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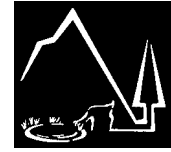
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**Ecosystem Services and Environmental Market Potentials:
Portland Katoomba Conference Notes**

by

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SUMMARY

Ecosystem services are the benefits people obtain from ecosystems. Capturing the value of ecosystem services is part of attaining sustainability, or in corporate social responsibility terminology, the triple bottom line—economic, environmental, and social. Viewing the Pacific Northwest and its forest wealth as ripe for a regional conference to further spur and galvanize emerging efforts to form conservation banks, carbon markets, water quality trading schemes, and other attempts to improve environmental conditions through market mechanisms, in June 2006 the Katoomba Group held the ninth such conference in Portland, Oregon.

Carbon markets were presented as the “first horse out of the gate” with \$11 billion in carbon trading transactions in 2005, and a potential for much more. Most of this activity is in the European Union, driven by efforts to meet the regulatory cap of the Kyoto Protocol to reduce greenhouse gas emissions. New York City’s watershed management experience demonstrates how and why attention to ecosystem services makes economic sense. Water quality trading may be possible, as attention to instream values heightens and TMDLs are implemented. Markets for biodiversity values are more elusive due to measurement and other problems. About 500 wetland mitigation banks exist to offset developments that would otherwise detract from the no net loss policy goal. Although environmental market development is impeded by lack of common terminology and, in some cases, the lack of property rights and enforcement mechanisms, the general feeling conveyed to the audience was that regulatory systems alone could not stimulate the conservation efforts necessary to protect the ecosystems upon which all life on Earth depends. Many creative people are at work on developing ecosystem services markets, and in some cases there may be a potential for financial gain.

College of Natural Resources Policy Analysis Group – University of Idaho

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Introduction

Potential development of Pacific Northwest (PNW) “ecosystem services”¹ markets for carbon, biodiversity, and water quality were featured at a conference on “Making the Priceless Valuable: Jumpstarting Environmental Markets” held in Portland, Oregon, in June 2006.² This was the ninth in a series of such conferences organized by the Katoomba Group, and the first one in the United States.³ Other ecosystem services mentioned were managing land for salmon, wind farms, and alternatives to fossil-based fuels. The main point of the conference was to make attendees aware of developing market opportunities that recognize values of ecosystem services over-and-above traditional goods, such as timber products and agricultural commodities.

An audience of 260 registrants⁴ heard representatives from institutions as different as Goldman Sachs (a Wall Street investment banking firm) and the USDA Forest Service put their heads together to map out avenues of progress in the realm of conservation finance. Some referred to this as a triple bottom line—environmental, economic, and social. Several presenters recognized a need to invest in natural infrastructure to an extent similar to the built infrastructure,⁵ in ways that benefit not only conservation, but also local communities. Local organizations spoke about their market-based efforts to enhance PNW rivers, forests, and fisheries.

Creating markets is not a global panacea; carbon and water services markets may work, but others may not because many countries lack appropriate institutions. Degradation of ecosystems could become worse, but such scenarios can be reversed with policy intervention. For example, in 2003 agricultural subsidies in OECD countries amounted to \$324 billion. Much of this accomplishes “the wrong thing,” according to the principal author of the Millennium Ecosystem Assessment project’s synthesis report. In the US, debate over the 2007 Farm Bill provides an opportunity to address this issue by restructuring forestry and conservation titles, and discussion of market-based incentives for greenhouse gas (GHG) mitigation may take place.⁶

Change will not happen if ecosystem services continue to be treated as free and limitless; economic incentives are one approach to policy change. Legislation and regulations pave the way for markets, and the capital and zeal of industrial firms are also necessary. Market-based tools include cap-and-trade systems,⁷ offsets,⁸ and auctions. The lack of a common terminology is impeding market development. An investment of intellectual capital is needed to support market development and would help maintain market credibility. Although voluntary market mechanisms for environmental services are the current focus, some presenters recognize that eventually these will become regulated markets.

