



Ecosystem Services in Practice: Management Decisions in the Public Sector- From Theory to Application

Speaker

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2011 ECOSYSTEM SERVICES SEMINAR SERIES

Ecosystem Services Seminar 6: Ecosystem Services in Practice: Management Decision in the Public Sector – From Theory to Application

*Presentation and Discussion Notes From Panelists:
Dr. Lydia Olander, Dr. Mary Ruckelshaus, Dr. Carl
Shapiro, and Ms. Heather Wright*

Seminar Series and Seminar 6 Goals:

The goal of the multi-session seminar is to educate the broader conservation community including practitioners and funders on the diverse aspects of ecosystem services – such as how to account for ecosystem services and to effectively measure, manage, and communicate them.


Seminar 6 and associated readings focused on the following goals:

- *Public sector ecosystem services theory, implementation, and factors shaping management decisions*
- *Lessons from public sector ecosystem services implementation*
- *Public-Private partnerships and ecosystem services*
- *ecosystem services and investment planning*

This document is a product of the Gordon and Betty Moore Foundation's Ecosystem Services Seminar Series that took place between March and November 2011. For more information please visit www.moore.org or request "ES Course Info" from Heather Wright at info@moore.org.

Disclaimer:



This document is a summary that includes PowerPoint slides from the panelists, Dr. Lydia Olander, Dr. Mary Ruckelshaus, Dr. Carl Shapiro, and Ms. Heather Wright, and notes of their talking points. In addition, we provide a synthesis of important questions discussed during Seminar 6. Please keep in the mind that the following document is only a recap of the presentations and Blue Earth Consultants' notetakers have, to the best of their ability, captured the presentations. We hope that the following presentations and discussion notes will be used as resource to advance further discussions about ecosystem services.



Ecosystem Services in Practice: *Perspectives from the USGS Science and Decisions Center*

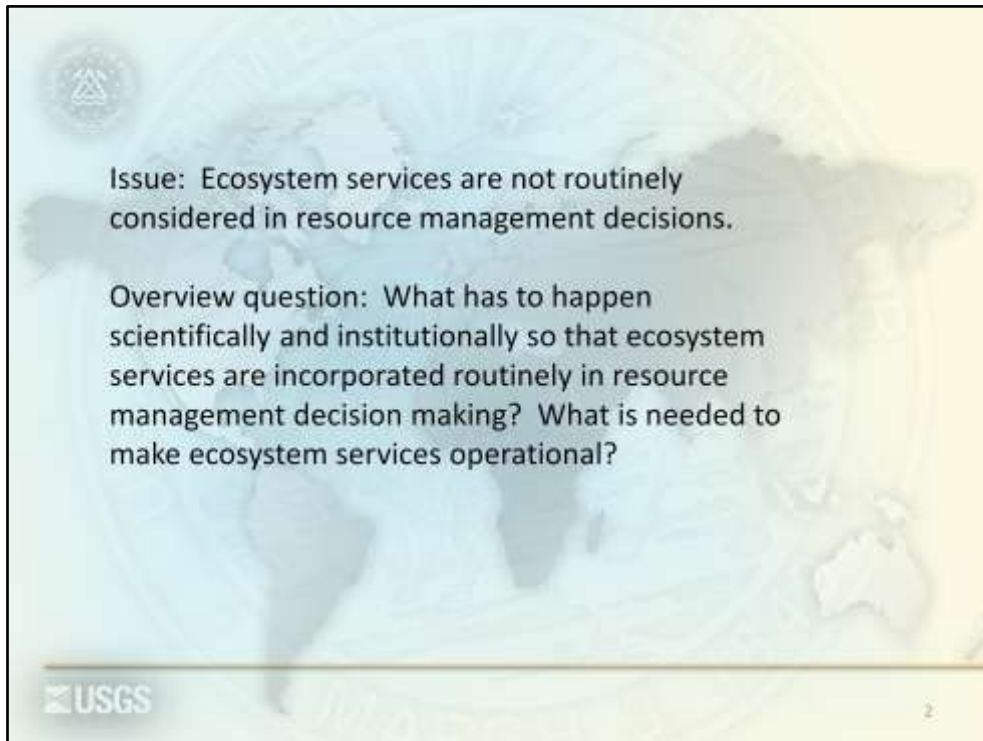
Presentation by
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The Gordon and Betty Moore Foundation
2011 Ecosystem Services Seminar Series
Palo Alto, CA
October 6, 2011



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Dr. Carl Shapiro



Issue: Ecosystem services are not routinely considered in resource management decisions.

Overview question: What has to happen scientifically and institutionally so that ecosystem services are incorporated routinely in resource management decision making? What is needed to make ecosystem services operational?

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- The basic issue is that we are not routinely considering ecosystem services (ES) in resource management decisions. We face a huge challenge to figure out a way to do this.

Establishing the Foundation: *Studying Ecosystem Services -- Success*

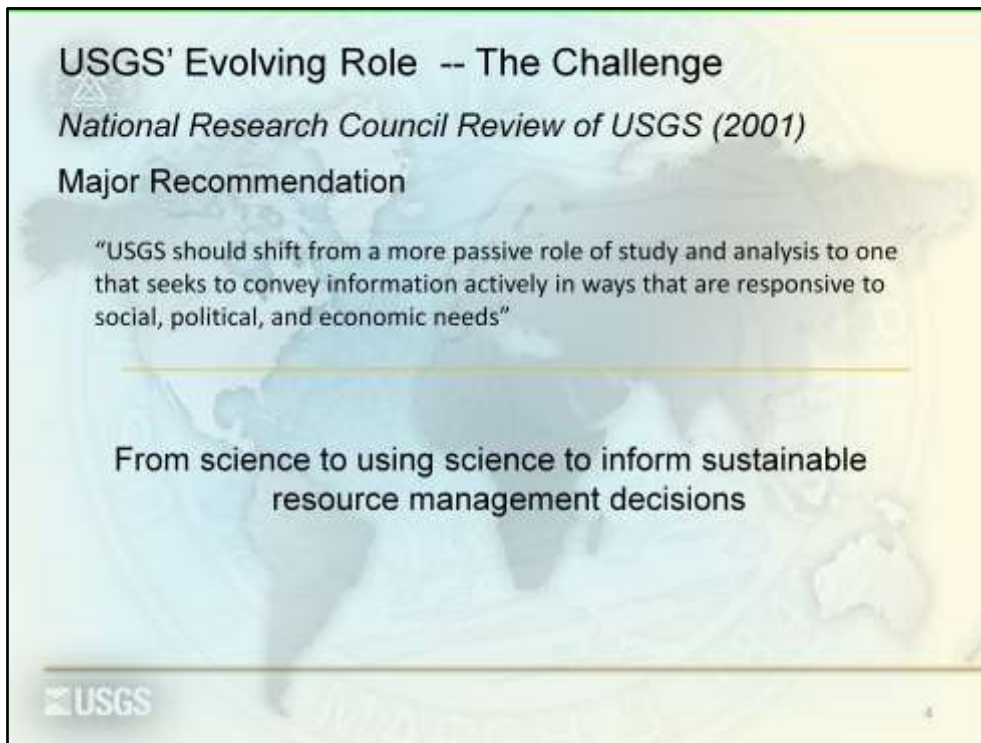
USGS Organic Act (1879)
“...classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain.”

