Sustainable Wellbeing Futures:
A Research and Action Agenda for Ecological Economics

Introduction: What is Ecological Economics and Why Do We Need it Now More Than Ever

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Abstract
Ecological economics (EE) is a transdiscipline. While it is difficult to categorize ecological economics in the same way one would a normal academic discipline, it can be characterized in general by its goals, worldview, and methodology. The overarching goal is sustainable wellbeing of both humans and the rest of nature, with three broad sub-goals of sustainable scale, fair distribution, and efficient allocation of resources. The worldview includes an interdependent, co-evolving, complex whole system perspective of economies embedded in societies embedded in the rest of nature. The methodology emphasizes intelligent pluralism and integration across disciplines, rather than territorial disciplinary differentiation, and an emphasis on the development of valuation techniques that build on a broad understanding of the interaction of built, human, social and natural capital to produce sustainable wellbeing. These characteristics make ecological economics applicable to some of the major problems facing humanity today, which occur at the interfaces of human-dominated ecosystems and other natural systems, and especially to the problem of improving humanity's wellbeing and assuring its survival within the biosphere into the indefinite future.

Introduction

Ecological economics is a transdisplinary effort to understand and manage the complex system of humans and the rest of nature toward the goal of sustainable wellbeing.

What does this definition really mean, and what are the implications for research, policy, and action?

Ecological economists focus on high stakes, urgent interdependent ecological, economic, and social problems in which facts are highly uncertain and values matter (Funtowicz and Ravetz, 1994). One useful definition of a problem is a gap between an existing state and a desired state. The first challenge in problem solving is to define the desired state, which requires input from a broad, representative swath of stakeholders. The scale and interdependence of many of today's problems requires a shared vision of the world we *all* want, rich and poor, North and South, East and West. Improved understanding of the existing state requires collaboration between numerous disciplines, supplemented by traditional knowledge.

Achieving solutions will require collaboration between academia, policy makers, the business sector, civil society, and nations.

The urgency of the problems is such that the role of scientists as merely the source of objective, value-free knowledge is inadequate. In the time it takes to research a given problem, publish the results in peer reviewed journals, and disseminate the results widely in the hopes of capturing the attention of policy makers who may then choose to act on it, continuing system change may well have made that research obsolete. If ecological economics is to remain relevant, it must transcend the traditional boundaries of academia and co-produce research and action.

Ecological economics is a *transdiscipline.* It is not a sub-discipline of economics or ecology or any other academic discipline. Nor is it a purely academic field. It recognizes that understanding or managing the complex, highly interdependent system we now inhabit requires the transcendence of both disciplinary and academic boundaries.

It requires the recognition that humans are a part of nature, not apart from it. We need to understand the world as a complex, interdependent and continually evolving whole system, not as a series of lightly connected or disconnected static pieces. We need to recognize that the economy is embedded within society, which is embedded within the rest of nature.

It also requires a better understanding of wellbeing and sustainability. What really contributes to wellbeing? What are the relative contributions of material standard of living, social, cultural, and community interactions and institutions, and ecological life-support systems? How can we assess the wellbeing of the whole, interconnected system of humans and the rest of nature? How sustainable are various configurations of the system? How do we define, assess, and measure wellbeing and sustainability?

Integrated Vision, Analysis, and Implementation

To solve these problems requires the integration of three basic elements (Figure 1):
(1) **Vision**: developing an adequate understanding of how the world is (our scientific understanding of how the complex system of humans and the rest of nature functions, and the limits to our knowledge) and a vision of how we would like the world to be (our shared vision of a desirable future)[1];
(2) **Tools and analysis:** analytical tools and techniques capable of creating and deepening this understanding in the presence of irreducible uncertainty (i.e. systems analysis and modelling); and
(3) **Implementation:** developing new institutions (e.g. common asset trusts), policies, and strategies (i.e. societal therapy)

Contributions to this volume explore all three of these elements and how to better integrate them We summarize these contributions further on, but first a bit about some of the underlying premises of ecological economics, both about how the world works, but also

[1] A big question is who is "we". It would be impossible to develop a detailed shared vision across the thousands of cultures and billions of people on the planet, though there may be more common ground than our current argument culture would lead us to believe. Developing a shared vision is both a process, and a goal. Chapters in this book suggest elements of a shared vision to which others are welcome to contribute or challenge. Any shared vision should be viewed as a testable hypothesis. As elements of the vision are implemented, we must ask whether they are as desirable as intended, how they can be improved upon, and even if they should be abandoned..

about how we need to organize our intellectual effort to reach our goals. To achieve a transdisciplinary synthesis, ecological economics must go beyond the tendency in our culture to cast every problem as a dichotomous choice between right and wrong, us and them.

