledge of key concepts about the environment seen as important by social ecological economists. At the same time their pro-growth, pro-development, technological optimism directly conflicts with the beliefs of the more environmentally concerned ecological economists. That the latter are mixing with natural scientists and other non-economists seems likely to be an important contribution to their different world view but also a further barrier to communication and understanding with other economists. One unifying factor seems clear in this study, the majority of heterodox economists concerned about the environment share common perspectives on their research approach, and this is a far more radical approach than found amongst neoclassical environmental and resource economists.

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Appendix I: Environmental Belief Scales

Technological Optimism

Item 1: Most environmental problems can be solved by applying better technologies

Item 2: Science and technology will eventually solve our problems with pollution,
overpopulation and diminishing resources

Item 3: Humans will eventually learn enough about how nature works to be able to control it

Item 4: We cannot count on science and technology to solve our problems (reverse item)

Ecocentrism

Item 1: Turning new unused land over to development should be stopped

Item 2: I oppose any removal of wilderness areas no matter how economically beneficial
their development may be

Anthropocentrism

Item 1: Nature is important because of what it can contribute to the pleasure and welfare of
humans

Item 2: One of the better things about recycling is that it saves money

Item 3: One of the most important reasons to keep lakes and rivers clean is so that people can
have a place to enjoy water sports

Item 4: One of the most important reasons to conserve is to ensure a continued high standard
of living.

Appendix II: Journal coding for network diagrams

- 1 Ecological Economics
- 2 Journal of Economic Issues
- 3 Journal of Economic Perspectives
- 4 Journal of Economic Literature
- 5 Environment & Resource Economics
- 6 Journal of Environmental Economics & Management
- 7 Nature
- 8 American Economic Review
- 9 Science
- 10 Ecology & Society
- 11 World Development
- 12 Land Economics
- 13 Futures
- 14 International Journal of Sustainable Development
- 15 Estudio Sociodade a Agricutural
- 16 European Environment
- 17 Organization & Environment
- 18 Environmental Values
- 19 Proceedings of the National Academy of Sciences
- 20 Antipode
- 21 Real World Economics Review
- 22 Journal of Interdisciplinary Economics
- 23 Science, Technology & Human Values
- 24 Journal of Economic Behavior & Organization
- 25 Journal of Behavioural Economics
- 26 Journal of Industrial Ecology
- 27 Environment & Planning C
- 28 Environmental Management
- 29 Land Use Policy
- 30 Journal of Environmental Planning & Management
- 31 Business Strategy & Environment
- 32 Development & Change
- 33 Journal of Development Studies
- 34 Review of Radical Political Economies
- 35 GAIA
- 36 Journal of Sustainable Tourism
- 37 Climate Change
- 38 Energy Policy
- 39 Ecological Economy (Chinese Journal)
- 40 Rethinking Money
- 41 Energy & Environment
- 42 Human Ecology
- 43 Quarterly Journal of Economics
- 44 Journal of Economic Growth
- 45 Journal of Evolutionary Economics
- 46 Waste Management
- 47 Water Management
- 48 International Journal of the Commons

- 49 Journal of Rural Studies
- 50 Journal of Environmental Policy & Planning
- 51 Sociologia Ruralis
- 52 Cambridge Journal of Economics
- 53 Journal of Economic Methodology
- 54 Review of Social Economy
- 55 Storytelling, Self, Society
- 56 Science as Culture
- 57 Tourism Management
- 58 Socio-economics
- 59 German Economic Review
- 60 Technology & Culture
- 61 Biological Invasions
- 62 Biodiversity Conservation
- 63 Economic Theory
- 64 Environment & Development Economics
- 65 Energy Economics
- 66 Journal of Economic Dynamics & Control
- 67 European Review of Resource & Environment Economics
- 68 Journal of International Economics
- 69 American Journal of Agricultural Economics
- 70 Energy
- 71 Economic Journal
- 72 Natural Resource Modeling
- 73 Economist
- 74 Game & Economic Behavior
- 75 Marine Resource Economics
- 76 ESB (Dutch Publication)
- 77 Canadian Journal of Economics
- 78 Journal of Public Economic Theory
- 79 Journal of Macroeconomics
- 80 Economic & Political Weekly
- 81 Monthly Review
- 82 New Left Review
- 83 Rethinking Marxism
- 84 The Economic & Labour Relations Review
- 85 Capital & Class
- 86 Radical Statistics
- 87 Journal of Political Economy
- 88 Journal of Post-Keynesian Economics
- 89 Population & Development Review
- 90 Forum of Social Economics
- 91 Intervention
- 92 Intereconomics
- 93 Journal of Institutional Economics
- 94 Desarrollo Económico Argentina
- 95 Realidad Económica Argentina
- 96 Journal of Economic History
- 97 History of Economic Ideas
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