



[List of Issues](#)
[Current Issue](#)
[Category: BioOne.1](#)
[Aims & Scope](#)

Print ISSN: 0044-7447

Online ISSN: 1654-7209

Current: Dec 2011 : Volume 40 Issue sp1

BioOne Member Since: 2001 (*Active through 2011*)

Frequency: Eight times per year

Impact Factor: 2.025

2011 ISI Journal Citation Reports® Rankings:

15/45 - Engineering, Environmental

76/205 - Environmental Sciences

Eigenfactor™: *Ambio: A Journal of the Human Environment*

Title Tools

Most Read Articles

[Climate Change Effects on Hydroecology of Arctic Freshwater Ecosystems](#)

[The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature](#)

[Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations](#)

[Bottled Water: Understanding a Social Phenomenon](#)

[The Threats from Oil Spills: Now, Then, and in the Future](#)

Most Cited Articles

[Effects of Environmental Methylmercury on the Health of Wild Birds, Mammals, and Fish](#)

[Methylmercury Exposure and Health Effects in Humans: A Worldwide Concern](#)

[A Synthesis of Progress and Uncertainties in Attributing the Sources of Mercury in Deposition](#)

[The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature](#)

[Coupled Human and Natural Systems](#)

[More](#)

Sign up for e-alerts

 [RSS Feeds](#)

Home / All Titles / AMBIO: A Journal of the Human Environment / Feb 2009 / pg(s) 47-54

AMBIO: A Journal of the Human Environment

Published by: [Royal Swedish Academy of Sciences](#)

[« previous article](#) : [next article »](#)

Select Language ▼

translator disclaimer

AMBIO: A Journal of the Human Environment

38(1):47-54. 2009

doi: <http://dx.doi.org/10.1579/0044-7447-38.1.47>

Ecosystem Services Assessment of Two Watersheds of Lancang River in Yunnan, China with a Decision Tree Approach

Chongyun Wang, Peter van der Meer, Mingchun Peng, Wim Douven, Rudi Hessel, and Chenlin Dang

Chongyun Wang is at the Institute of Ecology and Geobotany, Yunnan University. His address: Yunnan University, Institute of Ecology and Geobotany, Cuihubailu 2, Kunming, Yunnan, 650091, China. cywang@ynu.edu.cn

Peter van der Meer is at Alterra-Wageningen UR (Wageningen University and Research Centre). His address: Alterra-Wageningen UR, Centre for Ecosystem Studies, PO Box 47, 6700 AA Wageningen, The Netherlands. peter.vandermeer@ynu.edu.cn

Mingchun Peng is at the Institute of Ecology and Geobotany, Yunnan University. His address: Yunnan University, Institute of Ecology and Geobotany, Cuihubailu 2, Kunming, Yunnan, 650091, China. mchpeng@ynu.edu.cn

Wim Douven is at UNESCO (United Nations Educational, Scientific, and Cultural Organization)-IHE Institute for Water Education. His address: UNESCO-IHE, Integrated River Basin Management Westvest 7, 2601 AX Delft, The Netherlands. w.douven@unesco-ihe.org

Rudi Hessel is at Alterra-Wageningen UR (Wageningen University and Research Centre). His address: Alterra-Wageningen UR, Soil Science Centre, Alterra, PO Box 47, 6700 AA Wageningen, The Netherlands. rudi.hessel@wur.nl

Chenlin Dang is at the Institute of Ecology and Geobotany, Yunnan University. His/her address: Yunnan University, Institute of Ecology and Geobotany, Cuihubailu 2, Kunming, Yunnan, 650091, China. chldang@ynu.edu.cn

Abstract

In the Lancang (Upper-Mekong) watershed, degraded watershed ecosystems in upland areas threaten cultivation practices, water resources, and dam development downstream. Assessment of ecosystem services and the factors that threaten them is an important first step to support watershed management. This, however, requires detailed information that is often missing in mountainous regions. To overcome this, in this paper, we adopt a

Article Views

» **Abstract & References**

[Full Text](#)

[PDF \(6828 KB\)](#)

Article Tools

[Email](#)

[Disable search highlighting](#)

[Add to Favorites](#)

[Sign Up for E-alerts](#)

[Download to Citation Manager](#)

Alert me when this article is cited: [Email](#) | [RSS](#)

Citing Articles

decision tree approach to assess protection, biodiversity, and production services in two mountainous watersheds (Fengqing and Xiaojie) of the Lancang River Basin. Decision tree rules were built on the basis of field surveys, available references, ecosystem maps derived from remote sensing, expert knowledge, basic topographic information, and community interviews. Decision tree results showed that forest cover and agro-forestry practices contribute greatly to improved ecosystem functioning in the Fengqing Catchment compared to the Xiaojie Catchment. The results were consistent with field observations. The decision tree method proved to be a suitable and flexible tool for the rapid assessment of watershed ecosystem services, for highlighting those areas that need more in-depth research, and for guiding watershed and ecosystem management.

