

Innovation, Management Systems and Trading Committee Newsletter

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MESSAGE FROM THE CHAIR

Joseph Dawley
Babst Calland Clements and Zomnir PC
jdawley@bccz.com

Welcome to the first issue of the 2005-2006 ABA year. This year marks the sixth year for the committee and its efforts to publish newsletters with timely and relevant articles on innovation, management systems and trading. I hope that you find this issue's articles on ecosystem services as interesting and informative as I have. Many thanks to David Savage and the contributing authors for making the issue a success.

The committee is planning for another active year. At the 13th Section Fall Meeting in Nashville, the committee sponsored a spirited program on the Environmental Protection Agency's (EPA's) mercury rule. Dennis Hirsh moderated the panel that included John Walke of the Natural Resources Defense Council, Jason Burnett of the EPA and Lee Zeugin of Hunton and Williams. Our programming vice chair, Lee Paddock, is working to develop program proposals on converging and conflicting air trading issues arising from the numerous air program initiatives launched by the EPA, the use of waivers as regulatory innovation (and whether waivers are a form of regulatory innovation), and the use of innovative regulatory approaches to value and protect ecosystem services. If you would like to participate in the planning of these programs or have ideas for other programs, please contact Lee at lpaddock@law.pace.edu.

The committee also plans to reinvigorate its public service project of providing pro bono legal services to community organizations this year by seeking opportunities to participate in EPA's Community Action for a Renewed Environment (CARE) program. The CARE program is a grant program that offers an innovative way for communities to take action to reduce toxic pollution. On Nov. 3, 2005, EPA announced CARE grant recipients for 12 communities. Howard Hoffman, our public service vice chair, will be contacting the grant recipients to determine whether any legal assistance is needed. If you are interested in participating in this project, please contact Howard at (202) 564-5582 or hoffman.howard@epamail.epa.gov.

The committee is also gearing up for its contribution to the Section's 2005 edition of *The Year in Review*. Joel Bolstein, our vice chair for *The Year in Review*, will soon be soliciting authors and issues to cover for our *Year in Review* piece. The committee usually receives from 6 to 8 pages to cover the year's developments in innovation, management systems and trading. If you have any topics that are worthy of discussion or would like to contribute to our piece, please contact Joel at jbolstein@foxrothschild.com.

As you can see, there are many ways to participate in committee activities and I strongly encourage your participation. The areas of regulatory innovation, environmental management systems and environmental trading have been very active and there are many ways to contribute to the committee's mission of exploring these issues. If you would like to get involved in

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David A. Savage, Editor

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program planning, writing an article for the newsletter, or simply brainstorming new or evolving issues, please contact me.

NOTES FROM THE EDITOR

David A. Savage
Baker Botts L.L.P.
daivd.savage@bakerbotts.com

This issue of the newsletter focuses on the growing awareness of what has come to be called ecosystem services, their importance to society and the possible beginnings of an organized legal infrastructure designed to protect and facilitate them. Diligent readers of *Natural Resources & Environment* may have been first introduced to this topic through the lead article of the Fall 2005 issue. There, in his article titled “Ecosystem Services and the Common Law of the ‘Fragile Land System’” J.B. Ruhl discusses the relationship between the relatively new concept of ecosystem services and the tried-and-true doctrine of nuisance. As Professor Ruhl explains, “[m]ost of ecosystem management is devoted to keeping ecosystems functions healthy for the sake of ecosystems, whereas the study of ecosystem services is devoted to articulating which ecosystem functions provide service values to humans that would be costly, but clearly necessary or desirable, to replace were they to degrade in quantity or quality.”

So, we naturally turned to Professor Ruhl for a brief introduction to the subject of ecosystem services for this newsletter. Dennis Hirsch then focuses on certain critical ecosystem services that, through Hurricane Katrina, have been brought dramatically to the public’s attention: the services provided by the vanishing coastal wetlands of the Gulf of Mexico. On a more hopeful note, Howard Hoffman describes the impetus for and critical steps in the successful effort by New York City and others to preserve the vast reservoir system of the Catskill/Delaware watershed. These efforts will ensure that the watershed can continue to provide naturally clean water to millions (while saving taxpayers billions.) Finally, Brad Raffle sees the fragmentation of valuable

ecosystems as one of our most significant environmental challenges, but also new opportunities to address them. He outlines a proposal for a system of incentives to better foster the conservation of ecosystems, including steps to recognize and support what he sees as a growing market for ecosystem services.

***ABA Section of Environment,
Energy, and Resources***

**Environmental Sciences
Teleconference/Slide Webcast
Presentation CLE Series:**

Environmental Chemistry
Dec. 8, 2005

Hydrogeology
Jan. 12, 2006

Air Quality and Pollution Control
Feb. 9, 2006

**Water Quality and Wastewater
Treatment**
March 23, 2006

Site Remediation Technologies
April 6, 2006

Toxicology and Risk Assessment
May 11, 2006

Also, mark your calendars for:

**35th Annual Conference on
Environmental Law**
March 9-12, 2006
Keystone, Colorado

14th Section Fall Meeting
Oct. 4-8, 2006
San Diego, California

**WHY SHOULD ENVIRONMENTAL
LAWYERS CARE ABOUT
ECOSYSTEM SERVICES?**

J.B. Ruhl
Florida State University College of Law
jruhl@law.fsu.edu

Who owns pollination? Seems like a strange question, but it ought not be. After all, for centuries around the world private domesticated beekeepers have charged for the service of providing pollination to farmers, so why shouldn't the owner of a field full of wild pollinators do the same—charge for the service the pollinators provide? This seemingly absurd proposition exposes an emerging set of policies—going under the label of “ecosystem services”—that defines the intersection between ecology, economics and law. The groundbreaking research on the topic of ecosystem services appeared in 1997 with Gretchen Daily's publication of the edited volume, *Nature's Services*. The only thing missing among its chapters is one about law. Since *Nature's Services* was published, the piles of books and journal articles ecologists and economists have written about ecosystem services dwarf those written by lawyers. Ecologists get the concept of ecosystem services. Economists get it. It's time for lawyers to get it.

Ecologically speaking, ecosystem services are simply the product of ecosystem functions. Ecologists think of ecosystems as having structure (rocks, water, trees) and processes (energy flow, decomposition, nutrient flow). This is what ecosystems are and what happens in them, regardless of what humans think of them. Ecosystem functions are what ecologists identify as the dynamic effects of ecosystem structure and processes, such as how fire clears our underbrush, or habitat provides shelter or pollinators pollinate. To some extent the identification of ecosystem functions involves people making normative conclusions about what matters to ecosystems and the species in them.

All ecosystems have functions, but not all ecosystem functions provide ecosystem services. This is where economics enters the picture. Think of a forest. Economically speaking, it is easy to identify values

associated with the commodities one might extract from a forest, such as timber, or the uses one might enjoy in the forest, such as hiking. But there are also important economic *service* values to be derived from the forest simply functioning as a forest, such as the provision of water purification, runoff retention and carbon sequestration. Of course, these are only economically relevant when they benefit people, so one has to identify the distribution of such services to a human population. But once we do, it is possible to demonstrate the value of the services by, for example, considering what it would cost to replace them with technological substitutes, or by estimating the impact on economic life were they absent.

The problem with ecosystem services is that, unlike commodity and use values associated with ecosystems, ecosystem service values almost never enter the market pricing system. This is where law *should* enter the picture. The question of who owns pollination, though about an ecosystem service that has economic value, is fundamentally a *legal* question. As a threshold matter, it is about property rights, which all lawyers know are a creature of law. A forest owner can charge for trees and for hiking, but how would one charge for pollination? The forest owner can't tell the bees where to go, and once they leave the property, any nearby farm might benefit, so why would any farm pay for them? Of course, if no one will pay the forest owner for pollination services, why should the forest owner take their presence into account when thinking about what to do with the forest? The bottom line is that, while we know ecosystem services have profound economic value, we have not been successful at representing those values in property rights or, for that matter, in any realm of private or regulatory law.

There are many law and policy questions wrapped up in that conundrum. Should the forest owner have the right to deprive others of pollination services? Should farmers have the right to their continued provision? Is there a role for regulation? Perhaps all land use projects should be required to summarize impacts on ecosystem services for agency and public review. Perhaps the beneficiaries of ecosystem services should be taxed and the revenues used to compensate the owners of resources from which the services are

derived. Perhaps local zoning decisions should seek to promote conservation of ecosystem services.

Environmental lawyers ought to begin to think seriously about these questions, because it is abundantly clear that the American public is beginning to get the concept of ecosystem services as well. Countless media stories on Hurricane Katrina pointed to the degradation of coastal wetlands as having cost New Orleans dearly in terms of reduced storm surge mitigation. Although it is due largely to unfortunate natural disasters, the public increasingly appreciates the same about coastal dune systems, riparian wetlands, forested watersheds and other intact ecosystems—their loss is not simply an ecologic phenomenon, but rather presents an economic dimension as well. And as the economic dimension of ecosystem services becomes more apparent to the public in general, it is sure to follow that what today seem like abstract legal questions will soon be appropriate to field in courts, environmental agencies, local planning boards and the full realm of legal institutions.

The entries in this issue of the newsletter are designed to stimulate legal thinking about ecosystem services. This is largely uncharted territory, and thus a potentially exciting field. And given what is at stake, don't be surprised if someday it will seem ordinary when work on ecosystem services is billable time.

J.B. Ruhl is Matthews & Hawkins Professor of Property at Florida State University College of Law in Tallahassee, Florida.

**INNOVATION, MANAGEMENT
SYSTEMS AND TRADING COMMITTEE
ONLINE**

Committee Web Page:
[www.abanet.org/environ/committees/
secondgeneration/home.html](http://www.abanet.org/environ/committees/secondgeneration/home.html)

Committee List Serve:
environ-innovation@mail.abanet.org

HURRICANE KATRINA, ECOSYSTEM SERVICES AND REGULATORY INNOVATION

Dennis D. Hirsch
Capital University Law School
DHirsch@law.capital.edu

Environmental issues often get framed as a choice between economic prosperity and environmental protection. Hurricane Katrina demonstrates the fallacy of that view. Wetlands on the Gulf Coast once served as a natural buffer against hurricanes. Had we invested in protecting them, they could have significantly lessened Katrina's damage, already estimated at \$100 billion in economic costs alone. What can we do to ensure that we do not miss such opportunities in the future? One answer lies in new approaches to regulation that seek to enhance the protection of ecosystem services. The recent disaster should lead us to invest more in these important strategies and in the valuable natural services that they seek to preserve.