USGS Mission
To serve the Nation by providing reliable scientific information to:

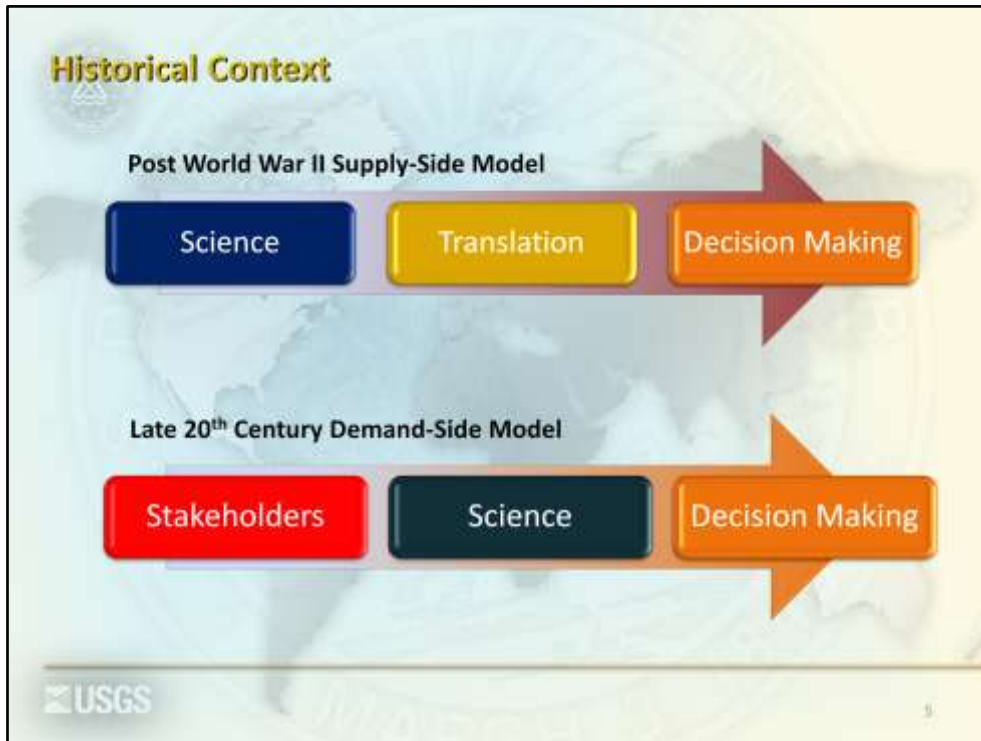
- Describe and understand the Earth
- Minimize loss of life and property from natural disasters
- Manage water, biological, energy, and mineral resources
- Enhance and protect our quality of life



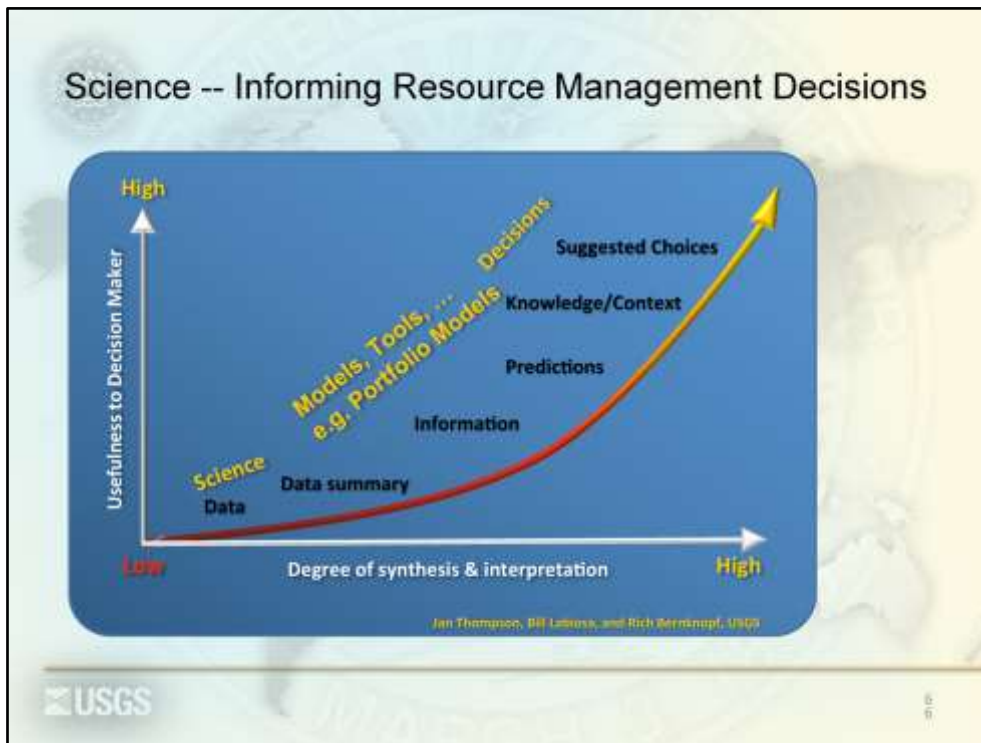
- I will speak today from a United States Geological Survey (USGS) Science Center perspective where we have been conducting a lot of science related to ES.
- The USGS's consideration for ES is apparent in the USGS Organic Act where the statutory language is all about ES.
- USGS's mission directly includes ES and their understanding. It is about providing information, not just the science, for decision-makers.



- In 2001, the National Research Council (NRC) did a study of USGS and recommended that USGS shift from a passive research role to one that is more actively producing science for decision-making.
- Again, in the context of this morning's discussion, the NRC was saying that USGS needed to shift its focus to inform decisions with ES. We need to move away from just doing science for science's sake and shift to doing science to inform resource decision-making. Essentially, we need to make science more useful for decision-makers.



- After World War II, science was dictated from the supply side. It was driven by the notion that we need to do good science, translate it, and then use that translated science for decision-making. This worked well for the time.
- As the 20th century ended, science moved to the demand side. In this model, the demand comes from stakeholders. Stakeholders define the relevant issues and the science is provided for the related decision-making.
- This short discussion about the historical context helps to set the stage about where we are heading today in talking about ES.




- Today, we are looking for synthesis. Science becomes more important and relevant for decision-makers once it is distilled and synthesized.
 - How do we combine information so it can share more disparate data?
- To get to this synthesis, it requires us to move along the curve to make information more useful for decision-makers.

**The Requirement:
Informing Resource Management Decisions –
Linking Science with Management**

A common analytical framework that facilitates balanced decisions across natural and developed systems

A structured decision process that allows decision making with uncertainty and incorporates new information as it becomes available

Methods that incorporate resilience, risk, and vulnerability



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- There are several things that we have to consider.
- First, we need to establish a common analytical framework. When we have this, we will be able to look at both natural systems and the values and assets we already have. We need to connect ES with terms like gross domestic product (GDP).
- Our GDP is something like \$14 trillion and the idea of ES and our natural environments has a tough time competing with such a powerful number.
- To some extent, our challenge is to establish a common analytical framework across these sectors. We need to express the values of ES produced in similar terms so we can discuss them and communicate across areas.
- Secondly, we need to acknowledge our uncertainty and develop a structured decision-making process.
- A structured decision process will help us make decisions knowing that things will change and allow us to incorporate new information as it becomes available. We still have a lot of unknowns and high uncertainty; management needs to incorporate these possibilities.
- Finally, we need to consider terms like risk, vulnerability, resilience, and identify what it takes for systems to recover from shocks.

Ecosystem services

ES provide an integrated framework for assessing the consequences of land and resource management decisions on the environment and for evaluating tradeoffs among resource management, conservation, restoration, and development alternatives.

This framework is especially important when assessing the impacts of dynamic systems caused by climate change, human settlement, and other drivers.

Because ES can be expressed in terms of monetary or non-monetary values rather than only as ecological or physical values, they can be evaluated and compared in different spatial or temporal settings.



