



Review

The evolution of ecosystem services: A time series and discourse-centered analysis



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ABSTRACT

The concept of ecosystem services is becoming increasingly influential in environmental research and policy – reshaping human–environment interactions. In this paper, we trace the rapid growth of ecosystem services across academic disciplines and amongst organizations at the boundary of science and policy. We approach ecosystem services as an evolving discourse and track its evolution across key institutional time frames. The review shows how the concept emerged in the United States as an economic and ecological response to ecosystem degradation, and has since expanded to incorporate a wide array of disciplinary perspectives across multiple countries. A discursive-institutional analysis identifies four key moments when ideas and initiatives from academia and policy became institutionalized. Using a spiral metaphor, we argue such moments shape subsequent research, policy and practice. The foundations of economics and ecology remain dominant, however there are emerging opportunities for other disciplines who have been marginal to this discourse up until now to contribute to what is becoming an increasingly powerful and global concept. We argue that social scientists must become more involved to ensure issues of poverty, justice, equality, differentiated wellbeing, governance, rights, and marginality are to influence the next institutional spiral of this important and influential discourse.

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1. Introduction

The concept of ecosystem services, which first appeared in the 1980s, is becoming increasingly influential (Gómez-Baggethun et al., 2010). Ecosystem services, according to the Millennium Ecosystem Assessment (MEA, 2005), are ‘the benefits ecosystems provide to human wellbeing’. The term has been joined by related terms such as ‘environmental services’ or ‘ecological services’, however ‘ecosystem services’ remains the most common term in scientific literature (Abson et al., 2014). The meanings and applications of the concept are rapidly evolving as researchers, policy makers and managers explore the benefits ecosystems provide for people (Haines-Young and Potschi, 2009). As a consequence, the literature on ecosystem services has grown exponentially (Fisher et al., 2009) and its central place in plans and

programs by different institutions has occurred surprisingly quickly.

A variety of disciplines are now exploring the concept with their specific interests and approaches (Abson et al., 2014). Older notions that saw nature and humans in competition, or as threats to one another, have given way to newer interpretations emphasizing the interconnections and dependencies between human and natural systems. Researchers are exploring social, economic and ecological aspects of ecosystems services and incorporating the concept into decision-making, adaptation, sustainability and others. Global initiatives, such as the recent formation of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) emphasize the expanding influence of ecosystem services within environmental fields.

Given the growing interest and its incorporation into policy, it is important to understand the history of the concept, how it is being shaped, and what concerns are arising. Mooney and Ehrlich (1997) provided an earlier review, and Gómez-Baggethun et al. (2010) provided a historical exploration of the concept with regard to economic theory and practice, particularly its incorporation into market mechanisms. In this paper, we attempt a similar task but

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look at the growth of ecosystem services as a multidisciplinary concept and track how different disciplines have approached the concept. We are interested in ecosystem services as a discourse and how this discourse has taken shape over time.

We are primarily interested in the evolution of ecosystems services discourse in the academic literature – however this cannot be isolated from developments in the policy arena. Instead developments in each sector influence one another (Pesche et al., 2013). Within the academic sector, the concept has traditionally been dominated by ecologists and economists (Lakerveld, 2012), however there have been calls to broaden the concept beyond economic discussions to include more diverse disciplinary perspectives (Daily et al., 2009; Pagiola, 2008), and to enable greater recognition of social and political issues (Daw et al., 2011). We are interested in the extent to which this is already happening, and whether the concept is evolving into a truly multidisciplinary concept or whether it remains anchored in ecology and economics. Such analysis is important given the increasing influence of the concept in policy and practice, where the omission/adoption of important social and political issues like gender, rights, and justice in the application of ecosystem services will have far reaching consequences for those affected by environmental plans and decision-making.