For millennia, the Mississippi River deposited millions of pounds of sediment daily into the Gulf outside of New Orleans. This created millions of acres of wetlands that slowed hurricanes, reduced storm surges and, until modern times, protected the city from flooding. These wetlands were producing an "ecosystem service," a valuable benefit that nature provides to society or to other natural systems. Other examples include soils and living organisms that purify water, insects and birds that control pests, and forests that sequester carbon and so stabilize the climate. These services are valuable. For example, if American farmers had to use chemical fertilizer, rather than natural processes, to enhance the nitrogen content of soil the cost would be around \$45 billion per year. Yet despite their great value, ecosystem services are seldom protected. The wetlands in the Gulf are a case in point. Government levees have channeled the Mississippi away from the wetlands without building in opportunities for controlled flooding to replenish the essential sediments. Private companies have sliced waterways through the wetlands to get at energy sources buried there. Starved of essential soils and weakened by a thousand cuts, the wetlands shrink by

the size of Manhattan Island each year. They have lost 1.9 million acres during the past 75 years. New Orleans is being stripped of its of its natural shield and left naked to weather the storms of the Gulf.

Similar stories can be told about other ecosystems throughout the world. While flood protection and other ecosystem services are of great value, they are not bought and sold and therefore have no *market* value. They appear to be free and are largely taken for granted. Because their contributions are hard to see it becomes difficult to rally political support for preserving them. The result is often severe degradation, leading to disaster.

What can be done to protect ecosystem services? The answer lies in innovative policies that enable people to see the value of these natural systems, and to act to preserve them. New York City's recent decision to invest in conserving watershed lands is a good example. The city derives much of its drinking water from the Catskills. Due to increased development in that area, the city found itself close to violating federal drinking water standards and so to having to build a water treatment plant costing billions. Instead, it opted to considerably less in land acquisition and restoration in the Catskills, thereby ensuring clean water. This both reduced costs and protected the environment.

The ecosystem services field seeks to identify such opportunities. It conducts scientific and social science research to better define the value of natural systems. It also develops new regulatory tools for protecting them. These include government funded restorations such as the \$7 billion federal effort in the Florida Everglades; health standards that allow regulated parties to comply through ecosystem preservation, as in the New York City example; subsidies for those who act to protect ecosystems such as farmers who set aside a buffer of land to prevent fertilizer run-off; and fees for those, such as energy companies who slice through wetlands, who damage important ecosystems. It is vital that more be done to refine and test each of these approaches to find out which works best.

Yet far too little work of this sort is being done. The ecosystem services approach is stuck between

environmental purists who argue that nature must always be treated as priceless, and shortsighted developers who insist that all environmental protections hurt the economy. Drowned out by these voices, the idea that environmental protection could be essential to economic health has attracted little attention.

Until now. The horrific flooding of New Orleans provided a unique opportunity to see, in bold relief, the value that wetlands and other natural systems provide to human society. Katrina could be the catalyst that wakes people up to the importance of understanding and safeguarding the ecosystem services on which we all rely. That would help to prevent other such catastrophes and so would draw something positive out of the recent tragedy.

Dennis D. Hirsch is associate dean and professor, Capital University Law School in Columbus, Ohio.

NEW YORK CITY: CLEAN WATER SERVICES FROM THE WATERSHED

Howard J. Hoffman
U.S. Environmental Protection Agency
hoffman.howard@epamail.epa.gov

For New York City, the availability of an abundant water supply has been one of the most important, if frequently overlooked, reasons why the city's name has, for generations, been synonymous with metropolis. Today, some 9.5 million people in the New York City metropolitan area, including several upstate counties, obtain about 90 percent of their water through a 2,000 square mile upstate reservoir system—the Catskill/Delaware Watershed—that is the largest, unfiltered, surface water supply in the United States. Virtually all of the city's water flows into its pipes by gravity; is treated, as a routine matter, with only chlorine and fluoride; and passes through nothing more than large metal screens designed to catch fish. The potability of the 1.4 billion gallons of drinking water that New Yorkers consume daily is assured by the natural filtration processes of earth and vegetation in the upstate watershed.

But it has fallen to modern regulatory processes to maintain this state of affairs. By the early 1990s, a complex set of factors generally stemming from upstate land use development and agricultural practices were threatening the city's water supply. At that time, city managers also faced a choice mandated by the Environmental Protection Agency (EPA): either build a water filtration plant or, at a cost of billions less, improve and maintain the water purification capabilities of the watershed. Enlisting partnerships in the upstate watershed communities, the city chose the latter. The city initiated an ongoing program comprised of multi-million-dollar land-acquisitions, regulations and educational programs designed to safeguard the watershed's ability to supply potable water. The New York City Watershed Program provides one of the most compelling instances in the country of an ecosystem providing valuable services, and of the development of a major regulatory program—with many innovative features—to protect and facilitate those services.



Innovation, Management Systems and Trading Committee Newsletter

LIKE TO WRITE?