A “green investments” panel of practitioners concluded that ecosystem service markets are unlikely to get Wall Street’s attention until they are larger and more stable, but agreed that day will come. Considerable attention was given to the idea of “bundling” several environmental services benefits together, or “stacking” them, one on top of another, like a wedding cake. This approach can, according to some panelists, result in “premium” returns 2-5% above baseline returns to traditional forestry investments, and also result in job creation opportunities.

Three brief sections summarizing presentations on **Carbon Markets, Biodiversity and Habitat Mitigation Banking**, and **Watershed Markets** are on pages 3-4; **Endnotes** are on pages 5-6, and for further information, a **Recommended Reading** list is on pages 6-7. Some figures that may help clarify the definition of ecosystem services appear on page 8.

Carbon Markets

One hundred billion tons of carbon flow through natural systems each year. The two main themes discussed were the concept of “offset quality” in environmental markets (i.e., has a real, measurable offset been provided?) and questions about how forestry will fit into the evolving carbon markets, which creates a need to differentiate “new” forestry from traditional forestry.

Carbon markets are only one year old, with \$11 billion in transactions in 2005; estimates pegged the potential at three to six times that in just a few more years. This market is driven today primarily by the European Union’s emissions trading scheme to help meet goals of the Kyoto Protocol. In Europe, 362 million tons of carbon were traded at a current value of 16 Euros/metric tonne. Carbon could become the largest commodity market in the world. Carbon trading is the only market where demand and supply are created entirely by policy. Demand is created instantaneously by regulation; supply needs to organize in response.

Small changes in the forest carbon stock can either contribute to or help mitigate carbon dioxide (CO₂) emissions. Four types of forestry offsets and related effects are: 1) avoid deforestation—immediate pulse of “saved” carbon (but a problem of tracking carbon “leakage”); 2) practice afforestation—carbon builds slowly in near- and mid-term; 3) reforestation—ditto; and 4) forest management beyond normal practices, which constitutes “additionality”—timber harvest adds to the complexity of quantification and management. Forestry offsets so far have played a small role globally. Although one presenter stated that forestry’s share could potentially reach 20-25% of carbon trading, most panelists expected forestry might attain a 5% share of carbon commerce.

Stabilizing Earth’s atmosphere will take a 20% reduction in CO₂ emissions. No one is talking about this, so offsets, although here to stay due in part to deforestation, are not a viable alternative to large-scale reductions of emissions. Many activities that reduce greenhouse gases, including some offsets, are not “additional” but would happen anyway. This issue, called “additionality,”⁹ arises from a Kyoto Protocol provision and leads to criticisms regarding the non-additionality that could be addressed through more attention to “offset quality.”

US activities include the Chicago Climate Exchange program, with carbon trading at \$4/ton on a voluntary basis, without a cap or regulatory system. California’s climate action registry program features emission reduction goals set in 2005 and forestry protocols. In the Eastern US, a voluntary nine-state regional GHG control program is developing. Federal legislation has been proposed in several bills. And carbon is traded on eBay. Although the PNW is brimming with innovators and poised for significant market development, there is a long way to go before real carbon markets are up and running.

To stimulate market development, forest industry firms and environmental groups were encouraged to work together on several policy fronts: a) establish cap-and-trade systems, b) define legal rights, c) establish enforcement mechanisms, and d) develop institutional mechanisms to address permanence, including strategies to reduce catastrophic forest fires. The global carbon market could have a role in helping remove biomass to prevent catastrophic forest fires in US forests, with the potential related to future US climate change regulations. Panelists projected that a US federal carbon market will be in place in 4-5 years, depending on the outcome of the 2008 national elections more than anything else.

Biodiversity and Habitat Mitigation Banking

To stem the loss of the world's biodiversity there is not sufficient time to develop a Kyoto-style international agreement.¹⁰ There are about 500 conservation mitigation banks in the US. These are large pre-established areas, restored and preserved to compensate for impacts to habitats and species, with roughly \$200-300 million in annual transactions. The market drivers are federal laws that regulate impacts to wetlands mitigation (the Clean Water Act section 404 "no net loss" goal) and species conservation (the Endangered Species Act protections against "take" and "jeopardy"). Conservation banking has been initiated in CA, OR, and WA but further development is impeded by unclear definitions. Is a conservation bank just a piece of property protecting habitat, or does it have to be backed by a regulatory regime? What is the metric?

