Estuaries and Coasts (2015) 38 (Suppl 1):S9–S18
DOI 10.1007/s12237-013-9662-8

Estimating Benefits in a Recovering Estuary: Tampa Bay, Florida

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Received: 18 December 2012 / Revised: 23 May 2013 / Accepted: 14 June 2013 / Published online: 22 August 2013

Abstract Restoration and preservation of riparian forests and coastal marshes provides nutrient removal and other biochemical and physical functions which may preclude, reduce, or delay the need for additional water treatment, while also protecting human health. We examined the ecosystem goods and related potential cost savings for the Tampa Bay community from seagrass expansion (more than 3,100 ha since 1990), coastal marsh, and mangrove restoration/recovery (more than 600 ha since 1990), and habitat that has been maintained or preserved. Habitats in and around Tampa Bay provide nutrient reductions equivalent to just over US$22 million per year in avoided wastewater treatment plant costs. Future accrual of value associated with maintaining the ecosystem good of usable clean water could rapidly increase to as high as ~US$3 billion per year, when one takes into account the additional costs of water treatment and storm water diversion infrastructure that is likely as the region's population continues to grow. There is additional value accrual close to a quarter million dollars per year based on avoided social costs to the global community due to greenhouse gases sequestered by bay habitats. Most human beneficiaries associated with the maintenance of usable clean water in Tampa Bay are part of the surrounding regional community. The large current and future cost savings for the community surrounding Tampa Bay and additional benefits for the global community speak to the value of maintaining a healthy bay through past and continued restoration and preservation efforts.

Keywords Ecosystem goods · Tampa Bay · Estuarine valuation · Habitat restoration · Water quality

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Introduction

Ecosystems contribute much towards maintaining human welfare. Accounting for the biophysical attributes, from which humans derive benefit, has been an issue since Gretchen Daily et al. (1997) nature's services, and gained popular interest with the publication of the Millennium Ecosystem Assessment (2005). The terms used to describe ecosystem contributions to human well-being can vary, but for clarity, we use Boyd and Banzhaf's (2005) definition of final ecosystem services as "… components of nature, directly enjoyed, consumed, or used to yield human well-being." We use that definition to describe the term final ecosystem goods, not services, however, since this slight substitution in terms, as discussed in Boyd and Banzhaf (2005), helps differentiate the tangible components of nature at any given time and space (goods) from those ecological processes responsible for that production through time (services). Examples of ecosystem goods include water of sufficient quality to allow designated uses, air with low enough pollutant concentrations to avoid respiratory illness, and or the quantity of flood water retained upstream and thus removed from surface flows. All of these are state variables resulting from processes that have already happened and so can be accounted for at a specific place and time. Ecosystem processes that others might call ecosystem services, however, would include the rate of nitrogen removal by denitrification, the rate of atmospheric pollution removal, and/or the rate of water infiltration. We deem these physical or ecological processes, since they are not directly enjoyed, consumed, or used by humans. These processes all require time to pass in order to produce the ecosystem goods, which humans can directly enjoy, consume, or use.

Most ecosystem goods are not currently traded in the markets but economic value can be estimated using standard valuation methods (Barbier et al. 2011). Valuation of ecosystems