The Innovation, Management Systems and Trading Committee welcomes the participation of members who are interested in preparing this newsletter. If you would like to lend a hand by writing, editing, identifying authors or identifying issues, please contact David A. Savage at david.savage@bakerbotts.com.

Back issues of this newsletter can be found at www.abanet.org/committees/secondgeneration/newsletter/archive.html.

Pressures on the City's Water System

During its first 200 years, Manhattan relied on local supplies of water from wells and springs. The year 1677 saw the first public well and the year 1776 saw the first reservoir. But by the first half of the 19th century, Manhattan's growth forced it to look elsewhere for its water. In 1842, dams were completed in branches of the Croton River (40 miles upstate in what are now Westchester and Putnam Counties), and aqueducts were built to reservoirs in downtown Manhattan. Further expansion occurred by 1928, with the completion of the Catskill Reservoir System, which drew water from Hudson River tributaries and channeled it through some 80 miles of tunnels to Manhattan. By the mid-20th century, New York City had begun to tap the headwaters of the Delaware River, which entailed construction of more reservoirs and tunnels. In 1964, the Catskill/Delaware Watershed was completed and, combined with the Croton Watershed, includes 19 reservoirs, three controlled lakes and approximately 6,000 miles of conduits and pipes. This system now extends 125 miles to the north and west of the city and supplies water to the five boroughs as well as parts of the upstate counties of Orange, Putnam, Ulster and Westchester.

In the last 30 years, however, the city's northern suburbs have exploded, agriculture has expanded and the Catskills mountains have seen significant tourism and recreation development. Among other things, water quality degradation resulted from pesticides and fertilizers used on farms, oil deposits and particulates from vehicles, and inadequately treated sewage. In some cases, sewage was discharged directly into the reservoir systems. (For a discussion of the history of the New York City watershed, *see* G. Daily & K. Ellison, *The New Economy of Nature: The Quest to Make Conservation Profitable* 61-85 (Island Press 2002).)

While these problems were accumulating, the city was presented with challenges from federal statutory and regulatory developments designed to protect water quality. In 1974, Congress required EPA in the Safe Drinking Water Act (SDWA) to establish minimum

national drinking water standards—including national primary drinking water regulations (NPDWRs)—that protect against both naturally occurring and man-made contaminants. The law gave the states the lead role in implementation and enforcement. Originally, the SDWA focused primarily on treatment as the means to provide safe drinking water at the tap.

Amendments to the SDWA enacted in 1986, however, mandated that EPA increase its pace for regulating contaminants as well as promulgate requirements for disinfection and filtration of public water supplies. Specifically regarding filtration, Congress required EPA to promulgate NPDWRs “specifying criteria under which filtration . . . is required as a treatment technique for public water systems supplied by surface water sources.” 42 U.S.C. § 300g-1(b)(7)(C)(i)-(ii). In 1989, EPA promulgated the Surface Water Treatment Rule (SWTR), which is designed to reduce the risk of waterborne disease outbreaks from microbial contaminants from surface water systems, that is, systems using water from reservoirs, streams, lakes, or rivers. 54 Fed. Reg. 27,486 (June 29, 1989). This rule required that surface water systems build filtration plants unless the “primacy” authority—EPA for the Catskill/Delaware Watershed—determined that a system could meet specified water quality, disinfection and other site-specific criteria. *See* 40 C.F.R. part 141, subpart H.

The SDWA Amendments and the SWTR led New York City to plan a filtration plant for the Croton Watershed, which supplies about 10 percent of the metropolitan area's water. With a planned completion date of 2011, the Croton plant is expected to cost over one billion dollars. Building a water filtration plant for the Catskills-Delaware system, however, would be much costlier: from six to eight billion.

The Watershed Memorandum of Agreement

In response to these pressures, city officials decided to explore controlling pollution in the Catskill/Delaware Watershed. They developed a plan that EPA determined in 1993 met the criteria for avoiding the filtration requirement. However, in issuing its determination—termed a Filtration Avoidance

Determination (FAD)—EPA imposed over 150 conditions relating to watershed protection, monitoring and studies.

The city faced many obstacles in fulfilling these conditions. Some conditions related to acquiring land in sensitive areas in the watershed. Of the one million acres in the watershed, the city owned only about 70,000, and New York State and other local watershed communities owned only about 200,000. Legal and political issues complicated the city's ability to acquire additional land by condemnation. These issues were particularly sensitive because, at various times in the preceding decades, entire communities had been relocated to allow the building of reservoirs and aqueducts. Other conditions related to the state's need to update its watershed regulations, which were unchanged from the 1950s and did not address major changes that had resulted from agricultural practices and land use development. In addition, wastewater treatment plants located outside of the city limits had to be upgraded to address various contaminants, including excess nutrients. When imposing a reevaluation date of December 1996 for the FAD, EPA made clear that the FAD would not be renewed absent additional major changes in the city's watershed program.

The city confronted many difficult issues in revamping the watershed program due to the widely divergent interests of the many stakeholders affected. These stakeholders included, among many others, upstate agricultural interests, upstate municipalities, environmental groups and, of course, the city itself. A lengthy and contentious regulatory process ensued, with the city considering, at various times, stringent regulations (including bans on new building in certain areas, limits on the amount of paved surfaces, and restrictions on watershed farming activities) that were opposed by upstate interests; and much more limited regulations that environmental groups asserted would not succeed in maintaining a clean water supply. Beginning in 1995, New York Gov. George Pataki offered the state's good offices to build a stakeholder consensus for a watershed plan and, for the next two years, negotiations ensued. More than 150 public meetings were held.

