

Clive L. Spash

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ecological knowledge

SRE-Discussion 2012/04

2012



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Clive L. Spash<sup>1,2</sup>

## Abstract

Integration of knowledge has become a contentious issue in an age where increasing specialisation creates boundaries and division. Yet, there is an identifiable need for integration across social, ecological and economic understandings if we are to address ever more threatening crises and alarming potential scenarios. This paper relates to the work of K. William Kapp and in so doing raises questions about how integration might be achieved. A core idea that arises is the role of common denominator concepts.

## Keywords:

Integration, social ecological economics, philosophy of science, epistemology, K. William Kapp, analogy, unity of science, interdisciplinarity

## I. INTRODUCTION

In his book *Towards a Science of Man in Society*, K. William Kapp explored the possibilities for integration across the social and natural sciences and for greater coherence across the disciplines constituting the social sciences. His basic thesis explained the separate qualities of the physical (inanimate matter), biological (living organism) and social (human society) realities, but also proposed possibilities for linking knowledge and how integration could be made feasible. In this chapter I will relate aspects of this work to ecological economics.

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<sup>1</sup> Socio-Economics Department, WU Vienna University of Economics and Business, Austria

<sup>2</sup> Department of International Environment & Development Studies, University of Life Sciences, Norway.

Kapp died in 1976 before modern ecological economics was established, in the late 1980s, but he had already covered much of the ground relevant to the movement and considered key issues including (amongst many other things) monetary valuation of the environment, the role of institutions, corporate power, the consumer society and participatory planning. He had recognised that while the intrinsic connection between the inorganic and biological was being explored with vigour the connection between the biological and social sciences was far from being accepted, even in principle (Kapp, 1961: 124). Yet this was a legitimate and necessary step for the integration of knowledge.

Ecological economics is a movement which by definition aims to fill that gap. However, understanding how this might be achieved has been largely left in abeyance. Within ecological economics there has been little discussion of the philosophy of science, ontology or epistemology. As a result how knowledge integration might proceed in practice is left to the individual researcher. Such an enterprise might at least have learnt from others about the pitfalls to avoid and the possibilities for success. Kapp's work then provides one source of guidance.

## II. INTEGRATION AND ECOLOGICAL ECONOMICS

Kapp was deeply concerned about the compartmentalising attitude in academia and the increasingly fragmented character of human understanding. In part this was due to the ensuing contradictions evident both across and within disciplines. Ecological economic was established on the basis of recognising a major failure along these lines, namely the ignorance amongst economists as to the physical reality of the world in which the economy is embedded. This was not a new revelation (see the history of energy-economy research in Martinez-Alier, 1990), but a forgotten one. Kapp himself had tried to raise the profile of the same problem. That addressing this issue needs a fundamental break with the past silo

mentality and serious integration of disciplines would seem rather self-evident. Such integration is also an important and central requirement for success in addressing social and environmental problems.

However, instead of ecological economics offering an integrative approach we are left with a movement founded on vague and unstructured appeals to transdisciplinarity and holism (Costanza, 1989) and methodological pluralism (Norgaard, 1989), which tend to hide more than they reveal. The first introductory book (Costanza et al., 1998), by leading American figures in the society, maintained an uneasy balance between requesting a new worldview, to address our social and environmental woes, and not ejecting the body of orthodox thinking. Daly, as a co-author of that book has apparently since developed in a different direction. The textbook by Daly and Farley (2004) invokes the concepts of both a Schumpeterian new preanalytic vision for economics and a Kuhnian revolutionary change. At one point they propose rejection of a value basis in subjective preferences and deride pluralism. They state: "we must have a dogmatic belief in objective value, an objective hierarchy of ends ordered with reference to some concept of ultimate end" (Daly and Farley, 2004: 42). There are some vague references to God and a footnote citing the Christian apologist C. S. Lewis. Their main concern is then that the scale of the economy and income distribution be addressed first and after that economic systems can proceed to pursue market efficiency. The goal of economic growth is replaced by that of a steady-state economy at optimal scale.

This attempt at a kind of dogmatic closure of debate as to the content, meaning and direction of ecological economics is far from helpful. Kapp warned of adopting mythological, religious or secular world views *a priori* as a means of integration. On the basis of the epistemological insight that all knowledge is provisional, he saw the potential to

become locked-in to an unthinking position as dangerous for society. As he stated (Kapp, 1961: 49-50):

"If there is one thing we have to guard against it is the temptation to interpret the world in terms of uniform and unifying principles which may be simple and comforting but without confirmation. For the results of such unification in terms of general worldviews is often imposition of integration "from the outside" and rationalization of preconceived unity into dogma."

Dogma is not open to question or refutation and therefore inherently unscientific.

In this respect another threat to ecological economics comes from the imposition of orthodox economic thought. For example, the European textbook on ecological economics by Common and Stagl (2005) adopts much from neoclassical economic theory including consequential utilitarian anthropocentrism. Such mainstream economic framing can also be seen as dogmatic in the resulting *a priori* dismissal of counter evidence (such as the importance of rights based ethics concerning non-humans e.g., Spash, 2000; Spash and Hanley, 1995) and *a priori* exclusion of alternative value systems (e.g. deontology, virtue ethics, see O'Neill et al., 2007; O'Neill and Spash, 2000). For ecological economics there is a serious need to avoid the very real dangers of dogmatic imposition of unity. The threat of this from orthodox economics is perhaps the more serious because of the historical development of the movement (Spash, 1999, 2011a).

Ecological economics has in part been a bridging or linking exercise between ecological impact studies and unreconstituted neoclassical environmental economics. This indeed was the vision of the first president of the international society and editor of the journal of ecological economics (Costanza, 1989). As I have explained elsewhere, this approach created an 'ecology and economics' conjunction, not a new integrated interdisciplinary endeavour, and was particularly strongly pursued in North America (Spash,

1999). The legacy of that start has not been generally beneficial to the movement. In the United States the field has been moribund for some years. In this regard let me offer an anecdote. When I attended a USSEE meeting in 2005, Costanza asked, while giving a plenary address, how many present had attended the founding Washington DC conference in 1990 (where there had been over 370 participants, Costanza, 1991: xi); just two people raised their hands—Herman Daly and myself.

