Chapter 10
What Price for Ecosystem Services in China?
Comparing Three Valuation Methods for Water Quality Improvement

Haixia Zheng
Chinese Academy of Agricultural Sciences, China

Stale Navrud
Norwegian University of Life Sciences, Norway

Shiran Shen
Stanford University, USA

ABSTRACT

Payment for Environmental Services (PES) in the watershed has been widely adopted as an important policy instrument to compensate upstream water users for providing water quality improvement for the whole river basin. In this paper, we use three independent valuation methods to determine the price of ecosystem service (ES), particularly water quality, in Miyun Reservoir, the main surface water source for Beijing. We find that the value of water quality is lowest using opportunity cost of limitation of development rights (OCLDR), highest with contingent valuation method (CVM), and water resources benefits assessment (WRBA) gives an in-between value. OCLDR determines the size of subsidies from those that benefit from water quality improvement from upstream. WRBA is a reference for compensation criteria to the upstream government and farmers when water resources are transferred across jurisdictional boundaries. CVM not only captures the direct value of water quality improvement, but also the indirect value of improvement in other ecosystem services as a result of improvement in water quality. Based on the results, we propose a multi-level ecological compensation system for the Miyun Reservoir river basin. We use OCLDR to determine subsides/ compensation to upstream farmers and other suppliers of the ES; WRBA set the price of water transfer; and CVM to figure out the size of payments for integrated water quality improvement.

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INTRODUCTION

Payments for environmental services (PES) have been widely adopted as a key policy instrument to compensate upstream water users for providing water quality improvement for the whole river basin. Due to increasing water shortages and rising economic and social costs to water pollution, surface water supply from Hebei Province to Beijing is compromised. To ensure the quality and quantity of Beijing's water supply, the central and Beijing governments launched a variety of PES programs, such as the Capital Program for Sustainable Water Utilization in Early 21st Century (2001-2005), the Program for Prevention and Control of Water Pollution of the Haihe River Valley, and the Beijing-Tianjin Sand Source Control Program. These programs mainly involve environmental protection projects and financial transfer payment, where the payment was simply decided by negotiation among the governments, which resulted in low economic efficiency (Zheng, 2011).

To fill this gap, we use three independent valuation methods to determine the price of water quality improvement. We use two relatively conventional approaches: water resources benefits assessment (WRBA) and opportunity cost of limitation of development rights (OCLDR). The third approach is contingent valuation method (CVM), an environmental non-market valuation technique that has the potential of capturing the value of marginal changes in the broader environmental service (ES) and thus usually entails higher values than the other two methods.

We find that the value of water quality is lowest using OCLDR, highest with CVM, and WRBA gives an in-between value. Although all three methods measure the economic value of the improvement in water quality, they differ in their coverage of ES. OCLDR determines the size of subsidies from those that benefit from water quality improvement from upstream (e.g., central and local governments, residents). WRBA provides compensation criteria to the upstream government and farmers when water resources cross jurisdictional boundaries. CVM not only captures the direct value of water quality improvement, but also the indirect value of improvement in other ecosystem services (e.g., landscape, biodiversity) as a result of improvement in water quality. Based on these results, we propose a multi-level ecological compensation system for the Miyun Reservoir river basin. We use OCLDR to determine subsides / compensation to upstream farmers and other suppliers of the ES; WRBA set the price of water transfer; and CVM to figure out the size of payments for integrated water quality improvement.

LITERATURE REVIEW

Examples of PES practices are ample in China, including the national South-to-North Water Transfer Project and regional projects in the Thousand Island Lake, the Xin'an River Reservoir, the Jinhua River, all of which are located in Zhejiang Province on the east coast of China, and Ziya River in Hebei Province. Case studies of PES utilize valuation methods such as the contingent valuation method (CVM), replacement cost, opportunity costs, travel costs, choice experiments, and hedonic pricing (Costanza et al,1997; Daily, G. C, et al., 1997; Blaine, T. W., Lichtkoppler, F. R., Jones K. R., et al, 2005; Carson R., Richard T., and Mitchell R. C., 1993; Li et al., 2007; Jiang, 2008; Zhong et al., 2008; Mao et al., 2008; Zhang et al., 2008; Zhang et al.,2009) and the concept of cost-benefit sharing coefficient of ecosystem services to estimate PES (Liu 2007; Jin 2010).