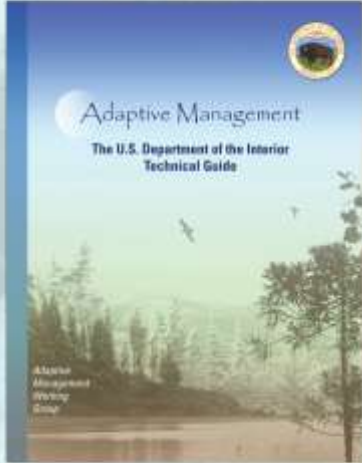
- ES provides us with that common analytical framework that we need. It is a mechanism by which we can make cross-sectoral comparisons. We can compare the value of ecosystems with things that have value in the developed world. ES functions have values that are commensurate with values in the developed world (GDP or some component of it).
- We are talking about the idea of measuring changes in ES.
 - What happens if we extract a resource?
 - What are the implications if we change the ES?
- There may be economic benefits or there may be economic losses. This is the kind of information that is critical for decision-makers.
- At last year's A Community on Ecosystem Services (ACES) conference, people discussed the dangers of not applying values to services. If we do not attempt to put values on ES, the value will be zero by default. This is a further argument that we need to find a way to value ES.

Adaptive Management

AM provides a structured decision process for iterative decision making when scientific uncertainty exists.

AM facilitates near-term decision making even when there is imperfect information about longer-term consequences.

The integrated conceptual framework provided by ecosystem services can be important to an AM decision process by contributing to the articulation of objectives, the assessment of potential management strategies, and the evaluation of management consequences.



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- Adaptive management is another critical part of the framework. ES need to be incorporated into this because uncertainty is high and we need a system that allows us to use new information as it becomes available.
- This needs to be an integral part of all decisions that use ES.

Resilience, Vulnerability, and Risk

Resilience, vulnerability, and risk provide measures of a natural, managed, or human system's ability to recover from sudden and severe shocks.

These elements can help frame the process of decision making, and play an important role in assessing the potential consequences of management strategies.

In this context they are directly connected to both AM and ES and are used to describe and define sustainability.

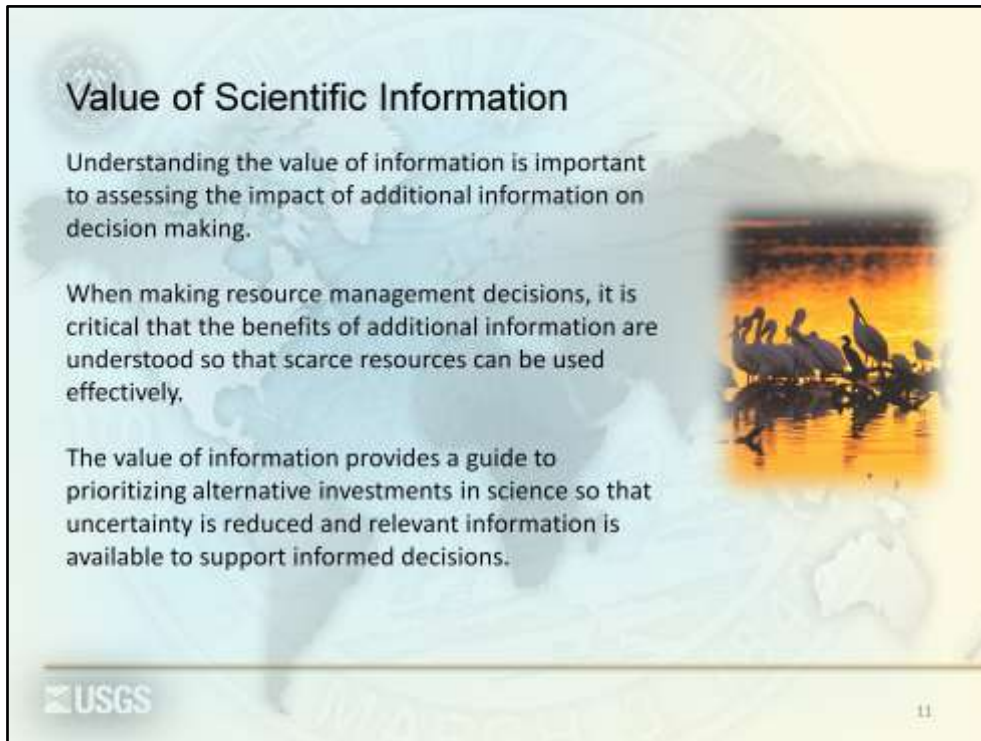


The image shows the cover of a USGS report titled 'A Framework for a National Ecosystem Risk Assessment and Management: Developing a Research Agenda'. The cover features a photograph of a person in a boat on a river, with a world map overlay on the right side. The USGS logo is in the top left corner, and the report title is prominently displayed.

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- We need to understand and develop metrics that allow us to measure resilience.
 - What are some of the factors that help us enhance resilience?
 - What can we do from a federal and nonfederal perspective to enhance resilience?
 - How can we restore our ability to have the provisions of ES?



Value of Scientific Information

Understanding the value of information is important to assessing the impact of additional information on decision making.

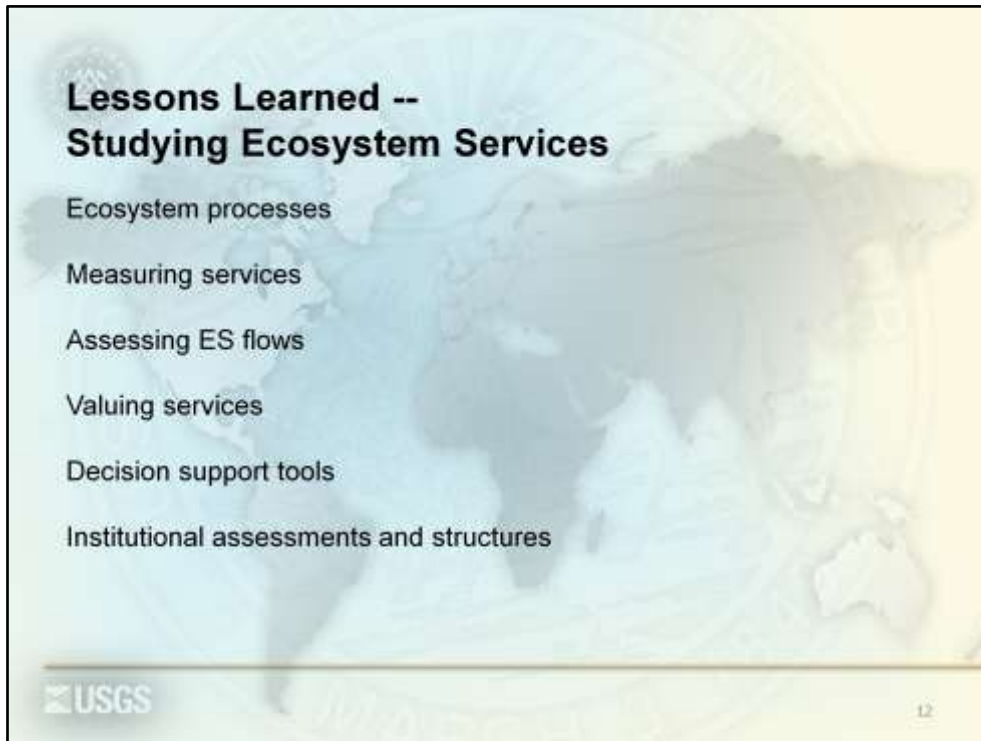
When making resource management decisions, it is critical that the benefits of additional information are understood so that scarce resources can be used effectively.

The value of information provides a guide to prioritizing alternative investments in science so that uncertainty is reduced and relevant information is available to support informed decisions.

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- Another important issue to discuss relates to scientific information, which is an important part of this.
- We need more information, but at the same time, we have scarce resources and small budgets. We need to prioritize the use of scientific information to inform the decisions that we have to make.
- All too often, we do not think about this prioritization. We have to make them on an informed and uninformed bases. We need more information and more insight in order for us to make better decisions.