Another problem has been domination by a narrow form of pragmatism and a failure to address criticism (exactly in the same mode as neoclassical economics). This has become abundantly clear from the monetisation of ecosystems services (Norton and Noonan, 2007) and the related use of benefit transfers (Spash and Vatn, 2006). Similar problems relate to the uncritical adoption of the capital approach, the promotion of tradable permits and the use of adjusted national income accounts. This is the kind of problem which Kapp (1961: 68) referred to as "the tendency to become a self-sealing system that selects data with a view to making the evidence fit the theory".

The current state of ecological economics is one where some now call for a rebranding exercise under the title of Sustainability Economics (Baumgartner and Quaas, 2010; Söderbaum, 2008, 2011), while others have moved on. Rebranding is a purely political strategy on behalf of those who have, for good reasons, become alienated from the 'ecology and economics' movement and who regard ecological economics as having failed to achieve the interdisciplinary integration they desired. Yet just changing names does nothing to address the underlying issues which concern how true integration and progress can be achieved, both across natural and social sciences and within the social sciences. Nor does running from one movement to the next help address the dominance of orthodox economics over heterodox thought.

The real underlying issues concern how the basic messages of ecological economics can be incorporated into a unified approach. This means recognition of the physical basis of social and economic activity. Clearly messages about the importance of thermodynamics and materials balances with their implications for resource use go back to the pre-history of ecological economics (Martinez-Alier, 1990). They reappear in ecological footprints (Rees, 1996; Wackernagel and Rees, 1997), social metabolism (Krausmann et al., 2008; Schandl and Schulz, 2002) and degrowth (Kallis, 2011). These are fundamental understandings of the biophysical world. They call for fundamental re-visioning and transition away from a consumerism built upon fossil fuels, with its gross political and social inequities, and so connect to foundations in ecological and scientific utopianism. That this has political and institutional implications is inevitable because of the stark realities that few gain at the expense of the many, and that irreplaceable available resources are being squandered on luxuries for the present rich at the cost of necessities for the future and present poor. Social structures and the power of organisations and institutions are then top priorities for research. This makes ecological economics an essentially social science subject area related to political economy and not a branch of natural resource management. These are points to which I will return in the penultimate section where I describe the contrast between what I term Social Ecological Economics and New Resource Economics. First I will explore how we might improve on the dismal state of integration in ecological economics.

## II APPROCHES TO INTEGRAION

In ecological economics the attempts at integration have been largely implicit. Kapp notes five major approaches which can be summarised as: interdisciplinarity, historical method, use of analogies, unity of science, and dialectic materialism. He is critical of all approaches and develops his own combining aspects of interdisciplinarity and a form of unity of science built

around concepts. He also notes the importance of history of thought in aiding understanding of the processes by which intellectual synthesis has succeeded or failed, but this does not in itself achieve integration of contemporary knowledge. Ecological economics has mainly involved concerns over interdisciplinarity and has clearly made use of analogies from the ecological and biological sciences. In addition, there has been some, if minimal, reflection on methodology and the possibility of unity through a common epistemology (e.g., Munda, 1997; Tacconi, 1998). I will therefore discuss analogy, the unity of science and interdisciplinarity.

### *Analogy*

Drawing analogies from other areas of knowledge has been important in the synthesis of information. Historically this has resulted in transferring concepts, methods and modes of thinking across disciplines. Such use of analogies is particularly important when developing a new area of research, such as ecological economics. As Kapp (1961: 51) explains:

“Particularly during the formative stages of a new discipline, analogical comparisons and the exploration of likenesses are often the only procedures available for deducing tentative conclusions in a new and as yet unexplored field of research.”

Despite the potential power and strong attraction of drawing analogies there are also some “serious dangers which have rarely been avoided” even by those conscious of the problems. These are particularly important for ecological economics because of the tendency to borrow directly and uncritically from ecology in terms of systems understanding (e.g. with respect to sustainability, resilience and co-evolution).

Reasoning by analogy has serious drawbacks as is evident in orthodox economics, which is used here as an example. Two issues highlight the problems. First, the tendency to pay inadequate attention to the nature of the subject of direct concern means assuming

fundamental similarity, if not identity, between qualitatively different phenomena. Thus, analogies from physics have been used to explain society with atomistic reductionism leading to a belief that the social is no more than a collection of individuals, and society can therefore be ignored as a distinct phenomena. Second, the selection of specific analogies involves hidden political and ideological elements. This may involve placing conclusions into the premises and then proceeding to theories, but presenting the logic in reverse to appear 'scientific'. Neoclassical economics in borrowing analogies from mechanics assumes human behaviour is a timeless reaction to information (e.g., prices) in an equilibrium setting so that rational economic responses become automatic and stabilising under conditions of perfect information. The mechanical analogy blocks the understanding of human behaviour as complex, fallible and operating under conditions of strong uncertainty.

Analogies are by their nature creative generalisations aiming to illustrate or illuminate borrowing from other understandings in a different field of knowledge. The danger then is to apply them without attention to the distorting effects which arise from lack of context and detail. Thus, Kapp argued that the greater the complexity and qualitative differences between subjects the less room there is for analogies. This implies borrowing from within the same general field of study is likely to prove less problematic. So the fact that biophysical sciences, such as ecology, are qualitatively different from the social sciences should alert us to the dangers of integration by analogy.

