Ecosystem Services Conference
Naples, Florida
December 2008

Good morning! I am delighted to join you. The daily fare of any federal agency is a composite of crises, communications, deliberation, and decisions. There is precious little opportunity for intellectual forays and contemplation of conceptual conundrums or cutting edge analysis and policy assessment.

I was pleased, therefore, to read the abstracts for this conference and review the rapidly broadening realm of ecosystem services thought and practice. I am intrigued to delve into both conceptual and practical considerations for incorporating ecosystem services into investment decisions, policy calculations, and a conservation agenda.

Let me first offer a resounding acknowledgement of Nature's benefits—what Paul Hawken, Gretchen Daily, and others call Nature's Capital, and still others call ecosystem services. Whatever the nomenclature, there is little dispute over the underlying fundamental concept that natural ecosystem cycles, processes, functions, and components generate significant benefits for human well-being.

These benefits are multi-dimensional. The ecosystem services literature is full of different typologies. In the Millenium Project, we see references to provisioning, regulatory, supporting, and cultural services, a typology sometimes supplemented by reference to "preservation services." Others categorize goods and services differently and draw distinctions between ends or outcomes and supporting processes. Whatever the typology, the concept of ecosystem services is relevant to how we manage lands, water, wildlife, and resources.

Consider Interior's portfolio, which offers a glimpse at the spectrum of ecosystem services, their promise, and their challenges. Interior manages millions of acres of wetlands. We all know their ecological benefits—the biodiversity they sustain. Increasingly, we also recognize their role in water purification. Many have strived to put a dollar tag to those benefits.

New Jersey assessed the value of ecosystem services in the state. In that assessment, analysts pegged the value of wetlands at $9 billion per year for the water filtration, waste treatment, and flood buffering they provide.

Along the Gulf Coast—and other coasts—wetlands and sea marshes have yet another benefit: they serve as "horizontal levees." At some locations, each 2.7 miles of sea marsh reduces storm surge by one foot.

Or, consider urban settings and benefits of natural landscapes and permeable surfaces. These surfaces help absorb stormwater runoff and cleanse it as it percolates through the soil. These permeable surfaces reduce pollution and help replenish groundwater.

Stanford scholar Gretchen Daily, through many articles, has made near legendary among ecosystem service scholars the tale of New York City's water supply and its nexus to the Catskill Mountains. In 1989, the city faced growing water quality challenges as development in the watershed added contaminants to water supplied to the city. The increased development also reduced watershed filtration capacity of some 2,000 square miles of rivers, streams, and lands linked to the New York City water supplies. The city faced the option of investing some $9 billion in a mechanical water filtration plant or putting $2 billion into restoring Nature's Capital through purchasing buffer lands and improving riparian ecosystems.

Beyond wetlands and watersheds, many of us recognize the heat island effect of paved-over urban places and the simple cooling effect of natural landscapes with trees amid urban settings. One organization—American Forests—looked at many of America's cities, reviewing the ecosystem services of tree canopies and estimating their value.

The cooling benefits of tree canopies in San Antonio were estimated to translate into $17.7 million in residential summer energy services per year. A failure to enforce basic shade tree requirements on 122 acres of Atlanta parking lots resulted in an estimated $500,000 loss in stormwater runoff services. The decline in tree canopy in Houston was calculated to result in a loss of $38 million in annual air pollution removal services and $237 million in stormwater management services foregone.

These ecosystem services are nontrivial. Yet nationwide in 10 U.S. cities, an estimated 631 million trees have been lost to suburban and urban development.

Some cities are taking action. Roanoke, New York City, and others have set tree canopy goals. Bellevue, Washington recognized the benefits of Nature's Capital and revised its stormwater fees from charges based on road frontage to charges based on the amount of impervious surface.

These efforts tiptoe into a reconsideration of urban landscapes and their interface with the environment. These tales offer just a snapshot of ecosystem services. Their list of benefits is long and varied.

But let me turn to matters of evaluating and measuring ecosystem services. Let us divert our attention, for a moment, to a parallel topic: environmental performance management. I use the term "environmental performance" as a reference to ecosystem or environmental management goals. What are we trying to do? How do we measure success?

Federal agencies and others struggle with efforts to move away from output measures like numbers of acres restored to outcomes, like the restored hydrological functioning of a wetland. Managers grapple with which metrics are meaningful in different settings. Those attempting to articulate environmental performance measures face challenges of aggregation and averaging. They face challenges of both technical and data limitations. They face challenges of defining the scope, scale, and timeframe for evaluating performance. They face challenges of context and situation. And they face problems associated with inconsistent data sets. But these exercises in developing performance metrics are not, as those gathered well appreciate, the same as efforts to calculate, count, and measure Nature's benefits.

Yet both efforts confront similar challenges. Let me offer a couple of observations regarding the second exercise—the calculation of ecosystem services.