The stakeholder process succeeded. On Jan. 21, 1997, the Watershed Memorandum of Agreement (MOA) was reached by New York City; New York State; the seven upstate counties of Delaware, Greene, Putnam, Schoharie, Sullivan, Ulster and Westchester; watershed municipalities; and several environmental groups. *See* www.dos.state.ny.us/watershed/AGREEMENT.htm. Through three major programs, the MOA established a framework for addressing increasing physical pressures on the watershed from human activity and complying with EPA's water quality mandates.

First, the Land Acquisition Program. The city committed to spend from \$250-300 million to buy environmentally sensitive, underdeveloped land at fair market value from willing sellers. This component of the MOA—that the city would, in effect, forego potential condemnation and acquire land only from willing sellers—was of particular importance to upstate interests. The targeted lands primarily were near reservoirs, streams and wetlands, and their protection was designed to leave in place soil and vegetation that naturally filter out contaminants. The city also agreed to continue paying property taxes, amounting to \$90 million annually by 2004, on the acquired land.

Second, the Watershed Regulatory Program. Under the MOA, stakeholders agreed to the establishment of new regulatory controls for pollution within the watershed. These included restrictions on new construction of impervious surfaces within 300 feet of a reservoir, river or wetland; prohibitions on road construction within 100 feet of a perennial stream and 50 feet of an intermittent stream; and prohibitions on septic system fields within specified distances of wetlands, watercourses or reservoirs.

Third, the Watershed Protection and Partnership Programs. To address farmers' concerns about the economic impact of regulatory restrictions, the city entered into a partnership with the watershed farm community to carry out the Watershed Agricultural Program. The city agreed to continue plans to spend \$35 million to demonstrate an environmentally sound "whole farm planning" approach, and a farmer-led Watershed Agricultural Council agreed to recruit farmers to participate in the program.

In addition to these core measures, the city agreed in the MOA to upgrade its upstate sewage treatment plants (\$232 million); upgrade its dams and water supply facilities in the watershed (\$240 million); and construct or upgrade wastewater infrastructure, including failing septic systems (\$300 million). The city also agreed to make payments to local governments and businesses in the 35 watershed communities to compensate them for foregoing certain types of development. This included \$68 million for Putnam and Westchester Counties for projects to improve water quality and provide jobs; \$75 million for the Catskill Fund for the Future, an economic development bank designed to encourage environmentally sound development by local business; and \$14 million for local government public works. Some of these expenditures were designed to encourage foresters and farmers to remain on their land (preventing development) and implement more environmentally sound practices.

With the MOA in place, EPA issued a FAD on May 6, 1997, which would be re-evaluated in 2002. During this period, the city had to demonstrate that the water supply met requirements for sediment and fecal bacteria, and was never the source of waterborne disease outbreak. That is, a single episode of waterborne disease could have resulted in EPA rescinding the FAD, and forcing the city to build the filtration plant.

The Long-Term Watershed Protection Program

Of course, water quality requirements continued to evolve. In the 1996 Amendments to the SDWA, Congress directed EPA to revise the SWTR. In response, EPA simultaneously promulgated the Interim Enhanced Surface Water Treatment Rule (IESWTR) and the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR). 63 Fed. Reg. 69,478 (Dec. 16, 1988)(IESWTR); 63 Fed. Reg. 69,390 (Dec. 1, 1998)(Stage 1 DBPR). The IESWTR added several new requirements, including the requirement for unfiltered systems to address *Cryptosporidium* in watershed control programs. See 40 C.F.R. part 141, subpart P. The Stage 1 DBPR

introduced new and more stringent maximum contaminant levels for disinfection byproducts. See 40 C.F.R. part 141, subpart L.

To meet these new directives, in 2001, the city submitted its Long-Term Watershed Protection Program to EPA. EPA determined that the program met the requirements of the SWTR and the IESWTR for unfiltered water supply systems and, accordingly, re-issued the FAD in 2002. See “New York City Filtration Avoidance Determination,” U.S. EPA 2002 (2002 FAD), located at www.epa.gov/region02/water/nycshed/2002fad.pdf.

The Long-Term Watershed Protection Program continues the program put in place under the MOA, enhances many of its components, and adds new components. These changes and additions reflect the broad range of activities needed to assure that the watershed will continue to provide the requisite quality of water services. They include the following features:

- Continue to upgrade wastewater treatment plants (WWTPs), including installing microfiltration (or an approved equivalent) and removing phosphorus at all surface water discharging WWTPs, as well as implementing phosphorus removal and disinfection, where applicable, at all subsurface discharging WWTPs;
- Implement a Stream Management Program to restore stream stability and forestall streambank and bed erosion, as well as the loss of riparian buffers that contribute to increased turbidity;
- More effectively address turbidity levels in the Catskill system, which is prone to elevated turbidity due to the underlying geology, including dredging the Schoharie Reservoir intake channel and increasing the number of stream restoration projects in the Schoharie basin;
- Minimize fecal coliform loads to the reservoir that result from roosting birds during the

migratory season (by, among other means, chasing birds from the reservoir using motorboats); and

- Update filtration plant design plans (as a contingency only) and construct Ultraviolet Light Disinfection Facilities (operation to commence in 2010).