In ecological economics a major analogical transfer has been based upon understanding of forest ecosystems. This has built itself into a whole movement around resilience and adaptive management. The original idea was expressed by Holling (2009 [1986]) and his diagrammatic exposition included the concept of creative destruction (later dropped) with a reference to Marx and Schumpeter. Holling (2009 [1986]: 95) boldly put forth a table in which he claimed "possible analogies between ecosystem function and

functions or typologies proposed for other systems”. Those other systems were economics, technology, institutions and psychology. So Holling moves from an understanding of forest ecosystems to explaining an entire body of human and social sciences. Since the original article, an organisation called the “resilience alliance” has taken on the job of pursuing and promoting such analogies in ever expanding realms. That ecosystems have a natural rhythm of change is used to imply the same cycles are followed everywhere and so the same phases—exploitation, creative destruction (now termed release), reorganisation and renewal—are an explanation for everything from human psychology to society! Yet, in some contradiction to the rather deterministic prospects for society of this cyclical analogy, humans are expected to manage and adapt, so implying these natural rhythms are perhaps not so deterministic for human society after all?

Similarly, there has been a serious attempt to transfer analogies from evolutionary biology. In more recent times this has appeared in the form of co-evolution being used to describe human development (Gowdy, 1994; Kallis and Norgaard, 2010; Norgaard, 1994) and this has been seen by some as a foundational idea for ecological economics (Munda, 1997). Co-evolution arose as a term explaining the relationship between butterflies and plants (Ehrlich and Raven, 1964). It relates to the fitness of genetic traits within each species being largely governed by the dominant traits in the other. The term fitness in the biological sciences refers to surviving and reproducing, and so basically population size. Fit species survive, reproduce and become more abundant. Norgaard has used the analogy to explain the impacts of modern industrial agriculture on the environment and the resulting lock-in of technology to chemical warfare on Nature (now shifting to genetic warfare via bio-engineering). The story told in the specific context is informative. Co-evolution could be taken as a modern version of Veblen’s cumulative causation, taken from Darwinian theory (Veblen, 1898: 378). However, the idea is extended too far by Norgaard (1994: 41) when we

are told that values and beliefs are merely matters of fitness and cultural traits are much like genetic traits!

Both these analogies seem to have arisen in part as a reaction to the valid criticism of neoclassical economics as having become dominated by analogies from physics. Going back to Veblen (1898) there has been an argument that economics should relate to biological and evolutionary science. The appearance of the above analogies in ecological economics is then a strong critical reaction to the dominant analogies from physics. Thus Norgaard (1994) spends much time attacking the physics analogy in neoclassical economics before presenting his preferred biological science alternative. As noted earlier, Kapp recognised the need for learning based upon the connections between the biological and sociocultural disciplines.

“However, it is a mistake to conclude that the integration of social knowledge can be achieved by viewing man and culture in the perspective of evolutionary time or by taking account of the findings of biology about the human organism. What speaks against this simple formula is the fact that ... man and human society represent qualitatively different levels of organisation.” (Kapp, 1961: 124)

Thus, while there may be some potential for learning from ecological analogies there is also much danger when they become dominant to the neglect of the subject to hand, which is humanity in a human society. For instance, the move towards evolutionary analogy runs the risk of equating human behaviour to some selfish genetic determinism or seeing human systems as purely cyclical systems subject to biophysical laws and nothing more. Where then is human volition? Neither physics nor biology nor ecology will provide an explanation of human society.

“The presence in man of elements of consciousness, volition, and purpose, and the human capacity to select alternative courses of action militate against any indiscriminate transfer of concepts, propositions, and methods of thought from the

physical and biological disciplines to social analysis. While such transfer may have succeeded in creating a semblance of integration of our knowledge in the past, it nevertheless belongs to those endeavours of reasoning by analogy which sooner or later leads to “reductionism” and are bound to break down because of the manifold qualitative differences between human society and organic and inorganic nature.” (Kapp, 1961: 124)

### *Unity of Science*

The unification of science by logic and methodology was promoted by the left wing of the Vienna Circle in their search for a logical and empirical approach to understanding the world.<sup>1</sup> This was pursued in two distinct but connected ways. One was an analytical search for a pure language by which scientific knowledge could be created free from metaphysics, pursued by Rudolph Carnap. The other was Otto Neurath’s idea of a more broadly conceived meta-theory of science that included history and sociology of science and actively sought a place for social science in the unified approach (O'Neill and Uebel, 2004: 78-79). Neurath and Carnap edited *The Encyclopaedia of Unified Science* with Charles Morris. Borrowing from Creath (2011) their respective positions can be summarised as follows. Carnap’s call for unity of the language of science is most simply understood as requiring that the various claims of the separate sciences should be publicly testable in a common observation language. Neurath's position was to avoid *a priori* methodological divisions between natural and social sciences, and also to connect the various sciences so they could be used together to solve complex human and social problems.

Clearly ecological economics has a strong sympathy with Neurath's position in terms of unifying knowledge to address serious complex problems and, while Carnap's abstractions appear less practically relevant, the aim for public evidence of confirmability also seems

desirable. Yet the project seems contradictory in practice because Carnap was trying to reduce down to a simple primary source the logic of testable statements while Neurath was aiming to collect all the intricacies of natural and social scientific language in a large multi-volume encyclopaedia. In the end the encyclopaedia became a collection of articles on the philosophy of science including a diverse mix from papers by Vienna Circle exiles (fleeing Nazi power), to American pragmatists such as Dewey, to Kuhn's sociology of science.

