Economic Valuation of Wetlands: Overview

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Abstract

The continued loss and degradation of wetlands and the role of economic drivers therein, urgently call for communicating the diverse values of wetlands, and the consequences of loss of vital ecosystem services, in the language of the world's dominant economic and ecological paradigms. Economic valuation helps bridge this communication gap by enabling expression of the impact of public and private decisions on ecosystem service values in comparable metrics. A fuller and meaningful application of economic valuation assessments merits can be enabled by understanding of why valuation is needed, whose and what values are important, how to derive values and ultimately ensure integration in decision making processes. As akin to various assessment tools, economic valuation is also associated with uncertainty of various forms and levels, which need to be understood for a meaningful application. Valuation in general, and economic valuation in particular, is an evolving field, and needs to be continually enriched with better understanding of ecosystem functioning and plurality of values.

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Wetland Wise Use and Economic Values

Wise use of wetlands entails stakeholder engagement and transparency in negotiating ecosystem services trade-offs associated with various forms of wetland use in order to determine equitable conservation outcomes (Finlayson et al. 2011). As public goods, a large category of these services are not internalized in sectoral policy decisions. Economic valuation helps better decision making related to use and management of natural resources, including wetlands, by making explicit how decision making would affect ecosystem service values, and expressing these value changes in units that allow for their incorporation in decision making (Mooney et al. 2005). It is a means of communicating the value of wetland ecosystem services to different groups of people using a language that speaks to dominant economic and political viewpoints across the world (TEEB 2012).

Economic valuation forms a part of a wider set of wetland assessment tools which help describe the site drivers, pressures, and management needs. Through use of this tool, it is possible to determine the contribution that wetlands make to economies, evaluate outcomes of alternate development options related to wetlands, or analyze impacts of developmental projects on wetlands (De Groot et al. 2006). Information derived from such assessments can help improve management of wetlands by raising awareness on wetland values, create a business case for investing into wetland restoration and sustainable management, identify better resource management options for wetlands, and, most importantly, promote mainstreaming of wetland ecosystem services and biodiversity in developmental planning and decision making. By alerting on the consequences of consumption choices and behavior, economic valuation serves as a societal feedback mechanism related to natural resources including wetlands (Zavetoski 2004).

Value is “the contribution of an action or object to user-specified goals, objectives, or conditions” (MEA 2005; after Farber et al. 2002). Valuation is “the process of expressing a value for a particular good or service . . . in terms of something that can be counted, often money, but also through methods and measures from other disciplines (sociology, ecology and so on)” (ibid.). Valuation involves assigning relative weights to the various aspects of individual and social decision problems, with the weights given being reflections of the goals and worldwide views of the community, society, and cultures of which individuals are parts (Costanza 1991; North 1994). Economic valuation of wetland ecosystem services and biodiversity is an expression of these weights in monetary terms, making them comparable with alternate uses which often have benefits and cost flows defined in similar units. It is an anthropocentric way of looking at wetlands, wherein values are assigned to the extent that these fulfill and directly or indirectly contribute to well-being (a positive change in well-being, hereinafter termed as "benefit" after TEEB 2012).

Economic Valuation Approaches and Methods

In economics, value is associated with trade-offs. Economic value exists when we are willing to give up something for the enjoyment of the value. The willingness to pay for the benefit or willingness to accept a compensation for being denied the benefit is an economic measure of this value. This economic measure is reflective of the choice pattern of all human-made, financial and natural resources given a multitude of socioeconomical conditions as preferences, distribution of income and wealth, the state of the natural environment, production technologies, and expectations of the future (Barbier et al. 2009).

Economic values of wetland ecosystem services can be derived based on biophysical or preference-based approaches. Biophysical approaches involve estimation of intrinsic properties of wetland ecosystems (e.g., material flows, primary productivity) for producing an ecosystem service. These intrinsic properties are treated as a "cost of production" of these ecosystem services. Energy analysis (Costanza 1980) and emergy analysis (Odum 1996) are some examples of application of biophysical approaches to valuation of wetlands. Preference-based approaches are based on models of human behavior and rest on the assumption that values arise from subjective preferences held by individuals (Appendix 2 of TEEB 2012 refers to a number of wetland valuation studies).

Ecosystems bear at least two major value components, one in terms of benefit arising from ecosystem service provision within a given state (termed as output value) and the second in terms of capacity of the system to maintain these values (termed as insurance values; Gren et al. 1994). The various components of output value are described by the total economic value (TEV) concept. The insurance value is related to the system's resilience and reorganizing capacity (Holling 1973; Walker et al. 2004). Ensuring resilience involves maintaining minimum amounts of ecosystem infrastructure and processing capability to remain at a given state or prevent regime shifts (ibid). Valuation of ecosystem resilience is an evolving field with challenges associated with nonlinear behavior, identifying and predicting thresholds, and the likely regime shifts.

Within the framework of neoclassical economics, techniques for value estimation derive information on individual behavior from market transactions related to ecosystem services. In cases where such markets do not exist, information from parallel markets is derived. If both direct and indirect markets are absent, hypothetical markets may be constructed for value elicitation. Accordingly, valuation techniques are classified into direct market valuation techniques, revealed preference techniques, and stated preference techniques. Revealed preference techniques are based on observation of choices in existing markets related to ecosystem services. Stated preference methods simulate a market and demand for ecosystem services by means of surveys or hypothetical changes in levels of provision of ecosystem services. Each of these techniques has its own assumptions, merits, and shortcomings.