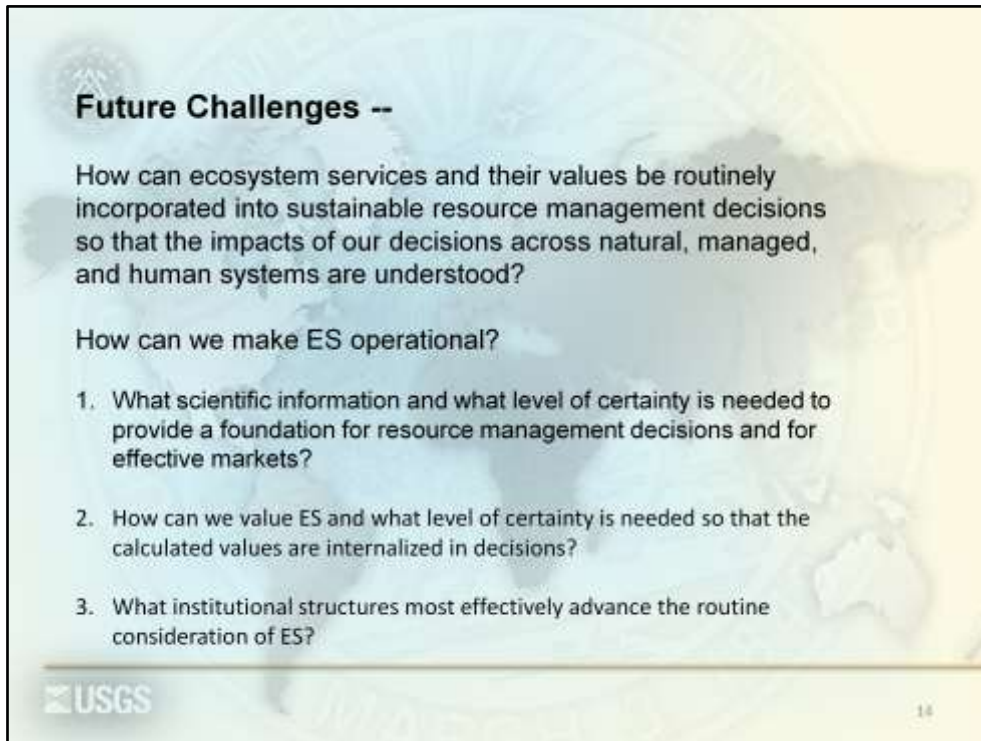
➤ Where are we now?

- USGS is measuring services and has made significant progress in the areas described on the slide. I will discuss a couple of them in more detail.
 - Assessing ES flows
 - The major challenge here is the disconnect between the production and the location of the beneficiaries. Bees are a classic example of this. We are doing a lot of work, but we have more to do.
 - Valuing services
 - Another big issue is how we value these service. Benefit transfer is less intensive but we do not know how effective it is or if it can be replicated. It is expensive and time consuming to recreate the process at each location, so finding a repeatable method is important.
 - We need to have metrics that are relevant for decision-makers. The decision-makers need to be convinced that the data is comprehensive and useful to them.
 - Our measure of success should not be whether or not something gets published in a journal, but rather if it gets utilized by decision-makers.
- How can we do this in a way that convinces people that the data they have meets their needs and has enough level of certainty?
- Decision support tools
 - USGS is working on an ES portfolio model where we combine human well-being and valuation models. Again, the challenge is not just in developing these models, but

developing them in a way so that decision-makers use them. This is not to

discount excellent work being done now, but it sets a target. We need scholarly work, but the end result has to be operational ES.

- Institutional assessment and structures
 - We have been experimenting with a lot of different structures, all of which are excellent, but we need to think about what structures will facilitate the use of ES. That is our target.



Future Challenges --

How can ecosystem services and their values be routinely incorporated into sustainable resource management decisions so that the impacts of our decisions across natural, managed, and human systems are understood?

How can we make ES operational?

1. What scientific information and what level of certainty is needed to provide a foundation for resource management decisions and for effective markets?
2. How can we value ES and what level of certainty is needed so that the calculated values are internalized in decisions?
3. What institutional structures most effectively advance the routine consideration of ES?

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- What are the challenges that we face?
- Again, the overall question is about making ES operational. The slides list certain questions that are likely to pose challenges in the future.

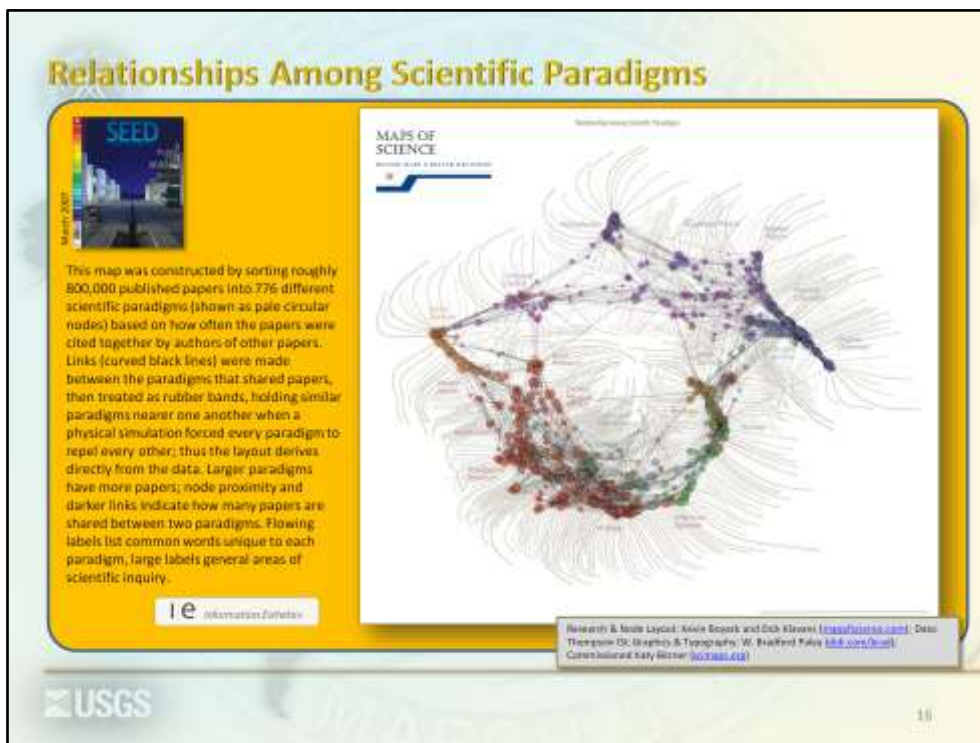
Future Challenges (cont.)


4. How can we address spatial issues related to ES flows so that they can be addressed in property rights?
5. How can ES markets be structured so that price can be market determined and provide a meaningful signal about the value of the service?
6. How can metrics for resiliency be developed so that we understand the ability of natural and managed systems to recover from sudden and / or severe shocks and so that the production of ES is sustainable?
7. How can the value of scientific information be more effectively determined and used to prioritize the science needed to better understand ES and to inform sustainable resource management decisions?
8. How can we more effectively communicate the concept of ES to technical and lay audiences?



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- One key challenge we face lies in the establishment of property rights that facilitate effective and routine considerations. Lawyers have a key part in this world; it is not just about ecologists. There are fiscal scientists and many other professionals; the community is broad.
- Another challenge we face with payment for ES (PES), is that we have public funds paying for restoration when those responsible should cover the costs. Furthermore, in many cases we are paying for them without market information and independent of the actual price.
 - How can we better use markets to not only provide a mechanism, but also to provide information on how to pay for them?
- Finally, we need to figure out how to explain this broadly and not just to people in the conservation community. To be successful, we need to reach out beyond the conservation community and include mainstream people.





USGS Science and Decisions Center

A multidisciplinary center with a mission of advancing the use of science in sustainable resource management decisions with emphasis on ecosystem services, adaptive management, and resilience.