Kapp (1961: 60-64) criticised the project as being an impossibility on the basis of the sheer diversity of language. The idea of unification by logical and semantic analysis would threaten a domineering super-science, which was not the aim of the left Vienna Circle. Kapp saw the part of the project which rejected metaphysics as divisive of knowledge, despite sympathising with its rationale, namely to avoid building systems of knowledge based upon speculative conceptualisation and hidden ideologies.<sup>ii</sup> He makes the point, which we could link to Max-Neef's (2005) metaphysical discussion of transdisciplinarity (discussed below), that a range of *a priori* knowledge is intuitive while Western scientific knowledge is logical. He felt that there should be room for both. In discussing these ideas he concludes that a form of supplemented and enlarged logical empiricism could be a way forward, but this point is not explicitly pursued further. For those unfamiliar with the divisions in logical empiricism this may seem strange, but it makes more sense in terms of realising that Kapp was relating his remarks to the left wing of the Vienna Circle and in direct reference to Neurath and Carnap. So Kapp can be interpreted as appealing for an ontological (metaphysical) base and then proceeding with analytical reasoning and refining knowledge through empirical research.

One other aspect of unity of science is worth mentioning. In orthodox economics there has been a rhetorical use of the tenets of logical empiricism which appears as an imposed form of unity (McCloskey, 1983), or perhaps more precisely as a means of

demarcation for 'real' economics. The claim is made that mathematical formalism is the only means of creating rigorous models for developing hypothesis which can be empirically tested. In fact this formally articulated methodology is not followed. However, this does not prevent orthodox economists from deploying the supposed practice as a means of arguing against unpalatable findings which attack the neoclassical paradigm or its models. The claim is easily made that the results do not follow the accepted methodology, or recommended empirical practice, and so they are unscientific, invalid, inadmissible and/or not economics.

### *Interdisciplinarity*

Interdisciplinarity is something which requires skill and training to achieve. Unfortunately, such training is rare and the common approach is to combine a set of disciplinary representatives to work on a project who then proceed to talk past one another. This is more correctly termed a multi-disciplinary approach and is in effect what we find when unreconstituted mathematical models from ecology and economics are linked together. Such multi-disciplinarity never accepts that different disciplines cannot be bound together in a report, and in the literal sense this is correct, but unfortunately the report just lacks any meaning beyond its separate perspectives. As there is no real interaction, there is no real potential for conflict, nor much hope of learning something new. This approach is prevalent in ecological economics.

In addition there is much reference to transdisciplinarity, although not that much evidence of it being put into practice. The basic transdisciplinary claim seems to be that as well as interdisciplinary integration there should be some engagement with the lay public. The following definition has been given in the journal *Ecological Economics*, after the authors noted the lack of precision and understanding relating to the term: "Transdisciplinarity means to reach out beyond science and to include aspects of practical

contexts and values or normative judgements (sustainability, good-practice), as well as to feed back results into practical actions (politics, management)." (Baumgartner et al., 2008: 387). Now this requires supporting a fact-value dichotomy which I personally reject for the social sciences as do others (Collier, 1998; Norton, 2003). More importantly, in the current context, this seems to rather confuse methodology with method. Indeed, Baumgartner et al. note the similarity to the recommended practice in post-normal science. Now, that practice is aimed at addressing strong uncertainty in the context of science-policy interactions and arises from a critique of normal science. The blanket requirement for public engagement in all ecological economics research seems excessive and loses the reflection upon contextual need. Interdisciplinary research with the option of applying methods (such as public participation) would be adequate and avoid the loose and contentious claims falling under the unclear heading of transdisciplinarity.

Another attempt at providing some substance to the idea of transdisciplinarity is that of Max-Neef (2005). He argues for a much more metaphysical philosophical basis for the term and relates this to a hierarchical structure of disciplinary knowledge and reality. His key concern is to challenge the boundaries of knowledge set by modern Western thought and open up the potential for "a logic capable of harmonizing reason with intuition and feeling". However the abstract reasoning about a metaphysical unity leaves few straight forward messages in terms of how to reach such an enlightened position. In contrast his diagrammatic exposition offers a complex pyramid of disciplinary interactions with highly contestable premises. For current purposes of seeking integration it does not appear that transdisciplinarity, as defined in these attempts, offers much help or much that adds to interdisciplinarity.

Thus we are left with interdisciplinary endeavour. This requires engaging with different disciplines at a sufficient level to gain insight and understanding of the potential

interconnections, differing perspectives and potential for synthesis. This may be undertaken by a group where disciplinary interactions and explanations on an object of study or problem lead to a new combined perspective or understanding. At an individual level this might be simply training in one discipline and then another, but with the proviso of integrating that combined knowledge. As Kapp (1961: 51) noted, this can result in clarifying boundaries and revealing limits to integration and realising the potential for no connection being possible e.g., due to different levels of abstraction in concepts and/or different methods in addressing problems. Serious revision of former positions and beliefs on behalf of the researcher must be accepted and openly embraced. Integration of social inquiry requires adopting an integrative frame of mind and the impact on individual psychology may relate to some of what Max-Neef discusses. The challenge of serious interdisciplinary research is certainly and foremost a personal one.

Despite describing the potential of interdisciplinarity in positive terms Kapp was sceptical of how it would operate in practice. Actually there is no real questioning of the need for an interdisciplinary approach, but rather the problem is how to make it effective and operational in achieving integration.

"The objective of integration is not the awareness of common problems nor the accumulation of knowledge from various related disciplines but rather the establishment of relationships between the different parts of social knowledge which can be meaningfully and systematically related."

The requirement then is for means to aid the process. This is where Kapp proposed the importance of finding integrating concepts.

### III. KAPP'S INTEGRATIVE PROPOSAL

Kapp is a realist with sympathies for logical empiricism while recognising the need for the avoidance of reductionism, critical examination of experience, and the role of historical analysis. He also accepts the role of metaphysics and his book gives an explicit ontological exposition. In that regard he accepts both hierarchy and structure. In his own words: "The central thesis which will finally emerge from the following discussion can be stated in relatively simple terms: Inorganic matter, living organisms, and human society, while intrinsically linked with each other, must nevertheless be regarded as essentially different and special levels of organisation" (Kapp, 1961: 75).

