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Estimating the economic benefits of a wetland restoration programme in New Zealand: A contingent valuation approach

Tom Ndebele [a,b,*], Vicky Forgie [c]

[a] George Perkins Marsh Institute, Clark University, 950 Main Street, Worcester, MA 01610, United States
[b] Department of Economics, University of Waikato, Hamilton Campus: Gate 1, Knighton Road, Private Bag 3105, Hamilton 3240, New Zealand
[c] Ecological Economics Research New Zealand, Massey University, Private Bag 11-222, Palmerston North 4442, New Zealand

HIGHLIGHTS

- A New Zealand based valuation of the ecosystem services provided by wetland.
- Total economic value exceeds the cost of restoration and preservation.
- Restoration and preservation of Pekapeka Swamp provides a new tourist attraction.

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ABSTRACT

Decades of failure to evaluate the ecosystem services provided by the Pekapeka Swamp located in Hawke's Bay, New Zealand, led to decisions that allowed prolonged degradation of the wetland. In 1998 a long-term management plan was adopted to restore and preserve the swamp without evaluating the potential welfare benefits of the plan. This paper employs the contingent valuation method to estimate the total economic value of the restoration and preservation of Pekapeka Swamp. Data required for the analysis was generated using a survey questionnaire administered by mail to 958 households in the Hawke's Bay region in 2008. An effective response rate of 42% was achieved after a second reminder. Using a dichotomous choice format with a follow-up open-ended valuation question, this study shows that, based on the population of the Hawke's Bay region, the estimated total economic value ranges from NZ$1.64 million to NZ$ 3.78 million per year and the net present value ranges between NZ$5.05 million and NZ$16.39 million. These results imply that the restoration and preservation of Pekapeka Swamp is an important investment which the authorities should continue to support. These estimates may be used to justify future increases in the level of expenditure on the project.

1. Introduction

The primary purpose of ecosystem and ecosystem services (ES) valuation studies is to recognize the fragility and increasing scarcity of the services freely provided by nature that we all benefit from and are reliant on for our well-being. Ecosystem services are the direct and indirect benefits that humans obtain from ecosystems. For example, wetland

* Corresponding author at: George Perkins Marsh Institute, Clark University, 950 Main Street, Worcester, MA 01610, United States.
E-mail addresses: tn73.waikato@gmail.com (T. Ndebele), V.E.Forgie@massey.ac.nz (V. Forgie).

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ecosystems provide direct benefits such as fish and eels that can be sold in the market place and indirect services such as recreation, flood control, storm protection, habitat, water purification, and carbon storage. The market paradigm that we operate in places value on the direct contributions that ecosystems provide, such as agricultural produce and timber, but does not put value on the significant non-market goods and services provided such as climate regulation, water filtration, etc., (Costanza et al., 1997).

Ecosystem services valuation studies expand information boundaries and provide a means of communicating the importance of ecosystem functions. Additional knowledge allows decision-makers to better identify, prioritize and protect critical ecosystems/ecological resources under pressure as well as promote remediation and restoration actions. Valuation studies can therefore provide policy-makers with the necessary economic and non-economic information for the development of efficient and effective strategies for ecosystem management. Furthermore, the values from these studies may be used to assess the economic efficiency of public policy programmes for the management of ecosystems.

Some argue that ecosystems and their services cannot or should not be valued in monetary terms (Sagoff, 1988; Spash et al., 2005). Reasons cited include: valuation is an anthropocentric approach that disregards other species; it is a pointless exercise as ecosystems are non-substitutable and their value approximates infinity given that humans cannot exist without them; moral and ethical values should not be reduced to the monetary calculation of cost–benefit analysis; the complexity of ecosystem services make any scientific estimates of their contribution highly uncertain; and, placing a monetary value on non-substitutable goods gives the impression that man-made goods can actually replace the services provided. However, it can also be argued that every decision involves value judgement and having an estimate of the value of the contribution made by ecosystems allows this to be done with more rationality than assigning a zero value, which is often implied when no value is given. The usual objective of ecosystem services valuation studies is not to establish a market place exchange value but to ensure that specific non-market services provided by ecosystems, such as wetlands, are adequately incorporated into the decision-making process. In any choice of one alternative over the other we are expressing a preference, therefore, "we cannot avoid the valuation issue because as long as we are forced to make choices, we are doing valuation" (Costanza and Folke, 1997, p.50). It is also increasingly argued that ignoring explicit valuation, and thereby the inclusion of ecosystems and their services in decision-making, is not an option in the face of rapid global environmental change. A lack of information on the full economic costs (i.e., market and non-market costs) and benefits of alternative uses of ecosystems has consistently led to poor policy decisions that permit the destruction of forests and wetlands, and the pollution of rivers, lakes, and coastal areas.

Acceptance of incorporating ecosystem services values into decision-making increases the need for a range of robust methods to value ecosystem services (Millennium Ecosystem Assessment, 2005). There are a number of different methods that can be used, with the approach most appropriate or useful dependent on the decision context.

> "For example, if the context requires a ranking or choice based on a single criterion (e.g., net benefits), a valuation approach that yields a single (aggregate) metric is needed. In contrast, in a decision context where multiple values are involved (e.g., human health, threatened species, aesthetics, social equity, and other civil obligations) and decision makers themselves are charged with appropriately weighing and balancing competing interests and resolving trade-offs, a multi-attribute approach is preferable. Depending upon the context, this weighing and balancing might be done through political discourse or through a deliberative, decision-aiding process" (USEPA, 2009, p.17).

This paper contributes a New Zealand ecosystem services valuation to the international valuation literature for wetlands. It also provides New Zealand with a current country-specific value for wetlands which has been lacking. Prior to this study the only available estimate was a partial valuation of the Whangamarino wetland completed in 1988 (see, Kirkland, 1988). Over a short period of time (approximately 160 years) there has been large scale loss of wetland in New Zealand. Early settlers drained wetland systems and converted them to urban settlements, pasture and cropland.[1] Of the original wetland area of 2.47 million hectares, just 10% now remains (Ausseil et al., 2008). As wetlands are still under threat from human activities, their preservation, protection, and restoration is a priority. The Pekapeka Swamp represents the typical trade-off made at the local scale between increasing agricultural production versus preserving the ecosystem services provided by a wetland. This wetland valuation study in addition estimates the total economic value (TEV) of benefits that could potentially be delivered by the Hawke's Bay Regional Council's (HBRC) public policy programme for the restoration and preservation of Pekapeka Swamp in the Hawke's Bay region of New Zealand; and secondly, tests the economic efficiency of the policy programme for the restoration and preservation of the swamp by comparing the costs and benefits.

The study applies the contingent valuation method (CVM), which is a non-market valuation technique that has been developed to estimate the monetary values of non-market goods and services for cost–benefit analysis (CBA) of public policy or projects, and use in environmental damage assessments. Non-market valuation literature provides many examples of studies that employ the CVM to estimate TEV of wetlands (e.g., Zhongmin et al., 2003; Wattage, 2002; Wattage and Mardle, 2007; Oglethorpe and Miliadou, 2000; Loomis et al., 2000; Bateman et al., 2000).

The model reported in this paper differs from previous studies by separately accounting for the effects of current recreational activities at the degraded site and anticipated future recreational activities at the restored site on willingness to pay (WTP). We also extend on the standard approach of identifying genuine zero WTP from protest bids by adopting a novel approach to the valuation question. The dichotomous choice (DC) question has an open-ended followed-up question

[1] A number of the major cities in New Zealand, including Christchurch in the South Island, and Hastings in the North Island were built on swampland after extensive drainage of the surrounding areas.