The most important economic advantage to developers is severance of liability, although lower cost, reduced permitting time, reduced uncertainty, enhanced public relations, and potential access to additional capital are also benefits. There is a very large potential to offset development or even produce a net gain in ecosystem values, however, the lack of a generally accepted unit of measurement, such as the species-habitat relationship, hinders market development. There is a need to define property rights and to understand how landowner actions provide ecosystem services. Similarly, landowners need to know what to provide so they can value and price it. A focus on ecological restoration may be an appropriate approach. The related issues of permanence and perpetuity are stumbling blocks.

The workshop included Oregon's experience with conservation banking for salmon needs, and the importance of such efforts to Indian Tribes. Companies are looking at conservation banking mechanisms to help deliver further value from their lands, and the need to ensure that these mechanisms are scientifically sound and business friendly. Panelists agreed that mitigation banking needs to become a much more transparent process and predicted that this would happen naturally, without government intervention.

Watershed Markets

Markets for consumptive use of water exist in many western states, and instream environmental values are now a focus of interest. Presentations included experiences in New York City's watershed and Ohio's Cuyahoga Valley as well as Oregon and the Seattle area. Presenters agreed that markets are not a substitute for regulation, but can help get things accomplished that regulations alone cannot. Water quality markets have to be a three-sided deal if they are to work: sellers, buyers and the environment all must get what they need. Negotiations are therefore important. Market drivers must be adequate, and rights to the services well defined. Water quality laws drive activities; implementation of TMDLs (which essentially "cap" the quantity of a pollutant in a waterbody) could be an opportunity for trading to develop.¹¹ How do we make sure that markets have a net restorative effect on ecosystems? This theme guided workshop discussion through ideas like the "bundling" or "stacking" of ecosystem services, the balance of private and public institutions, and appropriate governance.



Endnotes

1. Two leading, and quite different, definitions of “ecosystem services” are [A] “... the benefits people obtain from ecosystems. These include *provisioning services* such as food, water, timber, and fiber; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling” (Millennium Ecosystem Assessment 2005, page v, see reading list below for full citation); and [B] “... the end products of nature that yield human well-being ... [including] things like aesthetic enjoyment, various forms of recreation, maintenance of human health, physical damage avoidance, and subsistence or foraged consumption of food and fiber” (Boyd and Banzhaf 2005, 2006; see reading list below for full citations).

Definition [A] is all-encompassing, as it includes the biological, chemical, and physical interaction functions in an ecosystem (see **Figure 1.1** on page 8 of this document). Definition [B] does not include ecosystem functions as services, in order to avoid double-counting. For example, clean drinking water is an ecosystem service under both definitions; the ecosystem functions that purify water as it flows through wetlands and is filtered by riparian vegetation would be considered services under definition [A] but not [B] (see **Figure 2** on page 8 of this document and discussion in Boyd and Banzhaf 2006).

The lack of a common definition is problematic. Precise definition, measurement, and valuation can help decision makers set priorities and make trade-offs. To that end, Resources for the Future (RFF) held a May 2006 workshop on “Practical Measurement of Ecosystem Services: Can We Standardize the Way We Count Nature’s Benefits?”; background discussion of definition problems and the workshop agenda are available online at <http://www.rff.org/rff/Events/Practical-Measurement-of-Ecosystem-Services.cfm>

2. Information compiled primarily from Katoomba Conference notes by the authors. Review comments on an earlier draft were provided by Mark Ankeny, Idaho National Laboratory; and Doug St. John, Green Crow Management Services. Also used were reports by the Katoomba Group’s Ecosystem Marketplace, available online at <http://ecosystemmarketplace.com/pages/static/conference.news.archive.php>

3. Katoomba is a resort area near Sydney, Australia, where 40 people met in 1999 to consider market approaches to environmental conservation. Today the group has approximately 250 members.

4. Analysis by John Helms placed the 260 conference registrants roughly in the following groups: foundations, consultants, institutes, and other NGOs (134), USDA Forest Service (32), academic (26), industry (18), other federal government (17, mostly USDA Natural Resources Conservation Service), city/state government (13), banks & investment firms (12), international (6), and Indian Tribes (3).