Received: March 28, 2007; **Accepted:** April 20, 2008

References and Notes

- De Groot, R. S. 1992. Functions of Nature: Evaluation of Nature in Environmental Planning, Management and Decision-making. Wolters Noordhoff BV. Groningen, The Netherlands. 345 pp.
- Daily, G. C. 1997. Nature's Services. Island Press/Shearwater Books. Washington, DC. 392 pp.
- Chee, Y. E. 2004. An ecological perspective on the valuation of ecosystem services. *Biol. Conserv.* 120:549–565. [CrossRef](#)
- Postel, S. L. and B. H. Thompson. 2005. Watershed protection: capturing the benefits of nature's water supply services. *Nat. Resour. Forum* 29:98–108. [CrossRef](#)
- Millenium Ecosystem Assessment. 2005. Ecosystems and Human Well-Being; a Framework for Assessment. Island Press. Washington, DC. 245 pp.
- Tallis, H. and P. Kareiva. 2005. Ecosystem services. *Curr. Biol.* 15:R746–R748. [CrossRef](#), [PubMed](#)
- Kremen, C. 2005. Managing ecosystem services: what do we need to know about their ecology. *Ecol. Lett.* 8:468–479. [CrossRef](#)
- Lewan, L. and T. Soderqvist. 2002. Knowledge and recognition of ecosystem services among the general public in a drainage basin in Scania, Southern Sweden. *Ecol. Econ.* 42:459–467. [CrossRef](#)
- Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, et al. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387:253–260. [CrossRef](#)
- Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, et al. 1998. The value of ecosystem services: putting the issues in perspective. *Ecol. Econ.* 25:67–72. [CrossRef](#)
- Rapport, D. J., R. Costanza, and A. J. McMichael. 1998. Assessing ecosystem health. *Trends Ecol. Evol.* 13:397–402. [CrossRef](#)
- Farrow, R., C. Goldberg, and M. Small. 2000. Economic valuation of the environment: a special issue. *Environ. Sci. Technol.* 34:1381–1383. [CrossRef](#)

Gatto, M. and G. A. De Leon. 2000. Pricing biodiversity and ecosystem services: the never-ending story. *BioScience* 50:347–355. [BioOne](#)

Campbell, B. M., D. Dore, M. Luckert, B. Mukamuri, and J. Gambiza. 2000. Special section: land use options in dry tropical woodland ecosystems in zimbabwe: economic comparisons of livestock production in communal grazing lands in Zimbabwe. *Ecol. Econ.* 33:413–438. [CrossRef](#)

Guo, Z., X. Xiao, Y. Gan, and Y. Zheng. 2001. Ecosystem functions, services and their values—a case study in Xingshan County of China. *Ecol. Econ.* 38:141–154. [CrossRef](#)

Wilson, M. A. and S. R. Carpenter. 1999. Economic valuation of freshwater ecosystem services in the United States: 1971–1997. *Ecol. Appl.* 9:772–783.

Schroter, D., W. Cramer, R. Leemans, I. C. Prentice, M. B. Araujo, N. W. Arnell, A. Bondeau, H. Bugmann, et al. 2005. Ecosystem service supply and vulnerability to global change in Europe. *Science* 310:1333–1337. [CrossRef](#), [PubMed](#)

Metzger, M. J., M. D. A. Rounsevell, L. Costa-Michlik, R. Leemans, and D. Schroter. 2006. The vulnerability of ecosystem services to land use change. *Agric. Ecosyst. Env.* 114:69–85. [CrossRef](#)

Millenium Ecosystem Assessment. 2005. Ecosystems and Human Well-Being: Synthesis. Island Press. Washington, DC. 155 pp.