A Cooperative and On-Going Effort

Although nearly a thousand city employees manage the watershed, a striking feature of these efforts to protect the watershed is the significant involvement of numerous local entities. As EPA stated in its 2002 FAD, “[t]he City’s Long-Term Watershed Protection Program . . . reflects a very positive change that has taken place over the last several years—the increased cooperation between the City and watershed partners in implementing watershed protection programs. The City’s willingness to shift administration of a number of programs to locally-based organizations is a major demonstration of the progress made to date.” 2002 FAD, at 7.

These developments have put in place a comprehensive structure designed to protect New York City’s clean water supplies for years to come. The city is expected to review its watershed program by December 2006, and, at that time, extend it through 2012. EPA expects to review the FAD by April 2007. Changes and improvements seem inevitable—especially in light of new federal regulatory requirements, noted below—but the basic framework for watershed preservation has been established.

The Value of the Watershed’s Clean Water Services

The Catskill/Delaware Watershed supplies over a billion gallons of drinking water consumed daily by almost 10 million people in New York City and several upstate counties. The city and its upstate partners have chosen to maintain certain features of this watershed to facilitate the continued provision of a clean water supply without the need for a costly filtration plant. Thus, the Catskill/Delaware Watershed may be viewed

as an ecosystem that provides the valuable service of assuring a regular supply of potable water to the New York City metropolitan area and some upstate communities. This ecosystem has been consciously protected so it can continue to provide that service.

It has not been necessary to determine the precise value of this service to New Yorkers, but it plainly is significant. The cost of providing these watershed protections is at least \$1.5 billion. They have enabled the city, however, to avoid constructing a water filtration plant at a cost of at least \$6 billion. Thus, using the replacement cost method, the value of the watershed services is in the neighborhood of \$4.5 billion. But this is only part of the picture, as maintaining the watershed provides other benefits, including protecting recreational and aesthetic values, as well as the provision of wildlife habitat. There was no need to value these more intangible services as part of the decisions regarding the city’s water supplies because the cost of a filtration plant is so much greater than the cost of maintaining the watershed. (For a discussion of the valuation of the New York City watershed, *see* “Translating Ecosystem Functions to the Value of Ecosystem Services: Case Studies,” in Valuing Ecosystem Services: Toward Better Environmental Decision-Making (National Academy of Sciences, 2004), www.nap.edu/books/030909318X/html/153.html.)

This may change in time. For example, the cost of a filtration plant may drop in the future, and the opportunity costs of foregoing upstate development may increase. In addition, the development of additional regulatory requirements may increase costs of maintaining the watershed. For example, EPA’s proposed Long-Term 2 Enhanced Surface Water Treatment Rule and Stage 2 Disinfectants and Disinfection Byproducts Rule could affect costs. *See* 68 Fed. Reg. 47,640 (Aug. 11, 2003); 68 Fed. Reg. 49,548 (Aug. 18, 2003). The city and its partners may account for shifts in these, and other, costs during the periodic reviews of the city’s watershed program, and EPA may monitor the resulting effects on the watershed program in its periodic reviews of the FAD.

Many communities around the country rely on unfiltered watersheds or aquifers for drinking water.

Like New York City, these communities also have invested in protections for their natural water infrastructures. Among many others, these metropolitan areas include Portland (Oregon), Boston, San Francisco, and Seattle. Of course, no one should be surprised to hear New Yorkers point out that their watershed program is the biggest.

Howard Hoffman is an attorney with EPA in Washington, D.C. He would like to thank Karen Clark, Nicole Kraft, Carol Ann Siciliano, and Philip Sweeney, also with EPA, for their thoughtful suggestions, careful review of drafts, and insightful comments. The views expressed are the author's own and do not represent positions of EPA. Any errors remain the author's responsibility.

INCENTIVIZING LAND CONSERVATION: CARROTS AND STICKS

Bradley I. Raffle
Baker Botts L.L.P.
brad.raffle@bakerbotts.com

As I recently navigated the freeways that now criss-cross the hills and woodlands of our Capital's Virginia suburbs, I was hit by the essential irony of the "smart growth" article I had read that morning on the plane ride up from Houston. The people that designed these roads and constructed these malls, office buildings and golf courses were certainly not dumb. The economic health of the region is just fine, thank you.

Nevertheless, most Americans would probably agree that the escalating fragmentation of functioning ecosystems associated with this kind of suburban sprawl—wiping out forests, wetlands, wooded river systems and open prairies—is inexorably destroying American's sense of place and undermining a vital part of its quality of life. In my opinion, the evisceration of our suburban open spaces is our nation's most significant domestic environmental challenge. Nothing else comes close. If a large oil spill were to cause half the ecological havoc that we tolerate each month

because of suburban sprawl, the public outcry would be deafening.