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- As I close today, I want to leave you some information about the USGS Science and Decision Center.



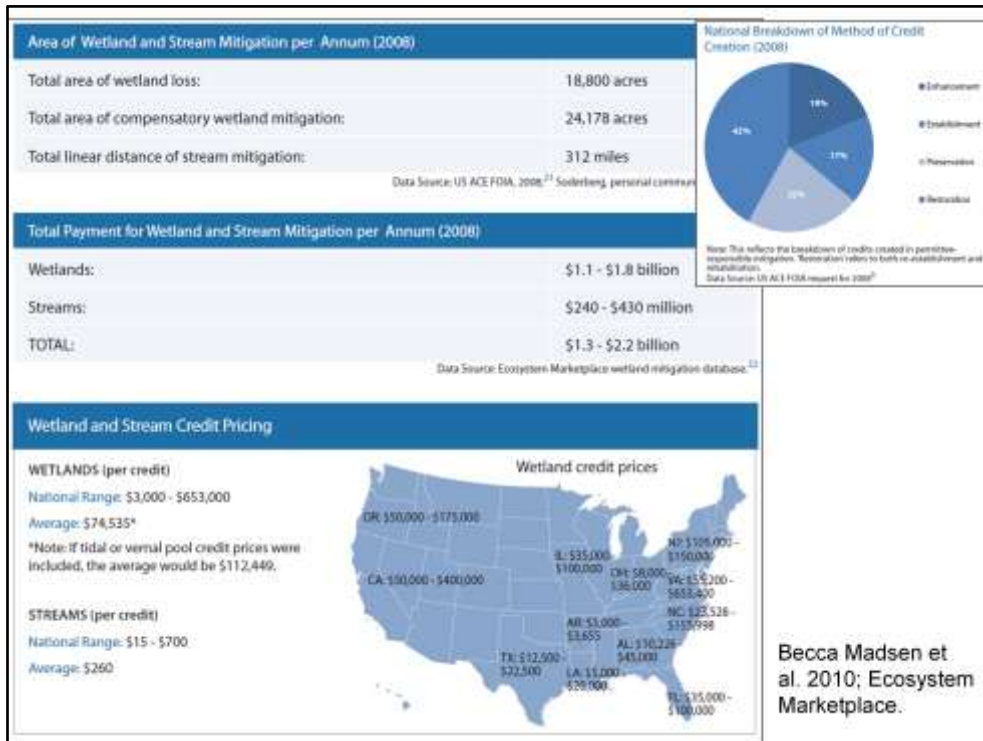
Dr. Lydia Olander

- Before we begin, I would like to acknowledge Bill Holman, Martin Doyle, and Emily Bernhardt who have all been instrumental and who's work is very relevant to today's discussion.
- The three of them are people who have helped to get me and other faculty members at Duke University to think about ecosystem services (ES) and its related topics.
- I have worked a lot with greenhouse gas policy and with Reducing Emissions from Deforestation and Forest Degradation (REDD) so some may be surprised to see me doing wetland work. At Duke, there is lots of interesting work related to water and in North Carolina, there are many mitigation programs.
- As some context, there are a number of ways ES can be incorporated into the public policy tool box.
- The regulatory guidance and mitigation mantra used for projects is to: avoid, minimize, and mitigate. Policies can do the same.
 - Integration of ES values into decision-making will work to avoid damages (and perhaps enhance services).
 - Payments for Ecosystem Services (PES) is an incentive based approaches used to avoid and/or mitigate damages.
 - Market/regulatory-based approaches, which address externalities, work to pay for damages and have mitigating or offsetting effects.
- The take home here is that we need all of these policies; regulatory mitigation should be our last defense not our only.

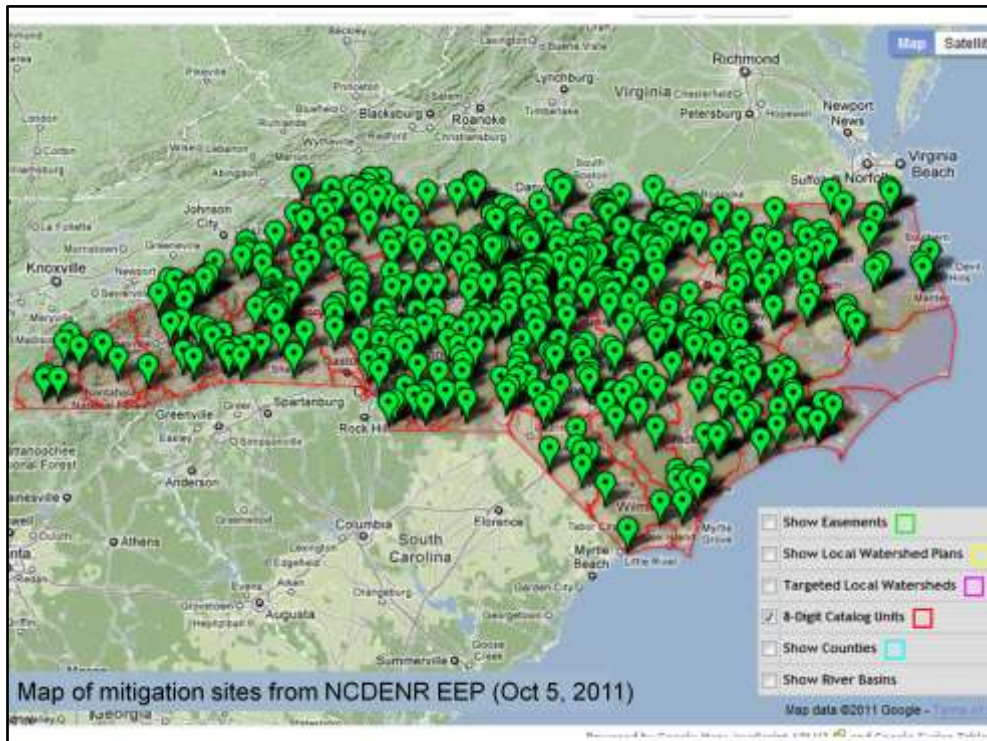


- One reason I thought this slide was interesting is because it shows the ways our watersheds have changed over time and it provides some context for compensatory mitigation.
- The Clean Water Act (CWA) is the oldest and largest mitigation program.
- Wetland regulation in the United States is rooted in the U.S. Federal Water Pollution Control Act of 1972 and the Clean Water Act of 1977, which provides for the protection of “waters of the U.S.” under the Interstate Commerce Clause of the U.S. Constitution. Congress designated the Army Corps of Engineers (Corps) to administer Section 404 for waters of the U.S. with oversight from the U.S. Environmental Protection Agency (EPA). Through judicial interpretation “waters of the United States” includes wetlands. As part of the 404 program, the permittee must mitigate wetland damage, a process through which they (a) avoid all possible impacts, (b) minimize unavoidable impacts, and (c) provide compensatory mitigation of unavoidable impacts, i.e., create, restore, or preserve wetlands such that there is no net loss of cumulative wetland ecosystem function.
- In the early years of this regulation (until the mid-1990s), compensatory mitigation was usually performed on-site by the permittee (also often called the ‘developer’ or ‘impactor’), resulting in the creation or restoration of numerous, small mitigation sites with limited ecological value in comparison to existing reference, less disturbed wetlands. During this period, regulations also began promoting off-site compensatory mitigation by permittees.
- Although this was thought to promote better mitigation, the ecological values of these compensation sites were also often extremely low, and the permittee, often a private land developer or a state department of transportation, did not want to be in the business of ecological restoration.