Hori, H. 2000. Dam-development projects in the upper basin and the Lancang River. In: The Mekong: Environment and Development. The United Nations University Press. Tokyo. pp. 189–211.

Xu, Z. F., H. Zhu, Y. X. Wang, L. Yang, H. M. Liu, D. R. Yang, D. T. Yang, C. D. Yang, et al. 2004. Species diversity dynamics of fragmented tropical rainforests in the Lower-Lancang/Upper-Mekong River Basin. *Acta Phytocologica Sinica* 28:585–593.

Krongkaew, M. The development of the Greater Mekong Subregion (GMS): real promise or false hope. *J. Asian Econ.* 15:977–998.

Yu, X. J. 2003. Regional cooperation and energy development in the Greater Mekong Sub-region. *Energy Policy* 31:1221–1234. [CrossRef](#)

Wang, H. and L. X. Yao. 2000. Soil and water loss in the Lancang River-Mekong River Watershed (in Yunnan section, China) and its control measures. *J. Env. Sci.* 12:90–97.

Yang, H. and X. Li. 2000. Cultivated land and food supply in China. *Land Use Policy* 17:73–88. [CrossRef](#)

Sheng, Ja and Az Liao. 1997. Erosion control in South China. *CATENA* 29:211–221. [CrossRef](#)

Liu, J., Z. Ouyang, S. L. Pimm, P. H. Raven, X. Wang, H. Miao, and N. Han. 2003. Protecting China's biodiversity. *Science* 300:1240–1241. [CrossRef](#), [PubMed](#)

Zhang, P., G. Shao, G. Zhao, D. C. Le Master, G. R. Parker, J. Dunning, and Q. Li. 2000. China's forest policy for the 21st century. *Science* 288:2135–2136. [CrossRef](#), [PubMed](#)

Weyerhaeuser, H., A. Wilkes, and F. Kahrl. 2005. Local impacts and responses to regional forest conservation and rehabilitation programs

in China's northwest Yunnan province. *Agric. Syst.* 85:234–253.

[CrossRef](#)

Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. B. da Fonseca, and J. Kent. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403:853–858. [CrossRef](#), [PubMed](#)

Wu, Z. Y. 1980. China Vegetation. Science Press. Beijing. 1375 pp.

Wu, Z. and Y. C. Y and Zhu. 1987. Yunnan Vegetation. Science Press. Beijing. 949 pp.

Lillesand, T. M. and R. W. Kiefer. 2000. Remote Sensing and Image Interpretation. (4th ed). John Wiley & Sons. New York. pp. 190–194.

Friedl, M. A. and C. E. Brodley. 1997. Decision tree classification of land cover from remotely sensed data. *Remote Sens. Env.* 61:399–409.

[CrossRef](#)

Von Gadow, K. and B. Bredenkamp. 1992. Forest Management. Academica. Pretoria, South Africa. pp. 7–23.138–147.

Le Bissonnais, Y., C. Montier, M. Jamagne, J. Daroussin, and C. King. 2002. Mapping erosion risk for cultivated soil in France. *CATENA* 46:207–220. [CrossRef](#)

Shrestha, D. P., J. A. Zinck, and E. Van Ranst. 2004. Modeling land degradation in the Nepalese Himalaya. *CATENA* 57:135–156. [CrossRef](#)

Saaty, T. L. 1980. The Analytic Hierarchy Process. McGraw-Hill. New York. 287 pp.

Souchere, V., O. Cerdan, B. Ludwig, Y. Le Bissonnais, A. Couturier, and F. Papy. 2003. Modelling ephemeral gully erosion in small cultivated catchments. *CATENA* 50:489–505. [CrossRef](#)

Fox, D. M., R. B. Bryan, and A. G. Price. 1997. The influence of slope angle on final infiltration rate for interrill conditions. *Geoderma* 80:181–194. [CrossRef](#)

Korkalainen, T. and A. Lauren. 2006. Using phytogeomorphology, cartography and GIS to explain forest site productivity expressed as tree height in southern and central Finland. *Geomorphology* 74:271–284. [CrossRef](#)

Tilman, D., C. L. Lehman, and K. T. Thomson. 1997. Plant diversity and ecosystem productivity: theoretical considerations. *Proc. Nat. Acad. Sci. USA* 94:1857–1861. [CrossRef](#), [PubMed](#)

