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Crowdsourced Economic Valuation of the Recreational Benefits of Constructed Wetlands

Authors : Andrea Ghermandi

Abstract : Constructed wetlands have long been recognized as sources of ancillary benefits such as support for recreational activities. To date, there is a lack of quantitative understanding of the extent and welfare impact of such benefits. Here, it is shown how geotagged, passively crowdsourced data from online social networks (e.g., Flickr and Panoramio) and Geographic Information Systems (GIS) techniques can: (1) be used to infer annual recreational visits to 273 engineered wetlands worldwide; and (2) be integrated with non-market economic valuation techniques (e.g., travel cost method) to infer the monetary value of recreation in these systems. Counts of social media photo-user-days are highly correlated with the number of observed visits in 62 engineered wetlands worldwide (Pearson's r = 0.811; p-value < 0.001). The estimated, mean willingness to pay for access to 115 wetlands ranges between $5.3 and $374. In 50% of the investigated wetlands providing polishing treatment to advanced municipal wastewater, the present value of such benefits exceeds that of the capital, operation and maintenance costs (lifetime = 45 years; discount rate = 6%), indicating that such systems are sources of net societal benefits even before factoring in benefits derived from water quality improvement and storage. Based on the above results, it is argued that recreational benefits should be taken into account in the design and management of constructed wetlands, as well as when such green infrastructure systems are compared with conventional wastewater treatment solutions.

Keywords : constructed wetlands, cultural ecosystem services, ecological engineering, social media
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