- In response to slow Section 404 permitting and high permittee-responsible mitigation costs throughout the early-1990s, entrepreneurs and regulators proposed creating large, consolidated areas of constructed wetlands, known as ‘mitigation banks,’ as pre-impact or advance mitigation. In order for a mitigation bank to be created, and credits from that bank sold, the mitigation banker must have the site approved by a Interagency Review Team (IRT) which is made up of personnel from the Corps, EPA, and other local or federal natural resource agencies (e.g., U.S. National Marine Fisheries Service, U.S. Fish and Wildlife Service, and state departments of environmental conservation).
- A key requirement of mitigation banking is that wetlands should be restored in advance of impacts. In less-developed regions of the US, however, mitigation bankers are unlikely to speculatively invest in banks because it is doubtful that there will eventually be sufficient demand for the created credits. Such markets are known as ‘thin’ markets. This lack of economic incentive to invest in mitigation banks has a feedback to development activities, as development activities become hindered or slowed by the lack of available mitigation banks in a region since developers cannot easily obtain a 404 permit. Such lack of available advance credits created the impetus for in-lieu fee (ILF) programs.
- ILF programs are run by government or non-profit entities that collect fees from developers (in-lieu of actual compensation) and then consolidate these fees over time to build the necessary capital to restore wetlands. Similar to mitigation banks, the obligation and associated liability for providing compensatory mitigation under ILF programs is transferred from the developer to the third-party mitigator.
- To summarize, compensatory mitigation of wetlands can now take place through three mechanisms:
 - permittee-responsible mitigation;
 - purchase of credits from a mitigation bank; or
 - purchase of credits through an in-lieu fee program.
- There are 38 Army Corps of Engineers and they all have differences in the way they apply the rules.
- Streams and rivers used to be mitigated with out of kind restoration (i.e. wetland or another different ecosystem type), but now we are starting to see stream mitigation. It has grown so much that it is starting to surpass wetlands.



- This is from Ecosystem Marketplace. It gives you the sense of the drivers, which provides scale, mechanism to transfer liability to make it work for developers and creates value through private engagement and investment.
- In a lot of ways the policy is working in this space.
- Just because the program is working at a large scale, does not mean that we have achieved outcomes we had hoped to.



- This is a map of North Carolina Ecosystem Enhancement Program (EEP) and its mitigation sites.
- In 2003, the Department of Transportation (DOT) and the Corps teamed up to mitigate road building activities; the in lieu fee program became the main pathway for mitigation.
- EEP program has a few other pathway such as, nutrient offsets and buffers. Initially it was for DOT but now private developers can use it as well.
- With rapid suburbanization, there are 560 projects statewide.
- Zero DOT projects were delayed because of lack of mitigation, which helped move forward about \$6.5 billion in transportation projects.

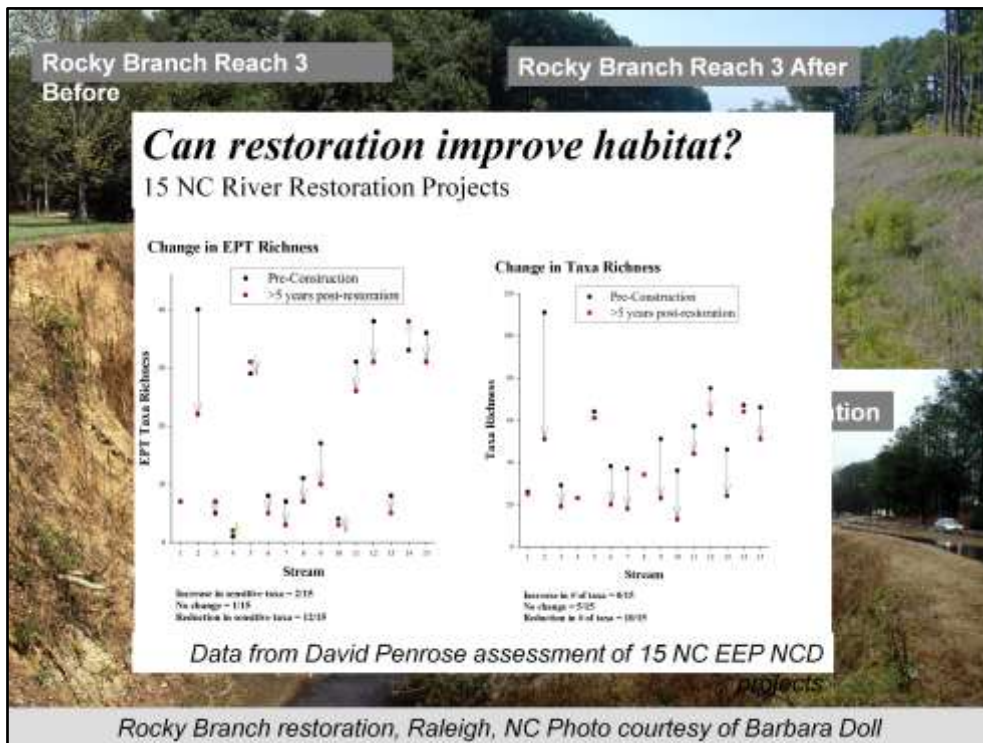


- In North Carolina, there is a lot of agriculture. Wetlands were cleared to make room for agriculture and now we are converting it back.
- In 2005 and 2007, EEP was ranked as a top 50 innovative government programs by Harvard University's Kennedy School of Government and won a prestigious award in 2005 from the National Association of Environmental Professionals.
- Instead of putting DOT in charge of restoration, an environmental organization conducted restoration activities, which increased restoration quality.
- It was a way to gain more strategic planning on how to set up mitigation opportunities and where to place banks.
- It allows for economies of scale so you could aggregate and address thin markets problem.



- "State records show that more than 30 stream restoration projects totaling more than \$30 million have failed over the past decade. That represents more than 30 percent of the stream restorations the state has completed in that time" (News & Observer SUN, APR 17, 2011).
- In several cases, improper design or construction flaws contributed to the failures, but the businesses that made those mistakes rarely ate the repair costs. None were barred from future work.
- There have been a lot of problems and I will go through some of those related to policy:
 - Stacking incidents, where they pay twice. This happens often and only rarely gets press. They sold wetland mitigation as nutrient offsets and effectively sold it outcome twice. There is an internal demand for quantity instead of quality. Now, rules exist to help to avoid this issue.
 - In lieu fee program, allows development to proceed without mitigation. It take 5-7 years for any mitigation to happen and is opposite of banks. In lieu fee is set too low and reduces money available for monitoring. In North Carolina, the price was set by legislature; it was too low and it is changing now.
 - North Carolina has a relatively small service area, which has pluses and minuses. Recent legislation prioritizes mitigation banking and requires the banks to be in place before impacts are incurred.
- We have learned a great deal about policy design:
 - We know that we need transparency and now there is a database where you can see where the work is happening.
 - Timing matters.