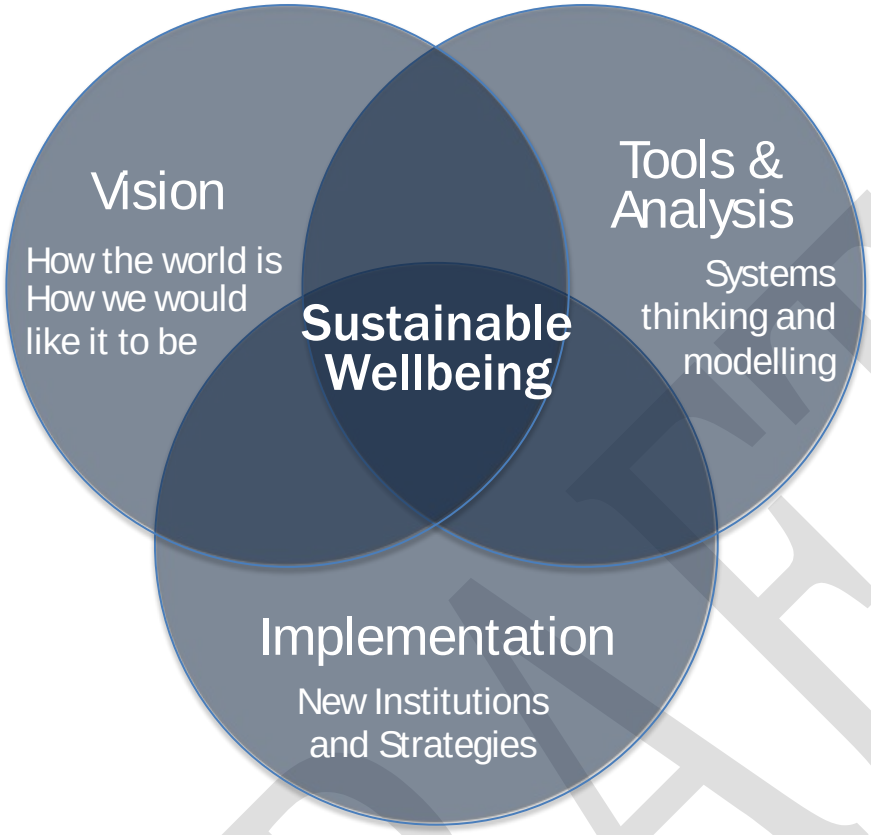

Figure 1.

Beyond the Argument Culture

We live in what Deborah Tannen has called "the argument culture" (Tannen 1998). In this culture, even the most complex, problems are cast as polar opposites. All discussions are cast as debates between two extremes in which one side is correct while the other is wrong. The media, law, politics, and especially academia are all caught in the argument culture and it is getting worse. While there is nothing inherently wrong with debate and direct confrontation on some topics, the problem is that this does not work for all topics. The complex problems that ecological economics focuses on require a more multifaceted, complex approach—one that encourages real dialogue and does not cast every discussion as a zero-sum, win-lose, either-or dichotomy. Ecological economists should also recognize the limits of their ability to fully understand a complex and evolving world.

The argument culture encourages creating and protecting disciplinary boundaries on the intellectual landscape. Sharp boundaries between disciplines, unique languages and cultures within disciplines, and lack of whole-system perspectives makes problems that cross disciplinary boundaries very difficult, if not impossible, to solve. There are also large gaps in the landscapes that are not covered by any discipline. The argument culture also encourages the continual sub-dividing into smaller and smaller fields, arguably with a resulting decrease in their ability to achieve system level changes.

Ecological economics, as an intelligently pluralistic transdiscipline, encourages moving beyond the argument culture. It tries to create an intellectual culture where the boundaries between disciplines disappear into the background and the problems and questions are seen as the defining landscape. This transdisciplinary perspective provides an overarching coherence that ties disciplinary knowledge together. It addresses the increasingly complex problems that cannot be addressed within the disciplinary structure. In this sense, ecological economics is not an alternative to any of the existing disciplines. Rather it is a different way of looking at a problem that adds value to the existing approaches and addresses some of their fundamental deficiencies. It is not a question of 'conventional economics' versus 'ecological economics' in the typical dichotomy of the argument culture. It is rather conventional economics as one input (among many) to a broader and richer transdisciplinary synthesis, which is ecological economics.