This fits well with ecological economic understanding of reality, where the physical is ordered prior to the biological which is prior to the social which is prior to the economic. Each level is dependent upon those preceding it. Thus, we can have a society without a market economy but we cannot have a society without a functioning biophysical system (a simple fact still absent from all economics except ecological economics). Each of the three levels of organisation specified by Kapp are connected and interrelated but, simultaneously, unique structures due to their complexities and qualitative differences. He is at pains to make clear, as has been noted, that social reality exhibits special characteristics making it distinct and not reducible to the natural sciences (by analogy or otherwise). The aim of his study is to offer an approach to match the fundamental interrelatedness of all elements of social reality with an integrated framework for analysis.

In order to achieve this, he proposes "integrating concepts" to help develop a common conceptual framework which explains meaningful and systemic relationships. Scientific knowledge is described as a system of hypotheses and theories formulated in terms of concepts. The conceptual framework must be open, flexible and constantly re-examined in light of new empirical data (Kapp, 1961: 139). Concepts are to have a precise meaning but, rather than being descriptions, are representations that symbolize common characteristics of

phenomena grouped as a class i.e., type or images of reality. As Kapp (1961: 126) states: "The intellectual images we call integrating conceptual constructs are based upon a critical examination of experience. They are derived from inferences drawn from experience and critically observed reality". Examples from the natural sciences are temperature, matter, energy and life. Narrow concepts on the same level are to be expressed in terms of wider concepts and logical frameworks (e.g., as hot and cold are combined in temperature). Fundamental integrative concepts in the social sciences include social context, social structure, social process, social causality, social law, social reality, social action, and time and space (Kapp, 1961: 208). These and other aspects for study need to be brought together to achieve integration and this requires "common-denominator concepts" in terms of which we can express the otherwise incommensurable concepts of our different disciplines, subject matters and cultures.<sup>iii</sup> Kapp appeals to a process (moving from facts, to interrelationships, to phenomena, to theories, to comprehensive rules) for the refinement of understanding leading to a summation of explanation under general laws or regularities.

For the integration of social inquiry the common-denominator concepts need to be general enough to cover several disciplines. They should also avoid ethnocentricity. The integrating conceptual framework should cover the structural character of human society, and relate to the dynamic interaction of parts and whole and their transformative relationships. The central aim is to force thinking in terms of functional interdependencies. At the same time, openness to new evidence and new knowledge is emphasised. In addition, Kapp clearly wishes to avoid ideological bias in referring to the need for researchers to make clear their values and social philosophy. As in Schumpeter's (1994 [1954]: 41-47) preanalytic vision, ideological bias is inevitable but the hope is then that analytical process free from ideology can be conducted to refine knowledge.

Unfortunately, disciplines tend to monopolise concepts: economics deals with wealth, political science with power, anthropology with culture, sociology with society (Preiswerk and Ullmann, 1985: xvii). Kapp wishes for us to break through these disciplinary barriers and proposes two overarching conceptual frames. The first he calls "man" which refers to individual human psychology (e.g., motivation, volition). The term man is used as shorthand for mankind, human, human nature and so on, but now appears dated and gender specific, still this should not distract from the content. The second conceptual framework is "culture" to cover the socio-institutional aspects. Kapp was aware of and warned against the danger of reducing this to a dichotomy of the individual and society (or say actor/structure), and emphasised the reality of interaction and fusion between the two. In recommending research on human nature and culture, Kapp warns against generalising from experimental research and prefers contextual study but also rejects cultural relativism. He explains in detail the importance of culture in human development but does not reject the ability to generalise as to human nature, motivation and psychology.

Kapp believed the new focus on human nature and socio-cultural frameworks of knowledge would have far-reaching effects on research in the social sciences. In particular he explained this in terms of four aspects: (i) orientation towards social context; (ii) preoccupation with social structure, social dynamics and cumulative causation; (iii) acceptance of social indeterminacy and incomplete predictability; (iv) the importance of real types and substantive analysis. In discussing these aspects he raised issues such as non-linearities, emergent properties, total systems analysis and uncertainty in knowledge formation. He is against formalism and for empirical testing and the role of critique. He criticises the focus on the logical implications of means-ends relationships and rational choice.<sup>iv</sup> Instead he recommends dealing with actual problems of human behaviour, human needs and social processes (Kapp, 1961: 198). That is, the focus of our effort should be on

the problem of human interaction with and dependence on both natural and cultural structures.

In rejecting a narrow disciplinary approach the idea of specialisation is not dismissed. Instead, a problem focus is recommended in which different specialisation can be brought together as needed by the specific nature of the problem being addressed. He regards the most progressive disciplines investigating social structures and institutional interdependences as cultural anthropology, social psychology and perhaps sociology (Kapp, 1961: 202). Yet he recommends that the social scientist who has decided to specialize in a particular problem area ignores all traditional boundaries and masters the ideas and methods that happen to be most relevant (Kapp, 1961: 206). Such an interdisciplinary and integrative approach clearly requires a change in the training of individuals and taking specialization in integrative studies far more seriously than is evident today. There is also likely to be strong resistance from traditional disciplines and Kapp (1961) recognised the potential for on-going academic imperialism.

#### IV. ECOLOGICAL ECONOMICS: A MOVEMENT IN THREE CAMPS

So far I have outlined the arguments for integration and how that integration might proceed. In this section I return to reflecting upon the state of play in ecological economics. Some mention has been made of the attempts to integrate knowledge using analogies from systems ecology and evolutionary biology. In addition, I outlined the tendency to link ecology and economics in a multi-disciplinary mode so no real integration occurs. Then there was mention of the more pragmatic approach which shows little concern for theory and mainly focuses upon how messages from the natural sciences can best be communicated to those holding political power. In order to explain these disparate elements I will refer to three groupings or camps: New Resource Economists, New Environmental Pragmatists (Spash,

2009) and Social Ecological Economists (Spash, 2011a), see Figure 1.<sup>v</sup> Note, the size of the areas in this and the next diagram is not to be taken as indicative of anything.