5. New York City’s experience is an often cited example contrasting investment in built infrastructure and natural infrastructure. Faced with a mandate from the US EPA to upgrade its drinking water treatment facilities at an estimated cost of \$6 billion, the city negotiated an agreement with the EPA to instead improve watershed management at an estimated cost of \$1.5 billion. See “New York City Watershed” online at <http://www.epa.gov/Region2/water/nycshed/index.html>

6. See US Department of Agriculture (2006). “Alternative 3: Encourage private sector markets for environmental services,” pages 29-31, in, *Conservation and the Environment*, USDA 2007 Farm Bill Theme Paper, available online at <http://www.usda.gov/documents/FarmBill07consenv.pdf>

7. “Cap-and-trade” systems are driven by a policy establishing a ceiling or threshold (“cap”) for a pollutant within a given geographic area. The successful US program for controlling sulfur dioxide (SO₂) pollution is a leading example. In 1995, following Clean Air Act amendments five years earlier, regulations mandating that electricity-generating plants reduce emissions were made more flexible, giving firms the choice of determining their own compliance strategy, including purchasing tradeable emission permits from other firms. The US EPA set a cap on total SO₂ emissions and divided it up among all polluters. Firms generating more emissions than their initial allocation could buy permits from firms that

generated fewer. The total number of permits would remain stable and not exceed the cap, but the distribution of permits among firms would change with trades in the market. This program has helped reduce SO₂ emissions by 50% at substantial cost savings.

8. An “offset” is designed to cancel out or offset undesirable effects (loss of habitat or pollution emissions) arising from a particular activity. The operator purchases an offset from a third party organization and thereby earns “credits.” Offset activities that provide credits can vary widely. For CO₂, the most frequent are energy conservation activities and planting trees for the purpose of sequestering carbon. A 1997 Oregon law, for example, requires new power plants in the state to offset part of their CO₂ emissions. Power companies may comply by paying mitigation funds to a non-profit organization that meets certain qualifications. In turn, the qualified organization must use the funds to carry out projects that avoid, sequester, or displace the CO₂ the new plant will emit in excess of the required standard.

9. “Additionality” was identified as a significant issue. Carbon emission offset credits would be awarded to project-based activities provided that the projects achieve reductions that are “additional to those that otherwise would occur.” For example, in order that carbon stocks or emissions qualify for the California Registry, the underlying forest activities must go beyond existing legal requirements and “normal” forestry, and practices must be truly aligned to enhancing carbon sequestration and storage.

10. Biodiversity market development is highly problematic. As Professor Jim Salzman, a presenter at the Katoomba Conference, wrote: “... we all gain from these [biodiversity] benefits, yet there is no sufficiently discrete class of beneficiaries with whom landholders can negotiate, and the transaction costs of gathering enough beneficiaries together to negotiate for the service are too high. Thus it is no surprise that private purchasers of biodiversity’s benefits are hard to come by, which explains why there are so few true markets for biodiversity” (Salzman 2005, page 883, see reading list).

11. See King, Dennis M. (2005) “Crunch time for water quality trading.” *Choices* 20(1):71-75.

Recommended Reading

... **glossary.** “Compilation of terms and definitions associated with carbon commerce,” available online at <http://www.co2e.com/common/glossary.asp> (note: does not attempt to define “ecosystem services”).

... **on new developments in ecosystem services marketplaces.** The Katoomba Group’s Ecosystem Marketplace provides access to news articles organized by biodiversity, carbon, mitigation banking, water, and other conservation markets, plus several other features, including a reference library, available online at http://ecosystemmarketplace.com/pages/section_landing.news.php

... **on defining ecosystem services.** Boyd, James W., and H. Spencer Banzhaf (2005) “Ecosystem services and government accountability: The need for a new way of judging nature’s value.” *Resources* 158:16-19, available online at http://www.rff.org/rff/Publications/Resource_Articles.cfm (this is a shortened version of “What are Ecosystem Services?” Resources for the Future Discussion Paper 06-02, 26 pages, available online at <http://www.rff.org/rff/Documents/RFF-DP-06-02.pdf>).

