Ecological Economics 69 (2010) 1387–1388

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Ecosystem services valuation in China

Ecosystem services are becoming increasingly threatened globally (MEA, 2005). This trend is partially due to a lack of valuation because resources that are not valued are often ignored in management decisions (Costanza et al., 1997; Sukhdev, 2008). Referring to environmental assets as 'priceless' and 'invaluable' has proven woefully insufficient in terms of reducing or halting ecosystem degradation. The challenge then is to acknowledge the multiple contributions of ecosystem services to human well being while managing them as public goods (Ehrlich and Pringle, 2008; Costanza, 2008).

Ecosystem Services Valuation (ESV) is the process of assessing the contributions of ecosystem services when managing for sustainable scale, fair distribution, and efficient allocation (Costanza and Folke, 1997; Liu et al., 2010). Valuation of ecosystem services has become one of the fastest-growing areas of research in ecological economics (Turner et al., 2003). More recently, monumental efforts such as the Millennium Ecosystem Assessment (MEA, 2003, 2005) and The Economics of Ecosystems and Biodiversity (Sukhdev, 2008), increasingly recognize the critical role of ecosystem service valuation for sustainable development.

In China, research on ecosystem services valuation has also become one of the most significant and fastest developing areas in the last decade or so (Zhang et al., this issue). However, most research results are inaccessible to the global research community because they are not reported in English. A limited number of works published in English (e.g. Guo et al., 2000; Xu et al., 2003; Xiao et al., 2005; Jim and Chen, 2006; Wang et al., 2009) are scattered through the literature but do not necessarily reflect the overall picture of ESV research in China.

The purpose of this special issue of Ecological Economics is to disseminate to the international audience ecosystem service valuation studies conducted by Chinese scholars. We hope this set of nine papers will provide a first step for the global ESV research community to get to know, and ultimately to collaborate with Chinese colleagues. Judging from our own experience, such collaboration is mutually beneficial for several reasons.

First, some of China's environmental problems are of global significance and require solutions beyond the country's borders. With the world's 4th largest territory, the largest population, and the fastest-growing economy, China generates significant global environmental impacts (MacBean, 2007). Likewise, the rest of the world affects China's environment through trade, investment, and resource exploitation (Liu and Diamond, 2005). Invasive plant species, for instance, are predicted to increase in China due to its rapidly growing international trade (Weber and Li, 2008). On the other hand, China has been recognized as a potential source for new invasive species in the United States (United States National Research Council, 2002) and the three best-known pests of North American tree populations all originated in China or somewhere nearby in East Asia (Xie et al., 2001). The control of invasive species is an international, sometimes global enterprise that always involves the collaboration of multiple countries (Perrings et al., 2002).

Second, political and cultural differences between China and other countries pose new challenges to and opportunities for ESV research. For instance, concentration of political power enables China to secure the resources to conduct some extremely ambitious projects. China is currently carrying out the three largest development projects in the world: The Three Gorges Dam, the South-to-North Water Diversion Project, and the development of Western China. All of these are expected to cause huge environmental problems (Liu and Diamond, 2005). At the same time, China has the two largest payment for ecosystem services projects in the world in terms of scale, payment, and duration (Liu et al., 2008): the National Forest Conservation Program and the Grain to Green Program. These long-term and large-scale projects offer ESV scholars unique opportunities to assess the value of ecosystem services (e.g. Chen et al., 2009, Cao et al., this issue) and a heightened necessity to do so.

The papers in this special section cover a broad range of ecosystem service valuation issues. Zhang et al. (this issue) review the history and the achievements of ESV research in China. In particular, the authors point out the effects of ESV studies in creating public environmental awareness and in providing a scientific basis for eco-compensation mechanisms (i.e. payments for ecosystem services). In addition, after discussing the challenges of conducting ESV work in China, Zhang et al. propose four directions for future research.

We classify the rest of the eight papers into two categories that match two of the four research directions proposed by Zhang et al. The first four papers focus on the role of spatial and/or temporal heterogeneity in valuing ecosystem services. Cao et al. (this issue) apply input–output analysis to measure energy productivity in agricultural systems at the national scale for six representative periods in China's modern development (1978, 1985, 1990, 1995, 2000, and 2004). In another study conducted at the national scale, Cheng et al. (this issue) evaluate the utilization efficiency of forest resources during the critical early economic development of China (1953 to 2000). The next two papers in this category concern ESV at a metropolitan scale. Zhang et al. (this issue) analyse the spatial variation of water conservation services provided by forest ecosystems in Beijing, the nation's capital. Li et al. (this issue) investigate the spatial and temporal variation of ecosystem service values in Shenzhen, one of the fastest-growing metropolitan areas in China for three periods in time (1996, 2000 and 2004).

The authors of the next four papers focus on the 'localization' of valuation techniques to incorporate the specific biophysical and socio-economic conditions in China. Based on detailed ecological studies at the field-scale, Yao et al. (this issue) study the environmental externalities

0921-8009/$ – see front matter
doi:10.1016/j.ecolecon.2010.03.010

generated by the rich–wheat farming system by assessing the services and 'dis-services' provided by the system. In another agricultural ecosystem study, Zhen et al. (this issue) attempt to quantify food consumption patterns and their impacts on land requirements by soliciting data from household surveys of the local population. Also relying on survey results, Cao et al. (this issue) aim to investigate how the attitudes of the 3000 forest workers, farmers, and livestock grazers towards the National Forest Conservation Program will interact with the rural environmental restoration policy and how this interaction will affect the livelihoods of those affected. Last, Zhang and Lu (this issue) assess the economic, ecological, and social values that make up the total value of ecosystem services by using an analytic hierarchy process to estimate the social welfare weights assigned to different ecosystem services. These weights reflect the relative importance of the various ecosystem services to stakeholders.