[FIGURE 1 ABOUT HERE]

New Resource Economists are those who basically accept most of the doctrines of mainstream neoclassical economics. They do not want any fundamental changes but are concerned that the formal models be adjusted to take into account environmental issues such as ecosystem sustainability and resilience. Some ecologists/natural scientists are happy to cooperate with this orthodox grouping and have no interest in a more radical revision of economics or integration with the broader social sciences. The lack of engagement by ecologists with respect to fundamental messages outside mainstream economics has a variety of explanations. There are some who agree with the self-regulating market ideology and view the world as all about competition (whether in the market place or natural environment). Some, such as wildlife and population ecologists, find the basic methodology of optimisation and formalism compatible with their approach to ecology and so adopt a unity of method approach. A third more epistemological driver is the belief that social sciences are merely a means for conveying the natural scientists message which contains an objective truth.

This last position can easily lead into pragmatism. Indeed a few ecologists, claiming to have placed economic values on the environment, have been known to acknowledge their lack of economic training as if to signify that ‘anyone can do this stuff’. Social and economic research is then regarded as important by such individuals because politicians and the press listen, not because it is an important subject in itself with its own contribution to make to knowledge and understanding. These positions explain some, but not all, of those found in the New Environmental Pragmatist camp.

Neither New Resource Economists nor the core of New Environmental Pragmatists have any expectation of changing the underlying approach or disturbing disciplinary boundaries. Much which has been placed under a title of ecological economics coming from economic-ecological modelling goes along this route. This seems perfect for those who believe their own discipline supplies the most important knowledge and all that is required is to get the message across to the “other-side”. Simple link variables can be constructed so the output of one model feeds some basic information across the disciplinary divide.

Yet there are some who are basically pragmatic but do recognise the need for fundamental reform; they then cross over into Social Ecological Economics. For example, the work on ecological footprints can be seen as having roots going back to the physical accounting and energy work of ecological utopians which form the pre-history of modern ecological economics (Martinez-Alier, 1990). This is a radical socialist tradition. At the same time the underlying land theory of value being employed poses serious theoretical problems, amongst which is violation of incommensurability, and so conflicts with Social Ecological Economics. The sacrifice of theory is accepted because of the need to communicate and create understanding in society and policy circles of more basic issues of environmental degradation and resource constraints. This might be summarised as a strong desire for policy change in the face of rapidly approaching calamities. The footprint approach can then be seen as possessing elements of messages and concerns from both New Environmental Pragmatism and the core of Social Ecological Economics.

New Environmental Pragmatism can also be seen as advocating a transdisciplinary approach but in the style of superficial engagement and rhetorical use of terms referring to integration. The basic instrumental drive means theory (of integration or otherwise) falls by the wayside. Thus, some ecological economists have engaged in the United Nations Environment Programme project on monetising and creating markets for Nature and natural

entities named *The Economics of Ecosystems and Biodiversity*. Their aim of engaging with international governments comes at the cost of theoretical insights into the failures of monetary valuation and the institutions of banking and finance (Spash, 2011b). In this case pragmatic engagement comes at the cost of critique, structural change and social reality.

Social Ecological Economics is where the insights from Kapp can be expected to have most relevance. There is then a major epistemological distinction in approach from the orthodoxy of New Resource Economists. Social Ecological Economics—as opposed to ecology and economics—is an interdisciplinary endeavour where revision of points of view is required in light of learning from other subjects. Those other subjects are not restricted. So this goes beyond just economics learning from ecology and easily extends into, for example, philosophy, social psychology and political science. In addition, this is a two way process. So the role of natural sciences is also seen as in need of revision in light of social science understanding, as for example found in post-normal science (Funtowicz and Ravetz, 1993) and sociological science–policy analysis (Wynne, 1994). Such an interdisciplinary approach requires understanding the key concepts and disciplinary language of others, how they perceive the world and why there is validity in different types of information e.g., avoiding the disdain and derision those trained in quantitative techniques tend to pour on qualitative information. Good communication should result from comprehension of the essence of other subjects rather than requiring that researchers be expert in many areas.

#### FIGURE 2 ABOUT HERE

Thus rather than the Venn diagram of Figure 1 the situation in reality is more likely to be that of Figure 2 in terms of the division of the orthodox from heterodox. Here New Resource Economics is embedded within orthodox economics, New Environmental

Pragmatism is heavily driven by natural scientist, and Social Ecological Economics is part of heterodox economics. There is no direct overlap between New Resource Economics and Social Ecological Economics, instead communication occurs via the New Environmental Pragmatists. A star shape is added to show the potential for other disciplines to enter the mix with Social Ecological Economics.

In addition, environmental economics is added as an additional aspect in order to illustrate the potential for some dynamics in the development of Social Ecological Economics and inline with the historical development explored by Spash (1999). The shapes of the areas in the Figure 2 restrict interactions in various ways. Thus environmental economists are a possible bridge to Social Ecological Economics but are themselves disassociated from New Environmental Pragmatists. Meanwhile New Resource Economists are not connected at all with the heterodoxy or Social Ecological Economists. This is because only with the later addition of environmental economics did increasing engagement with social reality occur which began to erode faith in the abstract and unreal models of the orthodoxy. Environmental economists engaged directly with policy instrument and valuation work extending into social psychology are forced to reflect upon social reality. This challenges the abstract and unreal neoclassical model. In contrast resource economists can avoid direct disturbance from empirical evidence by emersion in constructing those same models and justifying their existence on that basis. The arrows signify the movement amongst individuals and groups over time. In this regard movement is hypothesised to be from orthodoxy to heterodoxy. The no-mans-land between the orthodox and heterodox is regarded as potentially an empty space, hence the question mark. The transition of thought is based upon increasing interdisciplinarity. That is, from engagement by economists with environmental and resource economics they become interested in the natural sciences which raise questions about the relevance of their natural resource models and then a transition

towards the heterodox. This is merely a speculative story and the diagram a device, but aspects of the story (or others) could be subject to historical and empirical confirmation. What the diagram should do is make the reader reflect upon the possibilities for cooperation and for disconnect between disciplines and schools of thought.