Hector, A., B. Schmid, C. Beierkuhnlein, M. C. Caldeira, M. Diemer, P. G. Dimitrakopoulos, J. A. Finn, H. Freitas, et al. 1999. Plant diversity and productivity experiments in European grasslands. *Science* 286:1123–1127. [CrossRef](#), [PubMed](#)

Elmore, A. J., J. F. Mustard, S. J. Manning, and D. B. Lobell. 2000. Quantifying vegetation change in semiarid environments: precision and accuracy of spectral mixture analysis and the normalized difference vegetation index. *Remote Sens. Env.* 73:87–102. [CrossRef](#)

Zhou, Z. C., Z. P. Shangguan, and D. Zhao. 2006. Modeling vegetation coverage and soil erosion in the Loess Plateau Area of China. *Ecol. Model.* 198:263–268. [CrossRef](#)

Prosser, I. P., W. E. Dietrich, and J. Stevenson. 1995. Flow resistance and sediment transport by concentrated overland flow in a grassland valley. *Geomorphology* 13:71–86. [CrossRef](#)

Rodriguez Rodriguez, A., C. D. Arbelo, J. A. Guerra, J. L. Mora, J. S. Notario, and C. M. Armas. 2006. Organic carbon stocks and soil erodibility in Canary Islands Andosols. *CATENA* 66:228–235. [CrossRef](#)

Food and Agriculture Organization of the United Nations (FAO). 1986. *Strategies, Approaches and Systems in Integrated Watershed Management*. FAO. Rome. pp. 1–2.

Xu, J., P. Zhang, and Y. Wang. 2003. Land use and land cover in Lancang Watershed of Yunnan. *Acta Botanica Yunnanica* 25:145–154.

Peng, H. and Z-Y. Wu. 2001. The floristic characteristics and its significance in conservation of Semi-humid Evergreen Broad-leaved Forests in Mt Wuliangshan. *Acta Botanica Yunnanica* 23:278–286.

Meyer, L. D., G. R. Foster, and S. Nikolov. 1975. Effect of flow rate and canopy on rill erosion. *Trans. ASAE* 18:905–911.

Bruijnzeel, L. A. 2004. Hydrological functions of tropical forests: not seeing the soil for the trees. *Agric. Ecosys. Env.* 104:185–228. [CrossRef](#)

Guo, H. and C. Padoch. 1995. Patterns and management of agroforestry systems in Yunnan: an approach to upland rural development. *Glob. Env. Chang.* 5:273–279. [CrossRef](#)

Bond, G. 1976. The results of the IBP survey of root-nodule formation in non-leguminous angiosperms. In: *Symbiotic Nitrogen Fixation in Plants*. Nutman, P. S., editor. Cambridge University Press. London. pp. 443–474.

Sharma, E. and R. Ambasht. 1984. Seasonal variation in nitrogen fixation by different ages of root nodules of *Alnus nepalensis* plantations in the Eastern Himalayas. *J. Appl. Ecol* 21:265–270. [CrossRef](#)

Winkler, R. 2006. Valuation of ecosystem goods and services: part 2: implications of unpredictable novel change. *Ecol. Econ.* 59:94–105. [CrossRef](#)

Cited by

Christel Prudhomme, Alison L. Kay, Sue Crooks, Nick Reynard. (2013) Climate change and river flooding: Part 2 sensitivity characterisation for british catchments and example vulnerability assessments. *Climatic Change* Online publication date: 15-Mar-2013. [CrossRef](#)

Adrienne Grêt-Regamey^{1,*}, Sibyl Hanna Brunner¹, and Felix Kienast². (2012) Mountain Ecosystem Services: Who Cares?. *Mountain Research and Development* 32:S1, S23-S34 Online publication date: 1-Jan-2012. [Abstract & References](#) : [Full Text](#) : [PDF](#) (1143 KB)

Shuang Liu, Robert Costanza. (2010) Ecosystem services valuation in China. *Ecological Economics* 69:7, 1387-1388 Online publication date: 15-May-2010. [CrossRef](#)

BioOne is the product of innovative collaboration between scientific societies, libraries, academe and the private sector.

21 Dupont Circle NW, Suite 800, Washington, DC 20036 • Phone 202.296.1605 • Fax 202.872.0884

[TERMS OF USE](#) | [PRIVACY POLICY](#)

Copyright © 2013 BioOne All rights reserved