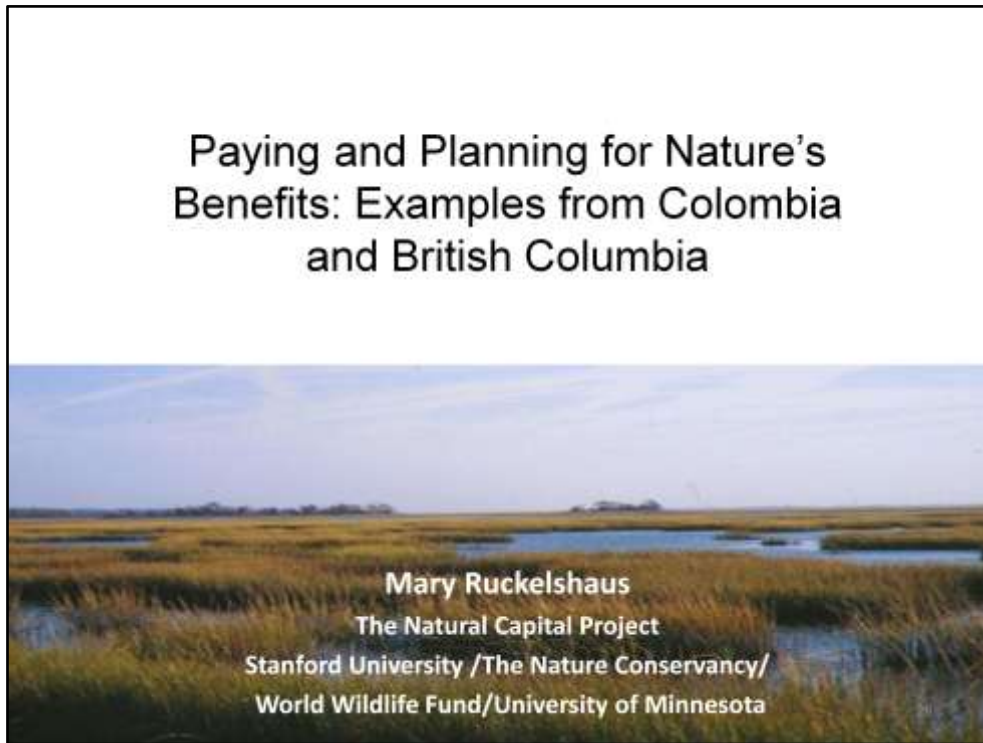
- Knowing the true cost is important so we do not use public funds and philanthropy to fund development. Developers should pay based on the true costs of their activities.
- Mitigation banks are good for economies of scale that are further away from urban areas.
- In lieu fees are good for small projects.
- There may be multiple different tools in our toolbox.



- This is a restoration site in Raleigh, North Carolina.
- We learned about ES outcomes and other questions that we need to answer.
 - What is performance and how can it be measured in these sites?
- Acreage is not good enough. The researchers I mentioned earlier are thinking about this question and how it relates to ecological uplift.
 - What type of mitigation where provides which services? Where about size?
 How does form relate to function?
 - Is restoration working? If not, how do we make it work?
- Martin Doyle is trying to understand how form relates to function, which can be used to better advise site selection.
- With stream restoration, we are finding problems with mitigation. We have a variety of different measurements at 15 restoration projects, five of which are post-construction.
- At these sites, we looked at insect diversity and found declines in species richness. We realized the species richness decreased because stream temperature increased from loss of side bank vegetation, which provides shade and reduced erosion. These are clay bank streams and so there is a lot of erosion and storm damage. Nearly 30% of stream restoration sites are having problems.



- The slide lists some targets for us to achieve by advancing ecological science in the future.
- We are having problems with replacement; it is not always working, but should be our last line of defense. Keeping development prices high may be a way to reduce harm and increase avoidance.
- “Ecological restoration is an activity that ideally results in the return of an ecosystem to an undisturbed state. Ecosystem services are the benefits humans derive from ecosystems. The two have been joined to support growing environmental markets with the goal of creating restoration-based credits that can be bought and sold. However, the allure of these markets may be overshadowing shortcomings in the science and practice of ecological restoration. Before making risky investments, we must understand why and when restoration efforts fall short of recovering the full suite of ecosystem services, what can be done to improve restoration success, and why direct measurement of the biophysical processes that support ecosystem services is the only way to guarantee the future success of these markets. Without new science and an oversight framework to protect the ecosystem service assets on which people depend, markets could actually accelerate environmental degradation.” From Margaret Palmer and Solange Filoso (Science Perspective July 2009).
- My concern is if we have issues at a large scale, we will lose public support.
- The Nicholas Institute for Environmental Policy Solutions is trying to find ways to improve the system we currently have.
- There are other areas where lessons can be transferred like with water quality trading, storm water trading among different municipalities.
- There are policy implementation and science questions in all of these.



- There are two very different entry points for ecosystem services (ES). The Natural Capital Project (Nat. Cap.) has been working in the decision context.
- Nat. Cap. has been trying to demonstrate how this information can make decisions and how we can learn from it.
- I will talk about two specific projects today. The first is in Colombia and is a payment scheme for a water fund investment. The second is in British Columbia and involves marine spatial planning (MSP).

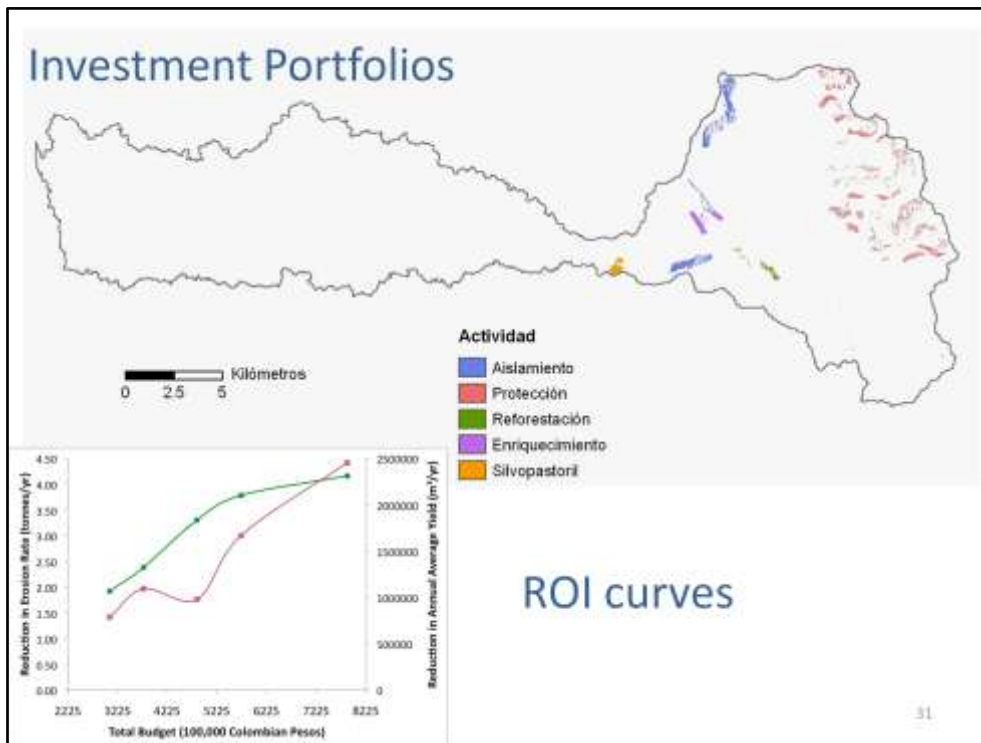
Outline

- Overview
- Successes and Challenges
- Requirements and Enabling Conditions
- Lessons Learned
- Future Challenges