## CONCLUSIONS

Unfortunately at institutions of higher learning—despite universal education supposedly being the aim—interdisciplinarity and integration are rare. Academic career advancement is more commonly achieved via intensive specialisation and conformity to core disciplinary doctrines rather than questioning them. Economics has been particularly prone to a narrow expression of the subject defended by those running the main (and generally oldest) journals. Government funded research assessment exercises (e.g. as found in the United Kingdom) have reinforced such close mindedness. The result is a general impoverishment of what might otherwise be a rich field of debate and discussion.

Value pluralism means that problems can be viewed from different, but equally valid, perspectives. Yet that does not mean all perspectives are accepted or acceptable. Various criteria may be called upon (e.g. coherence, consistency), different types of validity (e.g. face, construct) employed, and the role of judgment recognised. In addition we can appeal to the basic realities of the world in which we live. Kapp presents us with an ontology which raises the profile of both bio-physical and social reality. Mainstream economics is clearly failing on both fronts. That ecological economics is also failing is due to the paucity of attention to integration and its requirements.

The development and use of conceptual models, common-denominator concepts, and integrative frameworks can then aid understanding. Exploring these and other methods is important for ecological economics to progress. Interdisciplinarity can be achieved by

making problems the focus rather than techniques which restrain the type and form of concepts and protect disciplinary boundaries. At the same time we must be wary of simple forms of pragmatism and rhetorical appeals to holism and transdisciplinarity.

The ecological economics movement is caught between those who wish to protect orthodox economic formalism with its mathematical models and optimal solutions, and those who want urgent action on the basis of their natural science knowledge. The danger from the former is academic imperialism leading to no understanding of the need to change the institutional structures of the economic system and no understanding of society. The danger from the latter is neglect of theory and, somewhat ironically, overriding the basis for a scientific approach to understanding in the social sciences. The imperialism of orthodox economists imposing their formal models may be matched by that of natural scientists imposing their ecosystem and evolutionary analogies. In both cases the distinct quality of the social is lost. In order to address the serious problems of the modern world we urgently need a more informed social science approach to the environment. Kapp offers much in the way of guidance as to how Social Ecological Economics should proceed, and we should heed that advice.

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<sup>i</sup> For more detail on the Vienna Circle see Uebel (2011).

<sup>ii</sup> Neurath was concerned to remove metaphysics for political reasons. That was to move to a value free social science to avoid the absolutist and totalitarian enthusiasm in Germanic (and other) society. Amongst the problems O'Neill and Uebel (2008) 390 note: "There is a difference between rejecting moralising criticisms on the one hand and the attempt to eliminate any evaluative vocabulary from the social sciences on the other."

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<sup>iii</sup> In this regard Kapp references F. S. C. Northrop, "The Problem of Integrating Knowledge and the Method of its Solution" Proceeding of the Stillwater Conference (foundation for Integrated Education, 1950).

<sup>iv</sup> A means-ends framing and focus is something prevalent in economics since Robbins but also has appeared in ecological economics (see Daly and Farley, 2004).

<sup>v</sup> These categories are part of on-going work which, at the time of writing, involves papers under submission to Ecological Economics and the Cambridge Journal of Economics. Space restrictions preclude a full exposition here.

