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EDITORIAL

Valuing environmental goods and services using benefit transfer: The state-of-the art and science

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ABSTRACT

The purpose of this special issue of *Ecological Economics* is to elucidate the state-of-the-art and science of environmental benefit transfer and to assist in the design and reporting of future benefit estimation research. Compiling the insights of thirty-two international experts from seven countries, the special issue reviews the latest developments in transfer techniques, as well as ongoing efforts to standardize and validate them. Taken together, the papers in this special issue provide fresh answers to some long-standing questions, offer original research insights on state-of-the-art issues and identify fruitful areas for future research. This introductory paper provides background and context for the issues addressed by the contributing authors. Its purpose is to place the interdisciplinary thinking contained here in a comparative context, highlighting the need for integration and collaboration to maintain the momentum that has propelled environmental benefit transfer into a widely used approach for estimating the economic value of environmental goods and services worldwide.

1. Introduction

This special issue of *Ecological Economics* examines the state-of-the-art and science of benefit transfer for valuing environmental goods and services. Benefit transfer[1] uses economic information captured at one place and time to make inferences about the economic value of environmental goods and services at another place and time. Using this approach, economic estimates are either transferred as monetary value units (e.g., means or medians) or as value functions conditioned on explanatory variables that define the attributes of an ecological and economic choice setting. Value functions may be estimated using original value data (Loomis, 1992), estimated using the meta analysis of summary value functions (Woodward and Wui, 2001), or derived from a process of econometric calibration as in structural benefit transfer (Smith et al., 2002). Each of these approaches is examined in this special issue.

Regulatory agencies and financial institutions worldwide are increasingly being called upon to assess the full economic benefits and costs of legislation and development projects that impact the natural environment (Millennium Ecosystem Assessment, 2003). Given the time and resource constraints faced by such institutions, it is perhaps not too surprising that the benefit transfer approach has spread steadily in the last few decades as decision makers have sought timely and low cost ways to assign monetary values to goods and services that are not commonly traded in the marketplace. Conducting original valuation research is time consuming and expensive. Policy analysts are often constrained in their ability to support

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[1] Benefit transfer involves economic values that may be either positive or negative. In the latter sense, the terminology refers to a process of transferring economic costs from one economic situation to another.

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new research studies within mandated deadlines. Thus, as more work is done by scientists to ascertain the economic value of environmental goods and services worldwide, this empirical stock of value knowledge increasingly tends to find its way through benefit transfer into the legal, financial and institutional decision making process.

Despite increased use of benefit transfer as a practical policy making tool, few benefit transfer practitioners seem fully satisfied with the state of the science and continue to strive for agreement on best practice standards (Abt Associates, 2005). One problem we have identified is that many of the innovative ideas and important breakthroughs that have recently taken place remain scattered and disconnected throughout the peer-reviewed literature. A key purpose of this special issue is to bring recent developments together in one common forum to stimulate dialogue and bring clarity to this rapidly developing area of interdisciplinary research.

Compiling the insights of thirty-two international experts from seven countries, this special issue allows us to bring readers up to date on many of the latest developments in transfer techniques, as well as ongoing efforts to standardize and validate them. Taken together, the articles represent a diverse set of perspectives and a unique synthesis of issues associated with benefits transfer ranging from pragmatic, policy-oriented concerns to more nuanced theoretical and methodological developments. Given the opportunity to explore what they see as the most pressing issues in the field today, the authors provide fresh answers to some long-standing questions, offer original research insights on state-of-the-art issues and identify fruitful areas for future research.

2. Background

Environmental benefit transfer came into being only once the non-market valuation literature itself grew large enough to allow comprehensive synthesis and cross-study comparisons. While non-market valuation can trace its roots to Hotelling's proposal for estimating travel demand (Hotelling, 1949) and Ciriacy-Wantrup's "willingness to pay" method (Ciracy-Wantrup, 1962), the first synthesis studies that might be called benefit transfers appeared in the mid to late 1980s (Sorg and Loomis, 1984; Walsh et al., 1988). In 1990, Smith and Kaoru published a first application of meta analysis[2] applied to the literature on recreation values (Smith and Kaoru, 1990). By 1992, benefit transfer had developed to the point where it became the focus of a special workshop co-sponsored by the Association of Environmental and Resource Economists (AERE) and the U.S. Environmental Protection Agency (USEPA). In that same year, Water Resources Research (WRR) published the first special research and commentary section dedicated to benefit transfer (Vol 28, issue 3, 1992).

As an important first step toward synthesis in the field, both the AERE-USEPA workshop and WRR special section elucidated the dependency of benefit transfer results on the quality of original valuation studies. As Brookshire and Neil note in their editorial introduction to the 1992 WRR special section:

> There exists an inextricable relationship between non-market benefit estimation and benefit transfer techniques. Benefit transfers can only be as accurate as the initial benefit estimates (Brookshire and Neill, 1992).

The key insight from this early editorial review is that the accuracy of benefit transfer is conditioned, in part, on the measurement errors contained in original studies. A portion of measurement error is inevitably 'passed through' from original value estimation and may even be amplified by benefit transfer if care is not taken to minimize such effects. Benefit transfer is also conditioned on original studies insofar as the transfer may need to adjust for conditions or assumptions found in the original studies that may differ from the targeted policy site. For instance, adjustment for population income level is often critical to benefit transfer to satisfy economic theoretic requirements (Bergstom and Taylor this volume; Smith et. al., this volume), yet this basic socio-demographic information may not be measured uniformly or reported in original benefit estimation studies. Similarly, biophysical context and the presence of resource substitutes may differ considerably from one site to another (Bateman et. al., this volume; Troy and Wilson this volume). When such conditions and assumptions are not reported or adjusted for, an important source of error may be transferred from original studies to the target policy site.

Building on this insight, several papers in this special issue note that a critical limiting feature of contemporary benefit transfer practice is that it uses non-market value estimates in ways that were often not intended by the original researchers (see Loomis and Rosenberger, this volume; McComb et al, this volume; Rosenberger and Stanley, this volume). Empirical valuation research typically focuses on testing new concepts and hypotheses in specific policy contexts rather than providing raw data for benefit transfer *per se*. Thus, it is not uncommon to find that original studies do not contain all the information that would be desirable for facilitating transfers. One objective of this special issue is to better communicate the information requirements of benefit transfer to valuation researchers so that the possibility of including their findings in future benefit transfer is considered *a priori* in the design and reporting of original research.

The 1992 AERE workshop and WRR special section also pointed out that benefit transfer often raises issues that are not encountered in original non-market value estimation. For instance, the utility-theoretic theory of non-market valuation was generally well understood by the 1980s, but this understanding did not extend to a broader economic theory of benefit transfer. Benefit transfer is theoretically different from valuing a specific resource or service at a given time and location. Benefit transfer takes values from one biophysical, economic, temporal, and spatial situation and transfers them to another. Since it lacked an explicit theoretical structure in its early years, benefit transfer appeared to some more as "economic alchemy" than science (Smith, 1992). The WRR special section addressed the gap in theory and method by providing new economic models for benefit transfer (Boyle and Bergstrom, 1992; McConnell, 1992) and by providing

[2] The term meta analysis as it is used in this special issue, is generally defined as a statistical technique for synthesizing the results of several existing non market valuation studies by estimating relationships between control variables (methodology used, sample demographic characteristics, characteristics of the good) and monetary values estimated across multiple studies.