So what is going on here? The obvious answer is that the ecological impact of urban sprawl (two million acres of rural land each year—consuming an area the size of Pennsylvania since 1990)—is the result of thousands of small decisions, albeit very "smart" ones when considered individually. The decision of a housing developer to clear cut a 500-acre bottomland hardwood forest is usually a "smart growth" decision for that developer. To attack the developer for pursuing such a plan is to attack the basic underpinnings of our free market system. Is it reasonable to expect (let alone require) the owner of the land to leave the trees alone and forego the profit potential of a first-class housing development on the site? Many preservationists would say "yes," stop the housing project in its tracks and allow the landowner to charge fees for public bird watching. No "taking" there . . . provided, of course, that it is not *their* land.

There may be a smarter and far less contentious way to address this growing challenge, one that recognizes and takes advantage of the economic self-interest of the private owners of ecologically valuable land. Why not pursue a regulatory program *expressly designed* to economically incentivize the owners of such property to actively conserve their land's most important environmental attributes—while simultaneously preventing these landowners from destroying the land's environmental attributes. Carrots and sticks. A regulatory regime that might (1) leave half of our developer's 500-acre forest as a contiguous fully protected natural habitat, (2) allow the landowner to be fully compensated for this 50 percent open space commitment through a combination of mitigation and ecological service payments, discussed below, and (3) enable the developer to make an even greater profit through the property value elevation that will often occur on the developed half of such a site by virtue of its location adjacent to an intact forest. A regulatory program that incentivizes this kind of integrated site planning could begin to build a bridge between the two seemingly irreconcilable worlds of environmental preservation and economic self interest. The owners of these lands would earn *more* money, not *less*, because of the land's ecological attributes.

Although many types of open space are facing fragmentation pressures, coastal and fresh water wetlands are some of the most endangered. Since these wetlands are often found adjacent to ecologically valuable uplands, protecting these areas from fragmentation is a logical priority. If new market-based policies could begin to provide meaningful economic incentives for the protection of wetlands, which are currently protected by the Clean Water Act, similar policies could be expanded to other land categories through new statutory programs.

So how might Congress, the U.S. Army Corps of Engineers (Corps) and EPA reshape the Clean Water Act's Section 404 wetland program to lay the foundation for a bridge between land conservation and economic growth?

Reconsider the Avoidance, Minimization, Mitigation Policy

Longstanding Corps rules and policy require prospective wetland permittees to first avoid jurisdictional wetlands and, if avoidance is not practical, to minimize the project's disturbance of jurisdictional wetlands. Unavoidable dredge and fill activity will be authorized but the impacts must be mitigated, either off-site or preferably onsite.

Too often, this policy leads developers to locate structures near (but not in) the site's wetlands. Where on-site mitigation is provided, the quality of the work, if it is performed at all, is often shoddy and of questionable ecological value. Even if wetland impacts are technically "avoided," without the benefit of the adjacent upland buffers that are often crucial for wetland health, the avoidance/minimization policy has the effect of allowing "protected" wetlands to rapidly degrade. I visited one such "avoided" wetland not long ago. It was a small marshy area within 100 feet of several hydrocarbon storage tanks that were sited to avoid the wetlands. The "protected" wetland, which wasn't much to write home about before the tank project, was now withering and for all practical purposes, lifeless. What a waste.

Earlier this year, the Corps announced its intention to streamline and broaden the scope of its wetland

mitigation banking policy. A new policy is expected to be released by the end of 2005 or early 2006 that actively encourages the use of offsite wetland mitigation banks. Thoughtful conservationists should support this new approach as well as other complementary policies that actively encourage large-scale off-site mitigation banking, moving away from the kind of localized postage-stamp mitigation that often achieves so little real ecological benefit. In terms of the Clean Water Act's 404 program, I would go so far as to say that the policy should expressly authorize projects that entail the disturbance or elimination of low-quality wetlands (especially those that are soon likely to degrade due to non-regulated conditions or activities such as projected development of adjacent uplands) in return for the developer's financial support for regionally prioritized wetland mitigation projects within the same watershed or an immediately adjacent watershed. There is nothing in section 404 of the CWA that would expressly prohibit such a policy, even if the project sponsor was not required to avoid or minimize impacts to the low priority wetlands.

Many urbanized regions of the country are beginning to identify vital wetland (and associated upland) resources that are threatened by suburban sprawl. If these areas were targeted for protection as priority mitigation banking sites, the owners of the targeted land would have a logical incentive to investigate conservation as one of their best land use options. Mitigation buyers could become classic "anchor tenants." It would then be possible to supplement these mitigation revenues with revenue from emerging markets for ecological services, (*e.g.*, storm water detention) and low-impact natural resource extraction, (*e.g.*, sustainable timber harvesting). The careful stacking of these conservation-compatible business elements could provide a powerful incentive for land conservation, especially if traditional sources of conservation funding from government and philanthropy were added to the mix.

Use Government Mitigation Policies to Support Emerging Markets for Ecosystem Services

There is a potentially vibrant market for certain goods and services provided by intact ecosystems,

particularly the services provided by sizeable undeveloped tracts (*e.g.*, 500 acres or more) that are threatened by fragmentation from metropolitan sprawl. These markets are evolving around economically valuable services that intact ecosystems provide to identifiable entities, such as storm water detention (flood control districts), water quality enhancement (water utilities), carbon sequestration (electric utilities) and erosion control/sediment capture that reduces dredging expenses (port authorities). This market is further driven by suburban communities concerned with protecting their property values and quality of life, hunting and fishing groups concerned about disappearing habitat, agencies concerned about the loss of natural hurricane buffering capacity provided by coastal wetlands and many other interests that are beginning to see the economic value of intact ecosystems that they have taken for granted. While this market faces many challenges, since it often relies upon a private party's willingness to pay for services that may be shared with the public as a whole, there are many ecological service functions that disproportionately benefit a single identifiable party. These parties can form a buyer base for the owner of the service-providing land.