Conclusions

There is huge and growing interest and need in China for ecosystem services valuation studies, and for ecological economics in general. China's recent development path has replicated the Western model of rapid GDP growth with little concern for environmental and social externalities. But that situation seems to be changing, partly as a result of the kinds of studies included in this special issue. As China and the rest of the world increasingly recognize the value of natural and social capital, they can begin to pursue a more balanced and sustainable development path. China can build on the Confucian ideals of 'Xiao Gang' (a society in which all people are able to live relatively comfortably) and 'Da Tong' (the 'great unity' where everyone works together to share the commons). It can build on these ideas to develop an ecological economy where both private and public goods are valued and managed appropriately to achieve a sustainable and desirable future.

Acknowledgements

We would like to thank the Ecosystem Research Division of the Office of Research and Development, USEPA, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing Municipal Bureau of Landscape and Forestry, and Gund Institute for Ecological Economics, University of Vermont for sponsoring a Conference on Ecosystem Services in China and the U.S. in Beijing in 2008, which led to several of the papers in this special issue. In addition, we would like to acknowledge the support of the Joint US–China Center on Ecosystem Services (JUCCES) of the Chinese Academy of Sciences.

References

Chen, X.D., Lupi, F., He, G.M., Liu, J.G., 2009. Linking social norms to efficient conservation investment in payments for ecosystem services. Proceedings of the National Academy of Sciences of the United States of America 106 (28), 11812–11817.

Costanza, R., 2008. Ecosystem services: multiple classification systems are needed. Biological Conservation 141 (2), 350–352.

Costanza, R., Folke, C., 1997. Valuing ecosystem services with efficiency, fairness and sustainability as goals. In: Daily, G. (Ed.), Nature's Services: Societal Dependence on Natural Ecosystems. Island Press, Washington, D.C., pp. 49–68.

Costanza, R., et al., 1997. The value of the world's ecosystem services and natural capital. Nature 387 (6630), 253–260.

Ehrlich, P.R., Pringle, R.M., 2008. Where does biodiversity go from here? A grim business-as-usual forecast and a hopeful portfolio of partial solutions. Proceedings of the National Academy of Sciences of the United States of America 105, 11579–11586.

Guo, Z.W., Xiao, X.M., Li, D.M., 2000. An assessment of ecosystem services: water flow regulation and hydroelectric power production. Ecological Applications 10 (3), 925–936.

Jim, C.Y., Chen, W.Y., 2006. Recreation–amenity use and contingent valuation of urban greenspaces in Guangzhou, China. Landscape and Urban Planning 75 (1–2), 81–96.

Liu, J.G., Diamond, J., 2005. China's environment in a globalizing world. Nature 435 (7046), 1179–1186.

Liu, J., Li, S., Ouyang, Z., Tam, C., Chen, X., 2008. Ecological and socioeconomic effects of China's policies for ecosystem services. Proceedings of the National Academy of Sciences of the United States of America 105 (28), 9477–9482.

Liu, S., Robert, C., Stephen, F., Austin, T., 2010. Valuing ecosystem services. Annals of the New York Academy of Sciences 1185, 54–78.

MAcBean, A., 2007. China's environment: problems and policies. The World Economy 30 (2), 292–307.

Millennium Ecosystem Assessment, 2003. Ecosystems and Human Well-being: A Framework for Assessment. Island Press, Washington DC.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Current States and Trends. Island Press, Washington DC.

Perrings, C., et al., 2002. Biological invasion risks and the public good: an economic perspective. Conservation Ecology 6 (1).

Sukhdev, P., 2008. The Economics of Ecosystems and Biodiversity: An Interim Report. European Communities.

Turner, R.K., et al., 2003. Valuing nature: lessons learned and future research directions. Ecological Economics 46 (3), 493–510.

United States National Research Council, 2002. Predicting Invasions of Nonindigenous Plants and Plant Pests. National Academy Press, Washington, D.C.

Wang, C.Y., et al., 2009. Ecosystem services assessment of two watersheds of Lancang River in Yunnan, China with a decision tree approach. Ambio 38 (1), 47–54.

Weber, E., Li, B., 2008. Plant invasions in China: what is to be expected in the wake of economic development? Bioscience 58 (5), 437–444.

Xiao, Y., Xie, G.D., Lu, C.X., Ding, X.Z., Lu, Y., 2005. The value of gas exchange as a service by rice paddies in suburban Shanghai, PR China. Agriculture Ecosystems & Environment 109 (3–4), 273–283.

Xie, Y., Li, Z.Y., Gregg, W.P., Dianmo, L., 2001. Invasive species in China — an overview. Biodiversity and Conservation 10 (8), 1317–1341.

Xu, Z.M., Cheng, G.D., Zhang, Z.Q., Su, Z.Y., Loomis, J., 2003. Applying contingent valuation in China to measure the total economic value of restoring ecosystem services in Ejina region. Ecological Economics 44 (2–3), 345–358.

Shuang Liu
Gund Institute for Ecological Economics and Rubenstein School of Environment and Natural Resources, University of Vermont, Burlington, VT 05405, USA
Corresponding author. Tel.: +61 2 6246 4803; fax: +61 2 6246 4000.
E-mail address: shuang.liu@csiro.au.

Robert Costanza
Gund Institute for Ecological Economics and Rubenstein School of Environment and Natural Resources, University of Vermont, Burlington, VT 05405, USA