... **on the status of US environmental markets.** Woodward, Richard T., et al. (2005) “Markets for the environment” and four articles on SO₂ trading, western water markets, wetlands mitigation banking, and water quality trading. *Choices* 20(1):49-75, available online at <http://www.choicesmagazine.org> or the Katoomba Group’s Ecosystem Marketplace Library (see “... on new developments ...” item above).

... **on “cap-and-trade” systems (US sulfur dioxide scheme).** Stavins, Robert N. (2005) “Lessons learned from SO₂ allowance trading.” *Choices* 20(1):53-57; also see “Trading in pollution.” *OECD Observer* No. 233 (August 2002), online at http://www.oecdobserver.org/news/fullstory.php/aid/750/Trading_in_pollution.html

... **on water quality trading.** King, Dennis M. (2005) “Crunch time for water quality trading.” *Choices* 20(1):71-75; also see “Water quality trading.” US Environmental Protection Agency website, with many links and references, available online at <http://www.epa.gov/owow/watershed/trading.htm>

... **on wetlands mitigation banking.** Shabman, Leonard, and Paul Scodari (2005) “The future of wetlands mitigation banking.” *Choices* 20(1):65-70; also, “Mitigation banking factsheet.” US Environmental Protection Agency website, with many links and references, available online at <http://www.epa.gov/owow/wetlands/facts/fact16.html>

... **The Economist—market development example (Panama Canal watershed) and a provocative editorial.** “Are you being served? Environmental entries are starting to appear on the balance sheet. Perhaps soon, the best things in life will not be free.” *Economist* (April 23, 2005), pages 76-79; “Rescuing environmentalism: Market forces could prove the environment’s best friend—if only greens could learn to love them.” *The Economist* (April 23, 2005), page 11; both articles are available online, with a free 24-hour pass, at <http://www.economist.com/> (search “environment” limited to April 2005).

... **on carbon trading.** “Carbon emissions trading” and “carbon offset.” *Wikipedia*, with many links to other sources, available online at http://en.wikipedia.org/wiki/Carbon_trading; see also the Katoomba Group’s Ecosystem Marketplace (see “... on new developments ...” item above).

... **an overview of ecosystem services market development concepts, and some Pacific Northwest examples.** Robbins, Alicia (2005) “Ecosystem Services Markets.” Center for Sustainable Forestry at Pack Forest, College of Forest Resources, University of Washington, Eatonville, WA, 14 pages, available online at <https://digital.lib.washington.edu/dspace/bitstream/1773/2244/1/tp12.pdf>

... **for Pacific Northwest examples of ecosystem services markets.** Katoomba Group’s Ecosystem Marketplace (2006). *Northwestern Lights: Regional Leadership in Environmental Markets*, available online at http://www.ecosystemmarketplace.com/media/pdf/nw_lights_6.6.2006.pdf

... **an Idaho example, featuring the Nez Perce Tribe.** Zaffos, J. (2006, June 12) “Tribes [Nez Perce] look to cash in with ‘tree market’ environmentalism: Carbon banking could help restore forests and fight global warming.” *High Country News* 38(10):5.

... **on the genesis of ecosystem services markets.** Daily, Gretchen C., and Katherine Ellison (2002). *The New Economy of Nature: The Quest to Make Conservation Profitable*. Island Press, Washington, DC, 260 pages. The authors—an ecologist and environmental journalist, respectively—tell interesting stories about key players and efforts to establish ecosystem services markets, including the Katoomba Group, the Chicago Climate Exchange, and the Seattle and New York City watershed management examples.

... **on the challenge of establishing ecosystem services payments; literature review and Australian water quality trading experience.** Salzman, James (2005) “Creating markets for ecosystem services: Notes from the field.” *New York University Law Review* 80(6):870-961; an earlier draft was published as Duke Science, Technology & Innovation Paper No. 2, available online at <http://ssrn.com/abstract=796772>

... **on valuing ecosystem services.** National Research Council (2004) *Valuing Ecosystem Services: Toward Better Environmental Decision-making*. National Academy Press, Washington, DC, available online at <http://www.nap.edu/catalog/11139.html/2005-1/2005-1.pdf>

... **United Nations-sponsored project referred to as the “house is on fire” report at the conference.** Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC, 137 pages, available online at <http://www.millenniumassessment.org/en/products.aspx>