It is quite possible to identify the most important and threatened parcels of land within any given watershed. These lands will often contain jurisdictional wetlands and associated uplands. Such sites could be formally designated as "regional conservation priority sites," either because of their existing characteristics or because of enhancements that could be made to the property. The mitigation anchor tenant need not be limited to wetlands mitigation buyers. There are several federal and state laws and policies that provide a market for environmental mitigation, including but not limited to National Environmental Policy Act, the Endangered Species Act, the Coastal Zone Management Act and the Supplemental Environmental Project policies of EPA and most states. Streamlined governmental approval procedures for mitigation banking proposals targeting these sites could provide a mitigation-based "anchor tenant" for a conservation-based site plan, especially if those policies allowed the bank sponsor to devise and implement multi-faceted land use strategies for the site to generate additional

revenue from ecological service purchasers, sustainable development participants (*e.g.*, selective timber harvesters or ecotourism companies) and funding from non-profit or governmental conservation agencies. There is a vital need for mitigation policies that allow this kind of supplemental value stacking.

Recognize That You Need Sticks

As noted above, wetland mitigation has had a very spotty track record in the United States in terms of ecological uplift performance. Mitigation commitments are often performed badly or ignored altogether. Any market-based program of the type described above *must* reverse this poor performance record. At least three policy changes are essential to ensure that mitigation success is better assured.

First, mitigation (or ecological service) buyers and sellers must face joint and several liability for meaningful sanctions if mitigation commitments are breached. Financial assurance mechanisms, including the creative use of performance bonds, could go a long way to address this fundamental requirement.

Second, ecological uplift standards for offsite mitigation must be flexible but demanding. While tradeoffs will often be required that fall short of 100 percent preservation, there is no reason to set a low bar in terms of ecological performance metrics for mitigation sites. At the same time, the conservation community must recognize that the kinds of land we are talking about will rarely be preserved by attempting to prevent the landowner from profiting or simply demanding that privately owned property remain as public open space. Our constitution and our free market economy do not accommodate this approach and it is short-sighted and naïve to believe otherwise. If land conservation is a worthy goal, we should be willing to use the power of our market economy to incentivize it.

Finally, there is a need for greater simplicity in a market that addresses a subject as inherently complex as ecosystem conservation. The owner of a 500-acre ecologically valuable bottomland hardwood tract within a growing suburban area needs to know, with some reasonable level of certainty, that a commitment to

conserve the majority of that tract will generate a certain range of financial returns if that commitment is (1) structured to be attractive to prospective investors who stand to benefit from the conservation commitment, (2) implemented in accordance with governmentally prescribed guidelines that ensure a net ecological gain and (3) coupled with assurances that the conservation commitments will be honored. Governmental mitigation policies can further this goal by reducing as much red tape as possible and by accommodating the reasonable need of mitigation bankers for economic certainty, *e.g.*, assurances that the government will not become a direct competitor by setting up a competing mitigation bank within the same service area.

The Triple Win Concept

U.S. conservation policy today relies primarily upon the ability of shrinking government funding and private philanthropy to purchase threatened lands. These sources of funding cannot come close to meeting the challenge. Over two million acres of rural open space are converted to urban sprawl each year. If present trends continue, most intact ecosystems surrounding the nation's 280 metropolitan areas will be completely fragmented within a generation, two at most. Even if every state in the continental United States were to purchase, for long-term conservation, one percent of their privately owned suburban/ex-urban land base each year (a land base of approximately 200 million acres), at an average price of \$6,000 per acre, the cost over 10 years would be \$120 billion. This sum vastly exceeds government/foundation budgets for conservation, which total about \$2.5 billion per year. Market mechanisms are clearly needed to supplement philanthropic and governmental conservation funding. The benefit for future generations would be enormous.

A market-based approach to conservation could begin to incentivize many landowners to begin seriously evaluating the potential of their property to generate conservation-based revenues. Strategies that combine 2-3 mitigation/ecological services features with conservation-compatible limited development activities can clearly yield competitive financial returns. Without such incentives, many of these landowners will never

make such an assessment. Indeed, most landowners will continue to view their land's environmental attributes (wetlands, endangered species, *etc.*) as liabilities, not as assets. If a new, market-oriented approach to land conservation were coupled with stringent, but flexible, performance standards and financial assurance mechanisms to ensure that agreed-to conservation outcomes were actually achieved and maintained, substantial conservation outcomes could be catalyzed by a triple-win concept:

- Allowing conservation-minded landowners to “win” by generating at least as much revenue from conserving a majority of their land as they could generate through a normal arms-length sale to a private developer;
- Allowing each conservation buyer to win by sharing its conservation investment with others; and
- Ensuring that the public wins through the protection or creation of open space and functioning ecosystems.

Brad Raffle is a partner with Baker Botts L.L.P. in Houston, Texas.

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