Influential Publications in Ecological Economics Revisited

Summary
We revisit the analysis of Costanza *et al*. (2004, *Ecological Economics*) of influential publications in ecological economics to discover what has changed a decade on. We examine which sources have been influential on the field of ecological economics in the past decade, which articles in the journal *Ecological Economics* have had the most influence on the field and the rest of science, and what areas of science the journal is having the most influence on.

Introduction

We revisit the analysis of Costanza *et al*. (2004) of influential publications in ecological economics to discover what has changed a decade on. We examine which sources have been influential on the field of ecological economics in the past decade, which articles in the journal *Ecological Economics* (*EE*) have had the most influence on the field and the rest of science, and what areas of science the journal is influencing. We compare these findings with Costanza *et al*.'s (2004) findings to determine how the journal and the field have changed in the intervening time.

Literature Review

Costanza *et al*. (2004) carried out an analysis along similar lines to what we propose here and found a broad range of influences on the field of ecological economics. As the field was still quite young, inward influence from classic articles in the broader environmental and economic literature were more influential than the articles actually published in the *EE*. But the authors argued that this was likely to change as the field matured, as some articles published in the journal were receiving high numbers of citations per year. So, it would be interesting to now follow up on that prediction.

Ma and Stern (2006) followed up Costanza *et al*.'s analysis by comparing *EE* and the *Journal of Environmental Economics and Management* (*JEEM*) in order to understand the differences between transdisciplinary ecological economics and mainstream environmental economics. They found that "there is a significant overlap between the two fields at the journal level — the two journals cite similar journals" but "ecological economics tends to cite (but not be cited by) general natural science journals more often than environmental economics does, environmental economics cites more heavily from journals rather than other publications, and citations in environmental economics are more concentrated on particular journals and individual publications." There was much less similarity at the level of individual articles: "Non- market valuation articles dominate the most cited articles in *JEEM* while green accounting, sustainability, and the environmental Kuznets curve are all prominent topics in EE." (p491). We are interested in finding out whether the pattern of citation links to the natural science literature has been sustained or not and how the topics of influential articles have evolved.

Castro e Silva and Teixeira (2011) showed how the topics covered in *EE* evolved from 1989 to 2009. They "note that ecological economics experienced an 'empirical turn' reflected in a shift away from exclusively formalized papers towards exclusively empirical and, to a larger extent, 'formal and empirical' ones" (p849). An interesting question is whether there has also been such a shift in influential papers or whether theoretical papers remain the more influential.

Hoepner *et al*. (2012) revisited the question of influential publications in environmental and ecological economics covering articles published in a group of 14 environmental and resource economics journals including *EE* in the period from 2000 to 2009. Their main indicator is citations per annum, which gives recently published papers more weight and they distribute citations to authors and institutions on a fractional basis. They rank individual publications, authors, journals, and institutions with sometimes counterintuitive results (Costanza ranks as the 61st most influential author) for the first two categories. Spash (2013) criticized this analysis mainly for combining ecological and environmental economics together and thus giving a heavier weight to mainstream environmental economics as more such journals were included. As Spash stated, Hoepner *et al*.'s (2012) research design excludes important influences on ecological economics that are outside of the economic mainstream. These will be included in our study.

Plumecocq (2014) compares ecological economics research published in *EE* and *Environmental Values* with research published in *JEEM* and *Environmental and Resource Economics* using textual data analysis. His results "point to the increasing importance of the evaluation of ecosystem services in ecological economic discourse". This causes him to "question the kind of transdisciplinarity promoted by ecological economics" (p458). Our results will show how the topics covered by the most cited papers in the field, including ecosystem services valuation, have evolved in the last decade.

Methods

To measure inward influence, we will compile a database of all the sources cited in articles in *Ecological Economics* over the 11 years, 2003-2013 and select the most cited sources. We will distinguish between the influential articles published in the journal and the broader universe of influential publications. We will also compile a list of the most influential journals and publishers. We will then analyze the changes that have occurred in these distributions between the recent decade and the previous one.

To measure outward influence, we will examine the citations received by all articles published in the journal in the same period. We will distinguish the number of citations received by these articles from other articles published in *EE* and from publications indexed in the *Web of Science* as a whole. We will analyze whether there have been changes in where the journal is being cited over time. We will also identify the most influential individual articles published in the journal. To deal with the varying age of articles and their corresponding variation in potential to be cited, we will use the Thomson-Reuters "highly-cited" approach of picking the top fractile of most cited publications of all the publications in a given year (Thomson Reuters, 2014). We will again compare the nature of these influential articles with those we identified in our 2004 paper.

An important caveat regarding our analysis is the question of whether the changes we will find are due to changes in the field of ecological economics or due to changes at the journal itself and the market for publications in the field. In 2004, Robert Costanza had been editor for all but one year of our sample. In the past decade, Cutler Cleveland and Richard Howarth have been the editors. The number of submissions and published articles have both increased strongly and the journal has become more selective. There are also more alternative outlets for publication in this field.

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