Such calculations can surface in several relevant contexts—and the challenges can vary from context to context. Consider public and private investments in infrastructure. This context presents several potential questions:

- What is the comparative cost-benefit performance of investing in horizontal levees (through, for example, sea marsh restoration) versus investing in traditional concrete, civil-engineered levee systems?
- What is the comparative cost-benefit ratio of using wetlands for water purification rather than a tertiary mechanical treatment facility?

Both of these situations involve questions of science, engineering, and the calculation of project construction and operating costs. Both involve science and engineering assessments of benefits. To my mind, this set of problems is among the easiest to grapple with. Indeed, organizations both public and private are increasingly evaluating options of "green" versus what some call "gray" infrastructure.

If an infrastructure investment decision involves a pre-determined policy goal—community storm protection or, say, a previously regulated water quality goal—one need not calculate the dollar benefits of community safety or water quality. Instead, the task is one of comparing the costs and performance of a civil-engineered solution with the costs of a bio-engineered solution that uses Nature's Capital. This is precisely what we see with manufacturers and some cities that are moving toward use of wetlands for water purification rather than relying on mechanical treatment facilities.

These types of decisions fall into the category of what one author, Ruth DeFries, and her colleagues call win-win opportunities. New York City's Catskill Mountain watershed restoration is, perhaps, the most renowned poster child of win-win opportunities. The City achieves water purification benefits and does so at lower infrastructure costs than the traditional water treatment facility solution. DeFries and her colleagues point, also, to other low-hanging fruit—circumstances of small cost but big societal gains. Consider, they suggest, "precision farming" in which relatively small reductions in fertilizer can have big reductions in nutrient loadings with very little impact on agricultural productivity.

But another kind of investment decision is more challenging. Many land-use decisions or resource management decisions involve tough trade offs. Limiting development at an urban perimeter may maintain some ecosystem services, for example, but may limit wealth-creating economic opportunities. This larger context of evaluating trade offs—of establishing fundamental policy goals and understanding multi-dimensional costs and benefits of different land uses and resource management decisions—presents significant calculation conundrums.

China undertook just such a calculation in comparing water flow, hydropower, and water quality benefits of riparian forests with the countervailing economic benefits of logging. In that comparison, maintaining trees and watershed protection yielded estimated benefits greater than those from timber harvesting. China undertook this analysis. Yet that endeavor was an exception, not the rule. Too often, and for too long, the benefits of ecosystem services have not been part of our economic or policy calculus.

For ecosystem health, one metric is contribution to economic productivity—say, improved shrimping along the Gulf Coast or enhanced fisheries in Western streams. Yet such calculations capture only a part of potential benefits. What about aesthetic, spiritual, cultural, and human health benefits? Or are they already captured—implicitly—in land prices? Economic calculation is particularly challenging in the absence of value-revealing transactions in the marketplace.

Yet analysts also face science conundrums and issue-framing challenges. What, for example, is the appropriate scale or scope for valuating ecosystem services in a world of interconnectivity? Drawing analytic boundaries depends, in part, on the decision context. There is no “right” boundary. What about the timeframe? What is the right timeframe for analysis, especially when actions and corresponding effects often have considerable time lags? How might we analyze and incorporate nonlinear responses to land use changes into calculations? These are not easy questions—and they have no right answers.

These analytic problems are compounded by devilish details. Not all wetlands, or forests, or grasslands, or watersheds are equal, to put this matter in prosaic terms. Each location has different rates of carbon sequestration or varying qualities as storm buffers or different capacities for filter contaminants from the air or water.

The scope of this conference is broad. Many of these problems of economic and scientific analysis figure prominently on the agenda. Perhaps less focus is given to the nexus of these issues to the public policy setting and policy tools as they relate to ecosystem services. That setting is one of inevitably constrained time and resources. Knowledge-building and analysis have costs—both temporal and financial.

Sometimes making institutional adjustments—exploring incentive systems, mechanisms to assign rights to bundles of ecosystem services, or different contract models—can facilitate the sustained incorporation of ecosystem services into economic transactions. Such mechanisms can overcome the oft-described externalities problem associated with some ecosystem services.

Facilitating such institutional changes can realign incentives, generate information regarding values, and move us beyond what can be both contentious and arduous problems of calculation.

I applaud your efforts to grapple with these and other questions. Two things are certain: the effects of environmental transformations often are not well considered in many decisions, both public and private; and the benefits from drawing upon Nature's Capital in these decisions still are often overlooked. Yet these benefits are increasingly scarce. One estimate puts 40% to 50% of the Earth's ice-free land as transformed or degraded. In the United States alone, the urban land base is expected to triple over the next several decades.

These projected land transformations underscore the timeliness of ramping up our look at natural systems and their role in maintaining clean water, clean air, safer coastal communities, and other effects that benefit both mankind and wildlife. I thank all of you for your serious consideration of these questions.