This is not to say that disagreements do not and should not exist: science would never progress if all scientists agreed about everything. Scientists are taught to be sceptical, and to rigorously test hypotheses and theories in an effort to prove them wrong. Ecological economics' transdisciplinary approach in fact helps identify shortcomings of different disciplines as well as fundamental inconsistencies within and between them. For example, conventional economists frequently claim that the single feedback loop of the price mechanism will drive our complex economy towards an optimal equilibrium, which contradicts basic insights from complexity theory and hence is incompatible with the worldview of ecological economics. Prices are simply one powerful feedback loop among many and can be applied to only some of the many variables that contribute to sustainable well-being. Nonetheless, within a transdisciplinary framework, conventional economics can still offer important insights into how prices function. Another serious shortcoming of conventional disciplines that should be challenged is the belief that a narrow disciplinary approach is an acceptable approach for addressing complex problems at the interface of humans and the rest of nature. In a recent survey of various social scientists, 57. 3% of economists disagreed or strongly disagreed with the statement that "in general, interdisciplinary knowledge is better than knowledge obtained by a single discipline."

Transdisciplinarity can also contribute to consilience (Wilson 1998), meaning that core axioms of the sciences are mutually consistent, or where they are not, the shared goal is to make them so. The natural sciences have largely achieved consilience. Core axioms of the social sciences should also be consistent with the natural sciences and with each other (Wilson, 1998), At the same time, we must also recognize that social sciences are fundamentally different from natural sciences in that our theories about social, economic and political systems can affect human behaviour and hence the system they seek to explain (REF). Theories can be self-fulfilling. For example studying economics leads people to better conform to the rational, self-interested model of *Homo economicus*, (REFS). Theories can also be self-negating. For example, when politicians successfully regulate the financial sector in order to avoid major system instabilities, and the subsequent lack of instabilities then leads future generations of economists to claim that no such regulations are required, and should be eliminated.

Disagreements play an essential role, but this role is undermined by the argument culture in at least two important ways.

First, abundant studies have shown that many of our beliefs are more closely tied to group identity than to rational analysis of the relevant subject matter (Haidt, 2012). Humans engage in motivated reasoning, focusing on facts and arguments that support their convictions, and ignoring those that do not, to the point where providing objective scientific evidence that

someone's views are wrong can actually reinforce their conviction that those views are correct REFS. Certainty is more an emotional response than the outcome of rational analysis (Burton, 2008). It would be unscientific for scientists to consider themselves immune to this behaviour. When two groups identify themselves in opposition to each other, argument will only strengthen their group identities and convictions, reducing the likelihood of both scientific progress and mutual collaboration towards any shared goals. When individuals identify as members of the same group, they are more receptive to objectively weighing each other's views and modifying their own (Haidt 2012).

Second, the argument culture can lead to schisms within groups and the splintering off of separate groups. Each of these groups is more homogenous, less likely to be exposed to alternative views, and less likely to consider flaws in its own. Again, both scientific progress and collaboration towards shared goals are likely to suffer.

Unfortunately, the argument culture has crept into ecological economics and related transdisciplines. The field of ecological economics has numerous close cousins, allies and offspring with quite similar worldviews and goals, including Sustainability Science, Political Ecology, Degrowth, Environmental Justice, the Resilience Alliance, Industrial Ecology, Life Cycle Analysis, and so on. Though many of these fields have remarkably similar worldviews and goals, their advocates too often focus on their differences. A far better approach is to address controversies as elements of a research agenda. In most cases, additional research can help determine which approaches to will best help us achieve our shared goals. Ecological economics and its transdisciplinary kin offer a potentially powerful alternative to the business as usual of both disciplinary science and a growth driven human system, but are only likely to make progress towards a sustainable wellbeing society if they overcome the argument culture and collaborate.