We focused more on academic research and spent less time focusing on how concept was shaped in policy arena. However, we do focus on particular organizations that work between academia and policymaking known as ‘boundary organizations’ (Guston, 2001). Also known as hybrid organizations, they play an important role in mediating between political and scientific institutions and include the Intergovernmental Panel on Climate Change (IPCC), and the Subsidiary Body on Scientific Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (CBD) (Miller, 2001). Arts and Buizer (2009) show how boundary organizations play an important role in communicating science to policy makers, and institutionalizing particular understandings. There are many other activities being pursued by advocacy and policy organizations that contribute to the institutionalization of ecosystem services that we do not consider in this paper given the key aim described above. With these considerations in mind, the research seeks to answer the following questions:

1. When, why and how did the concept evolve?
2. What are key subject areas, institutions and actors shaping the concept?
3. What are the key moments of institutionalization in the development of ecosystem services discourse?
4. What key concerns/critiques have emerged regarding ecosystem services?

In doing so, we are particularly interested in how the more recent multidisciplinary interest in ecosystem services can further develop and strengthen the concept.

2. Methodological framework

2.1. Literature review

The evolution of ecosystem services discourse is tracked through a review of the literature. Fisher et al. (2009) identified over 1100 articles by using Web of Science, and Haines-Young and Potschi (2009) identified over 4000 journal articles by using Web of Knowledge (WoK) and Science Direct (SD). Following Fisher et al. (2009) and Haines-Young and Potschi (2009), this study also used web platforms, in this case ‘Scopus’ and ‘Google Scholar’. They were used for their specific merits with regard to the aims of this

research. Scopus, a bibliographic database containing abstracts and citations of peer-reviewed literature with access to more than 20,000 journals, was used to analyze number, journals coverage, and country contributions as it provides detailed information on affiliation/zipcodes and number of journals (Harzing, 2010). With access to 55 million articles, Scopus claims to be the largest abstract and citation database of peer-reviewed literature and is therefore appropriate for literature review tasks. As the volume of the articles was large, some criteria were used to focus on targeted literature. The term ‘ecosystem services’ was used as the keyword and practicalities dictated that only English language peer-reviewed journals were analyzed. The articles were then grouped into selected time frames (Pre-1997, 1997–2000, 2001–2004, 2005–2009, 2010–2013). The time frames were chosen based on key events/landmarks identified early in research during initial review (see Section 2.2). Some influential books, reports/strategic plans and websites were also reviewed. The reasons for choosing the term ‘ecosystem services’ as a keyword rather than ‘environmental services’ or ‘ecological services’ are:

1. The term ‘ecosystem services’ has become the most common term in literature (Abson et al., 2014);
2. Pilot research confirmed Fisher et al.’s (2009) observations that the term ‘environmental services’ retrieved a much broader set of publications – such as those relating to hospital environments. Far more articles referred to ‘ecosystem services’ rather than ‘ecological services’.
3. Most international organizations and initiatives use the term ‘ecosystem services’.

Google Scholar was used to order articles by citations as it casts a broader net for citations and results in higher counts than Scopus (Harzing, 2010). The selected peer-reviewed articles and books were saved in an EndNote database. In a separate excel sheet, articles with citations (high to low) were chronologically listed and reviewed. A grounded theory approach was applied for categorizing those ordered articles into subject areas. Grounded theory is a method that generates theory based on field data/content, rather than initial conceptualization of theories (Glaser and Strauss, 2009). The core themes of each article were first identified and a subject area was theorized based on those noted themes. The common subject areas of articles were then grouped and counted for each time frame. The total number of articles for each time frame, subject area, journal, and country of author’s origin was counted and reviewed (Annex A), which helped us to analyze the temporal and geographic growth. The overall methodological framework is portrayed in Fig. 1.

2.2. Discourse analysis of ecosystem services

In this paper, we adopt a discourse-centered approach through which we are interested in the evolution of ecosystem services, the concepts and ideas that have been normalized and the role of different actors in shaping those concepts. Discourse, in simple terms, is a conversation of a formal nature, or an orderly expression of ideas in speech or writing (Mills, 2004). In a more critical academic sense, discourse refers to the languages, knowledge, institutions and means through which we make sense of the world. Attention is directed to the ideas that become accepted as ‘commonsense’, how these ideas are mobilized and communicated, and the institutions, such as the norms, plans, guidelines, conventions or procedures, which are embedded within, enable or constrain particular ways of thinking or acting (den Besten et al., 2014; Schmidt, 2008). Different discourses construct and interpret phenomena in different ways – hence a tree has very different meanings when embedded in an economic discourse than an

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