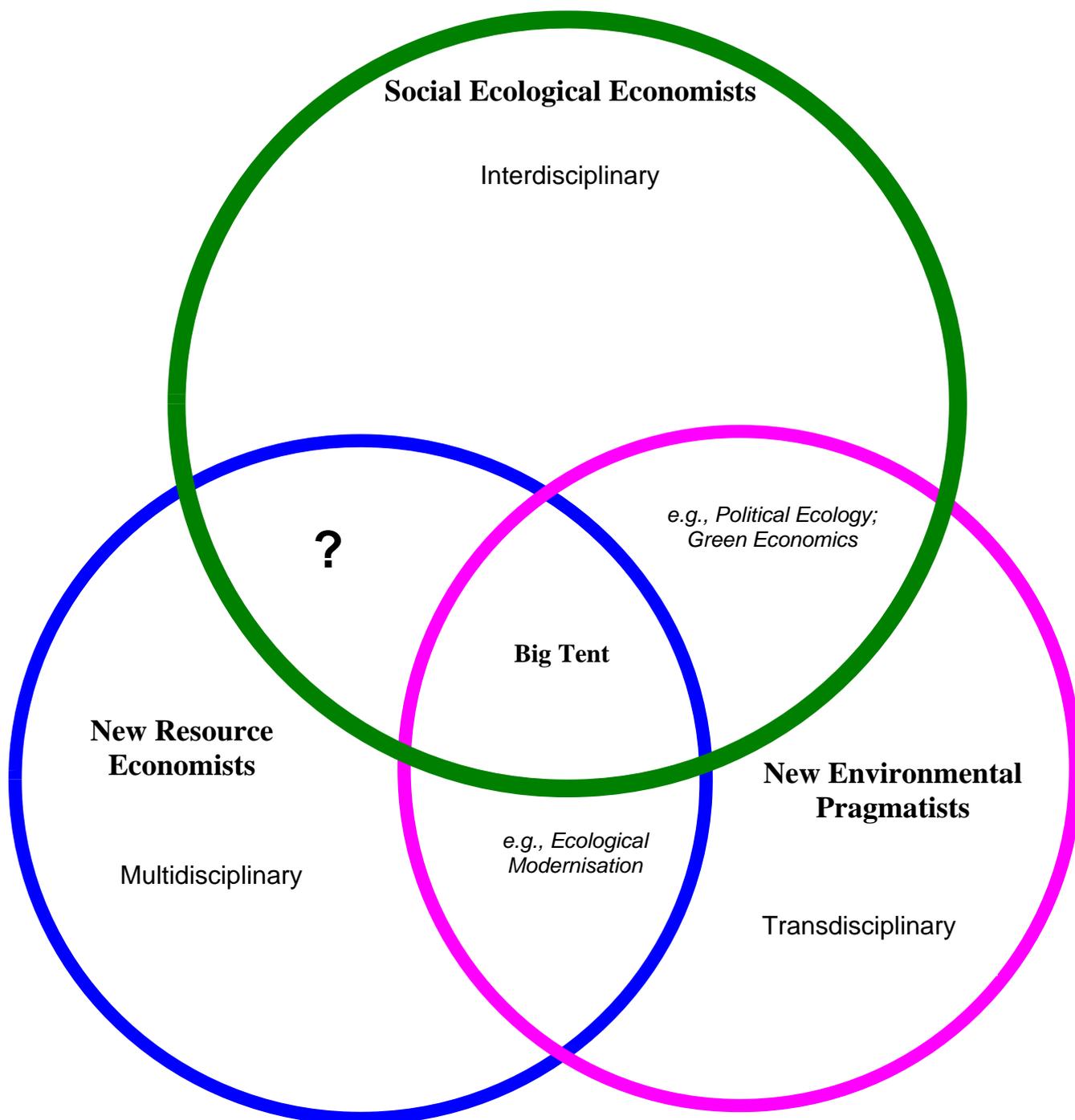


Figure 1. Ecological Economics Conceptualised as 3 Campes and a 'Big Tent'

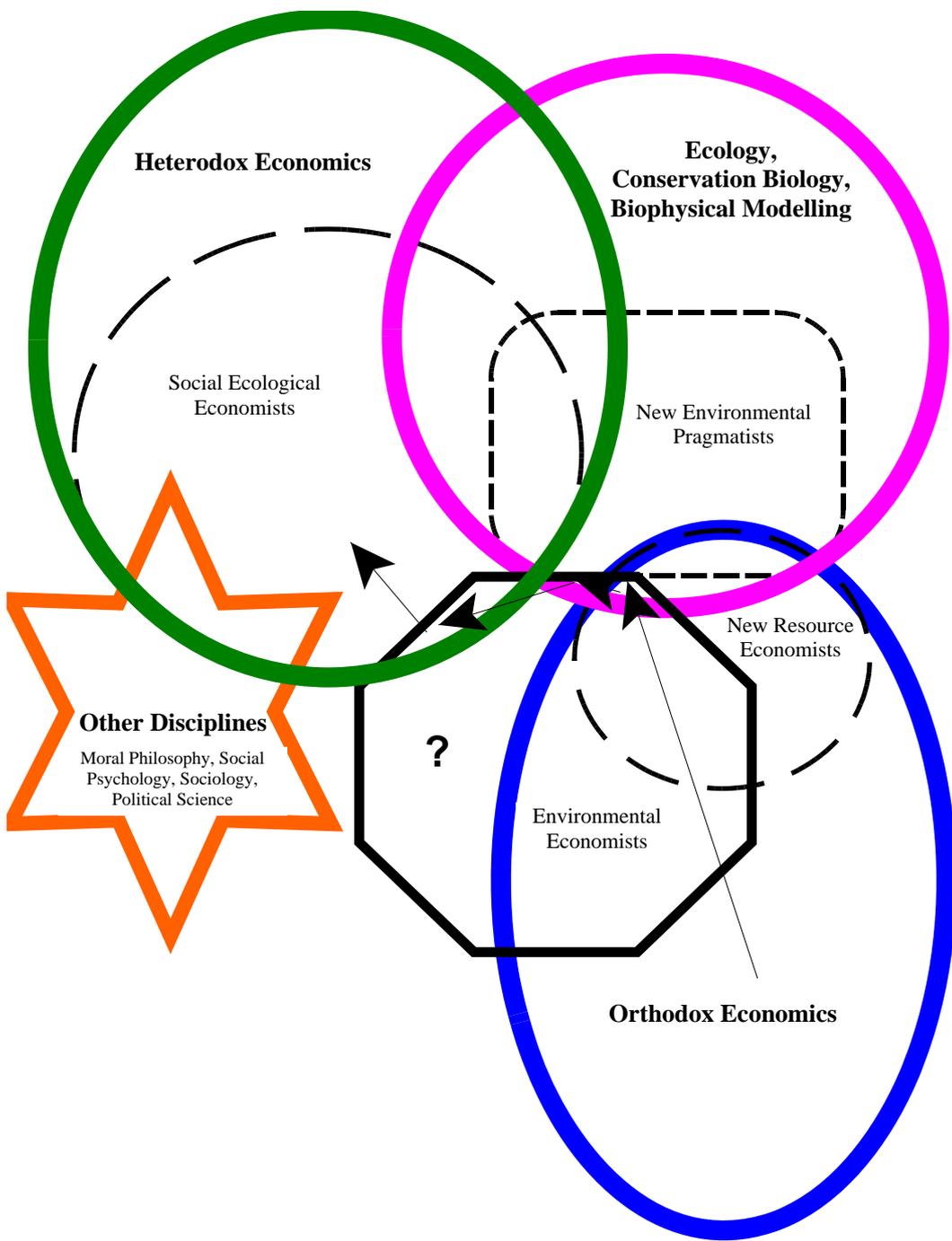


Figure 2. Development of Environmental Thinking in Economics







Institut für Regional- und Umweltwirtschaft  
Wirtschaftsuniversität Wien  
Institutsvorstand : ao.Univ.Prof. Dr. Gunther Maier  
Nordbergstraße 15  
A-1090 Wien, Austria  
Tel.: +43-1-31336/4777 Fax: +43-1-31336/705 E-Mail: [ruw@wu.ac.at](mailto:ruw@wu.ac.at)  
<http://www.wu.ac.at/ruw>