Basic Worldview and Goals

Ecological economics starts with the observation that the human economy is a subsystem of society, which in turn is a subsystem of the larger ecological life support system. It recognizes that humans are a part of this larger ecological system and not apart from it. Humans have shaped and modified their supporting ecosystems since the time of their appearance as a species, sometimes sustainably, sometimes not (Costanza et al. 2007). In the past, this human presence (the economic subsystem) was relatively small in scale compared to the size of the rest of the supporting ecosystem. In the last century, due largely to the utilization of fossil fuels, the human subsystem has expanded so dramatically that it is now a major component of the overall system. Unlike the situation in the majority of human history, we now live in a relatively 'full' world and have entered a new geologic epoch some have called the "Anthropocene" (Daly 2005; Steffen et al. 2006). This changes everything. In a full world context, the goal of the economic subsystem can no longer be simply expansion and growth with little regard to the rest of the system. We must now consider the whole system and the goal must shift from economic growth to a truly sustainable development. Growth implies increasing in quantity or size, while development implies improvement in quality without necessarily increasing in size (Daly 2005). In a full world context, the goal must shift from creating 'more' to creating 'better' – to create a sustainable and desirable future.

This shift in primary goals and vision for the future has profound implications for analysis, policy, and action across the full range of academic disciplines, policies, and human activities. For example, if one's goals include ecological sustainability then one cannot rely on the principle of 'consumer sovereignty' on which most conventional economic solutions are based, but must allow for coevolving preferences, technology, and ecosystems (Norton et

al. 1998, Beddoe et al. 2009). One of the basic organizing principles of ecological economics is thus a focus on the complex interrelationship between ecologically sustainable wellbeing (including system carrying capacity and resilience), socially sustainable wellbeing (including the distribution of wealth and rights, social capital, and coevolving preferences), and economically sustainable wellbeing (including allocative efficiency via institutions matched to the specific goals and resources in question, which may or not include our incomplete and imperfect markets). The complexity of these many interacting systems that form the biosphere means a very high level of uncertainty. Indeed, uncertainty is a fundamental characteristic of all complex systems involving irreversible processes, and ecological economics focuses on this type of uncertainty. More particularly, it is concerned with the problem of assuring sustainable wellbeing under uncertainty. Instead of locking ourselves into overly brittle development paths that may ultimately lead to ecological, social, and economic collapse, ecological economics seeks to improve wellbeing and maintain the resilience of the highly interconnected socio-ecological system. This may be done by conserving and investing in natural and social capital assets in a balanced way with investments in human and built capital.[2]

Ecological economics thus focuses on a broader set of questions and goals than the traditional disciplines (Daly 1992). Here, again, the differences are not so much the newness of the questions or goals, but how to find integrated solutions. They can be stated as both questions and goals since they represent complex problems requiring further research:

- **1. Sustainable Scale**: assessing and insuring that the scale of human activities within the biosphere are ecologically sustainable; how do we stay within the biophysical planetary boundaries?
- **2. Fair Distribution**: distributing resources, power and property rights fairly, both within the current generation of humans and between this and future generations, and also between humans and other species; and
- **3. Efficient Allocation:** efficiently allocating resources toward sustainable well-being as constrained and defined by (1) and (2) above, including both marketed and non-marketed resources, especially social and natural capital and ecosystem services.

History

Ecology and economics share the same Greek root, *oikos*, meaning 'house'. Ecology literally means the 'study of the house', while economics means the 'management of the house', where the house is taken to be the world. Thus ecological economics implies studying and managing the world in an integrated way, taking full advantage of our accumulated knowledge and understanding of both the natural and the social parts of the system.

Ecological economics has historical roots as long and deep as any field in economics or the natural sciences, going back to at least the seventeenth century (REF). Nevertheless, its immediate roots lie in work done in the 1960s and 1970s. Kenneth Boulding's classic *The Economics of the Coming Spaceship Earth* (Boulding 1966) sets the stage for ecological economics with its description of the transition from the 'frontier economics' of the past, where growth in human welfare implied growth in material consumption, to the 'spaceship economics' of the future, where growth in welfare can no longer be fuelled by growth in material consumption. This fundamental difference in vision and worldview was elaborated further by Herman Daly (1968), who recast economics as a life science, akin to biology and

[2] Some ecological economists do not like the term 'capital' as applied to nature or society. We use it here in the sense of a stock that yields a flow of benefits into the future (Costanza and Daly, 1992), without implying substitutability between types of capital or their commodification.

especially ecology, rather than a physical science like chemistry or physics. The importance of this shift in 'pre-analytic vision' cannot be overemphasized. It implies a fundamental change in the perception of resource allocation and how such a problems should be addressed. More particularly, it implies that the focus of analysis should shift to balance marketed resources in the economic system and the biophysical basis of interdependent ecological and economic systems and their coevolution over time.