Ecosystem services are multidimensional, contested, and context-specific, and thereby no single method is capable of generating a representative value. Each of the valuation methods implies certain models of human-nature relationship and defines whether values are revealed, discovered, constructed, or evolved during the process of valuation and in that sense are "value articulating institutions" (Jacobs 1997). While neoclassical methods assume existence of preferences which are discovered, deliberative methods are being increasingly applied to support emergence of values from a communicative social process (Zografos and Paavola 2008). A mix of methodologies is required to express the multiple values stakeholders hold for wetland ecosystem services and biodiversity.

Framework for Integrated Assessment and Valuation of Wetlands

A fuller and meaningful application of wetland valuation assessment merits careful consideration within ecological, sociopolitical, and institutional management contexts. For a wetland manager, understanding why valuation is needed, whose and what values are important, how to derive economic values, and integration in a decision-making process are critical to setting up an objective-led assessment. A framework for integrated assessment and valuation of wetland services provides process steps for such an exercise (De Groot et al. 2006). The five-steps of the framework are as follows:

Step 1 – Policy analysis to sets the stage for discussing why valuation is necessary and what kind of valuation is required.
Step 2 – Stakeholder analysis to determin the relevant ecosystem services and associated trade-offs.
Step 3 – Function analysis for assessing the capability of wetlands to deliver ecosystem services on a sustainable basis.
Step 4 – Valuation of ecosystem services. The framework recommends expression of a range of values, ecological, social, economic, and cultural using appropriate indicators.
Step 5 – Communicating wetland values to stakeholders.

Scaling Up Values

Given the differences in site characteristics, ideally a detailed value assessment for each site of interest should be commissioned. However, there are practical limitations of various sorts, key being cost and time implications. The benefit transfer method addresses the lack of information on values for a particular site by transferring an existing valuation estimate from a similar ecosystem. If care is taken to adjust for important differences between the two, benefit transfer provides a cost- and time-saving approach for estimation of economic value of ecosystem services (Smith et al. 2002).

Application of benefit transfer methods has its challenges. Transfer errors can be introduced due to errors in primary valuation studies or due to application in sites without accounting for differences in characteristics. Differences in spatial scales at which ecosystem services are supplied and demanded and nonconstant marginal values also bring in added complexity. Capacity to predict future demand for critical ecosystem services essential to human life and for which no adequate substitute exists is likely to remain limited. The problem of dealing with nonconstant marginal values over large changes in ecosystem state and functioning becomes more difficult in the face of nonlinear dynamics and calls for alternate approaches as multiple criteria or deliberative approaches (Spash and Vatn 2006).

Accounting for Uncertainty

As akin to various assessment tools, economic valuation is also associated with uncertainty of various forms and levels, which need to be understood for a meaningful application in policy. Uncertainty refers to either a situation in which the decision maker cannot enumerate the possible consequences of a decision (also termed radical uncertainty) or to a situation in which possible states of outcome can be enumerated but cannot be objectively assigned probabilities. Ecosystem services supply side uncertainty can be attributed to limited knowledge of ecosystem functioning and delivery of ecosystem services. Several empirical studies on stated preference indicate that individuals often do not act as utility maximizers, but are uncertain about their willingness to pay (e.g., Ready et al. 1995; Akter et al. 2008). Each of the valuation methods has its own conceptual, technical, and methodological shortcomings, giving rise to technical uncertainty (Kontoleon et al. 2002). One way to handle technical and preference uncertainty is to combine revealed and stated preference methods to increase reliability of valuation estimates. Preference calibration approaches also allow calibration of preference functions by using values from multiple methods. Uncertainty associated with ecosystem services supplies can be addressed with increasing understanding of complexities of ecosystem functioning, within ecological as well as socioeconomic systems.

Choosing How to Value

Valuing wetlands is a complex, spatial, and institutional cross-scale problem (Turner et al. 2003). Economic valuation is one of the several diagnostic and assessment tools and political-institutional mechanisms that facilitate understanding of wetlands as complex socioecological systems (Ostrom 2009). While it has an intrinsic appeal and utility in terms of supporting informed decision making in relation with wetlands and in particular exposing the impacts of conventional economic thinking on health and functioning of wetlands, it has several critiques as well.

Monism and utilitarianism implicit in economic valuation are seen as inducing an instrumental conceptualization of the relationship between humans and nature, based on a very limited rationale of comparing costs and benefits (McCauley 2006). The scientific objectivity associated with valuation has been questioned as economic values are negotiated based on the economic activities that surround it and thus sensitive to several factors that prevent its reduction to a single "representative" value (Sagoff 2011). The legitimacy of individual rationality and choice and preference relationships which form the basis of neoclassical economics based valuation techniques have also been extensively critiqued (Bromley and Paavola 2002; Sagoff 1994).

These limitations notwithstanding, the continued loss and degradation of wetlands and the role of economic drivers therein, urgently call for communicating the diverse values of wetlands, and the consequences of loss of vital ecosystem services, in the language of the world's dominant economic and ecological paradigms. Economic valuation is an evolving field and needs to be continually enriched with better understanding of ecosystem functioning and plurality of values, so that wetland ecosystems continue to deliver their wide ranging ecosystem services in the longer term. Shying away from valuation is not an option; rather the emphasis needs to be on a credible valuation process built on robust understanding of ecosystem dynamics and complementing societal decision-making structures.

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