Ecological economics is not, however, a single new paradigm based on shared assumptions and theory. It is instead a pluralistic 'meta-paradigm'. Rather than espousing and defending a single discipline or paradigm, it seeks to allow a broad, pluralistic range of viewpoints and models to be represented, compared, and synthesized into a richer understanding of the inherently complex systems it deals with. It represents a commitment among academics and practitioners to learn from each other, to explore new patterns of thinking, and to facilitate the derivation and implementation of effective economic, social, and environmental policies. Ecological economics is deliberately and consciously pluralistic in its conceptual underpinnings. Within this pluralistic meta-paradigm, traditional disciplinary perspectives are perfectly valid 'as part of the mix'. Ecological economics therefore includes some aspects of neoclassical economics, traditional ecology, and environmental impact studies, and other disciplinary perspectives as components. It also encourages completely new, more integrated ways to think about the linkages between ecological and economic systems. It facilitates the integration and synthesis of new and emerging fields of study like behavioural economics, positive psychology, earth systems science, multi-level selection theory, and many more. It is based on pluralism, but recognizes that "all models are wrong – but some are useful" as George Box famously said. It thus aims for 'intelligent pluralism" – recognizing the limits of all paradigms but also recognizing what ideas and perspectives are most useful for the task at hand.

Ecological economics has also developed a solid institutional base. After numerous experiments with joint meetings between economists and ecologists, the International Society for Ecological Economics (ISEE) was formed in 1988. The journal of the society, *Ecological Economics*, published its first issue in February 1989 and currently publishes 12 issues per year, with an impact factor taking it to the top one-fifth of all economics *and* all environmental journals (REF). The first major international conference was held in 1990 at the World Bank in Washington, DC. Following that conference, a workshop was held that resulted in an edited book laying the groundwork for the field (Costanza 1991). The first chapter of the 1991 book synthesized the "Goals, agenda, and policy recommendations for ecological economics" (Costanza, Daly, and Bartholomew 1991). The current volume is, in part, an update of that agenda, almost three decades on. Much has changed, but much is the same – in particular the basic transdisciplinary, co-evolutionary, intelligently pluralistic worldview of ecological economics. We need it now more than ever.

Organization of the Book

The remainder of the book is organized in five sections that cover the major themes of EE, along with an appendix reporting on surveys of the EE community about the research and action agenda. Below we summarize the contributions in each of these sections.

The Future We Want

Measuring and Achieving Wellbeing

The Institutions We Require

Integrated, Dynamic Analysis and Modelling of Socio-Ecological Systems

Making the Transition

Surveys of the EE Community About the Research Agenda

Summary and Conclusions

This is a sample of the range of transdisciplinary thinking that can be put under the heading of ecological economics. While it is difficult to categorize ecological economics in the same way one would a normal academic discipline, some general characteristics can be enumerated.

- The core problem is creating a future that is both sustainable and focused on the wellbeing of both humans and the rest of nature.
- An explicit attempt is made at 'pluralistic dialog' and integration across disciplines, rather than territorial disciplinary differentiation.
- An emphasis is placed on 'integration' of the three hierarchical goals of sustainable scale, fair distribution, and efficient allocation.
- There is a deep concern with the 'biophysical underpinnings' of the functioning of jointly determined ecological and economic systems.
- There is a deep concern with the relationship between the 'scale' of economic activity and the nature of change in ecological systems.
- Since valuation based on stated willingness to pay reflects limitations in the valuer's knowledge of ecosystems functions and unfairly favours the preferences of the rich, there is an emphasis on the development of valuation techniques that build on an understanding of the role of ecosystem functions in economic production and wellbeing, and awards equal weights to the preferences of rich and poor alike.
- There is a broad focus on systems and 'systems dynamics, scale, and hierarchy' and on 'integrated modelling' of ecological economic systems.

These characteristics make ecological economics applicable to some of the major problems facing humanity today, which occur at the interfaces of human-dominated ecosystems and other natural systems, and especially to the problem of improving humanity's wellbeing and assuring its survival within the biosphere into the indefinite future. It is not so much the individual core scientific questions that set ecological economics apart – since these questions are covered independently in other disciplines as well – but rather the treatment of these questions in an integrated, transdisciplinary way, which is essential to their understanding and effective use in policy.

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