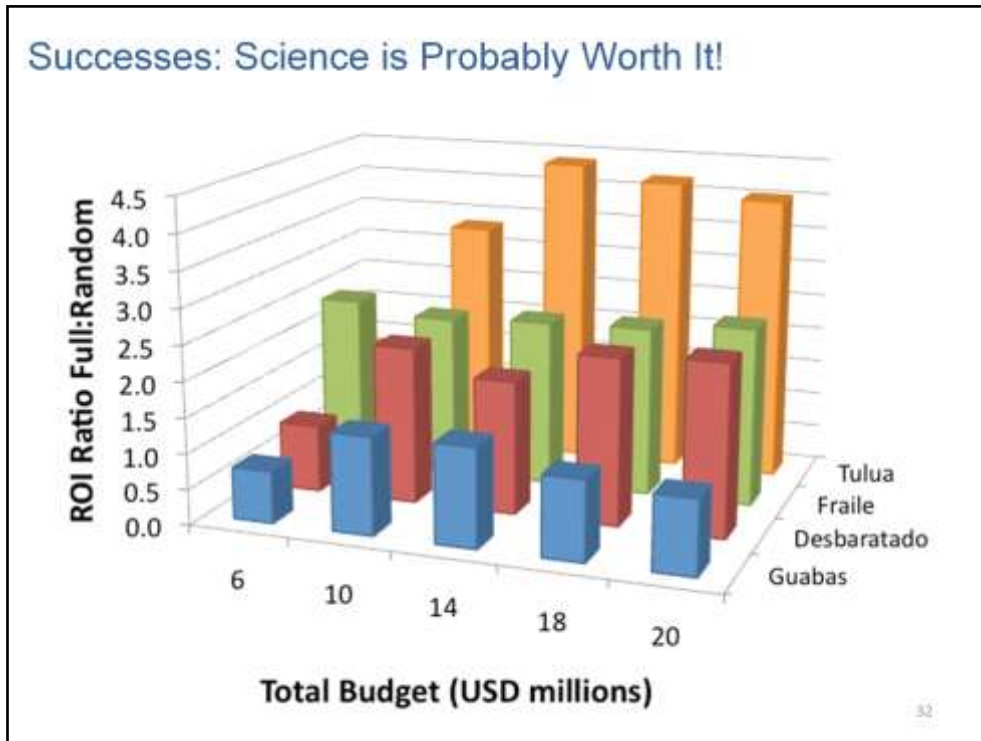
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- This first project is led by Heather Tallis.
- It was initiated from the Delaware Catskills example and some other older water funds from the early 90s.
- The idea has been around but it is starting to accelerate now.
- This is a set of 11 watersheds that feed into Cauca Valley. It involves cities, public utilities, sugar cane companies, bottled water companies, and citizens; it is a relatively mature group of people. They asked the Nat. Cap. to offer advice on how to improve their existing fund. The slide lists the main questions of the fund.
- The fund was a voluntary fund managed by a steering committee. They wanted to invest the fund's interest (USD\$10 million) over three years to affect upstream practices to help downstream users.
- Our advice was to fund fencing activities, pesticide reduction, changes in grazing practices, and increased control to limit illegal cutting of trees.



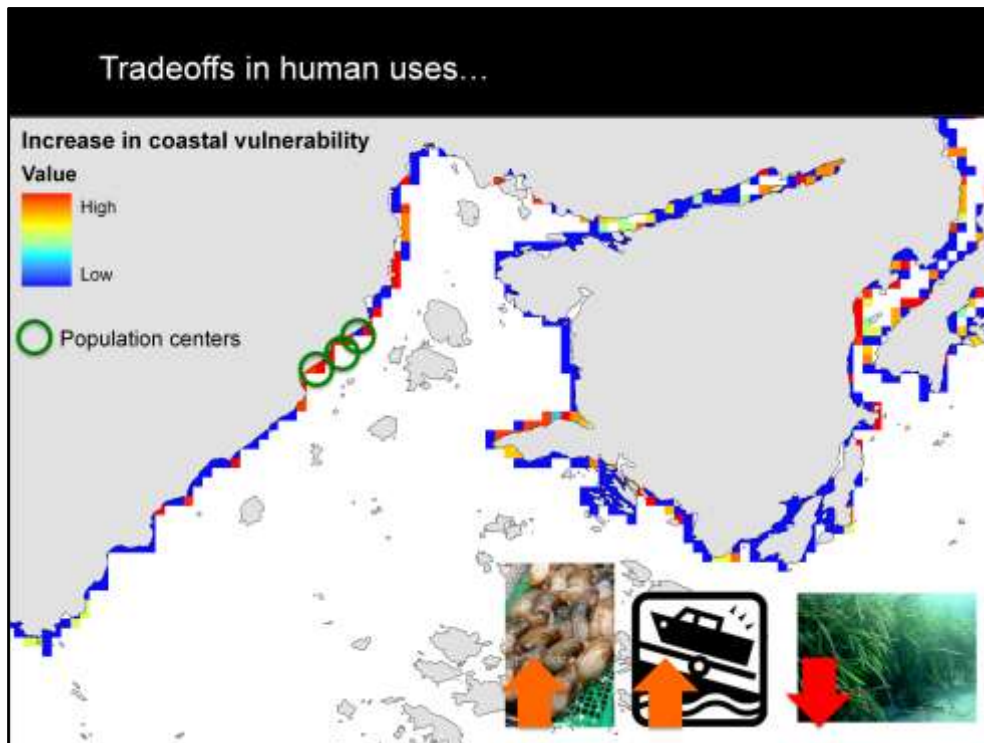
- We have an accounting tool the we use to visualize these things.
- One of the first is to build return on investment (ROI) curves. In the graph above, we compare the money invested against two services: erosion is on the left and in green while reduction in water yield in the stream is on the right and in red.
- They look at these curves in the catchments to get a ball park of how much they need to invest by considering tradeoffs. For instance, more vegetation means less water will be available in the streams.
- Also, this tool can help them look at space.
 - Where should we use different activities?
- There are various activities that can be used. In this case, we have shown where one might array the activities; not just the total amount, but their spatial distribution as well. This is the kind of information we provide and they use it to guide investment.



- This shows the ratio of ROI between the targeted and random approaches for each budget level in each watershed.
- This shows four out of 11 total catchments.
- We determined the ROI from using guidance for the accounting tool vs. ad hoc decisions.
- When ROI >1, it indicates a real bounce in improvement. You really can get up to a four fold investment return.
- For example, in Guabas, the approaches had about the same ROI (ratio is 1);
- In Fraile, the targeted approach gave twice the ROI.
- In Tulua, the targeted approach gave an ROI that was four times better.
- I will come back to this at the end of the talk to mention challenges and lessons learned.
- This is one context where there is an active and engaged group.
- We have shown through our engagement that if you have specific information about where services are provided and flowing, you can get and improvement.



- We are working in two places to help make the big idea of MSP a reality.
- The first area is along the west coast of Vancouver Island, Canada. There we are working with WCA, a public-private partnership with four levels of government, industry, and NGO participation. In this example, First Nations are key; their treaty and settlement lands stitched together make up the lion's share of the planning area.
- This is another very different context from the Colombian water fund example; this is a MSP effort. It is very young and totally bottom up. It is driven by an NGO, a couple of mayors, First Nations, citizens, and private industry (aquaculture and logging). The biggest revenue generating industry is tourism, of which, surfing is the biggest.
- The groups have come together in a voluntary way and are organized to achieve the following goals:
 - Minimize conflicts between users.
 - Provide them with the benefits they want.
- We entered into this right when the NGO and public-private group was starting to develop its vision and values; we entered much earlier in this example than we did in the previous example.



- This map shows the InVEST results from a scenario where we increased shellfish harvest and increased boat traffic. These two negatively impact eelgrass, which in turn loses the capacity to protect the shoreline from erosion and flooding during big storms.
- We have been able to show the group different scenarios (based on their vision and values). We want them to tell us how they want to use their space and what is important.
- They did lots of community outreach to get together and find common objectives. They went to tiny towns and villages to define objectives.
- We mapped them as scenarios. One of which is that they want to boost commercial value of ocean extraction (i.e., aquaculture, to which the First Nation has management rights) and tourism (i.e., lodging, boat ramps, etc.).
- The slide depicts the map of the enhanced tourism and increased aquaculture scenario. The result of increased development (aquaculture and tourism) impacts nearshore wetlands and sea grass habitats, which is another tradeoff because these areas are important for young fish species. Recreational and commercial fishers may be upset about this. The areas also provide protection from erosion and storms.
- The red areas show increased vulnerability because of negative impacts to buffering habitats. We can also show where the people are going to be most affected.
- In response, the community is looking to relocate some activities to increase vegetation. They are moving activities across the bay to reduce vulnerability to private property while still sustaining aquaculture production.
- This is one way the tool helps people plan out how to use their area to maximize and obtain most goals.

Successes: Policy Uptake, local ownership



Portfolio maps ship with RFPs

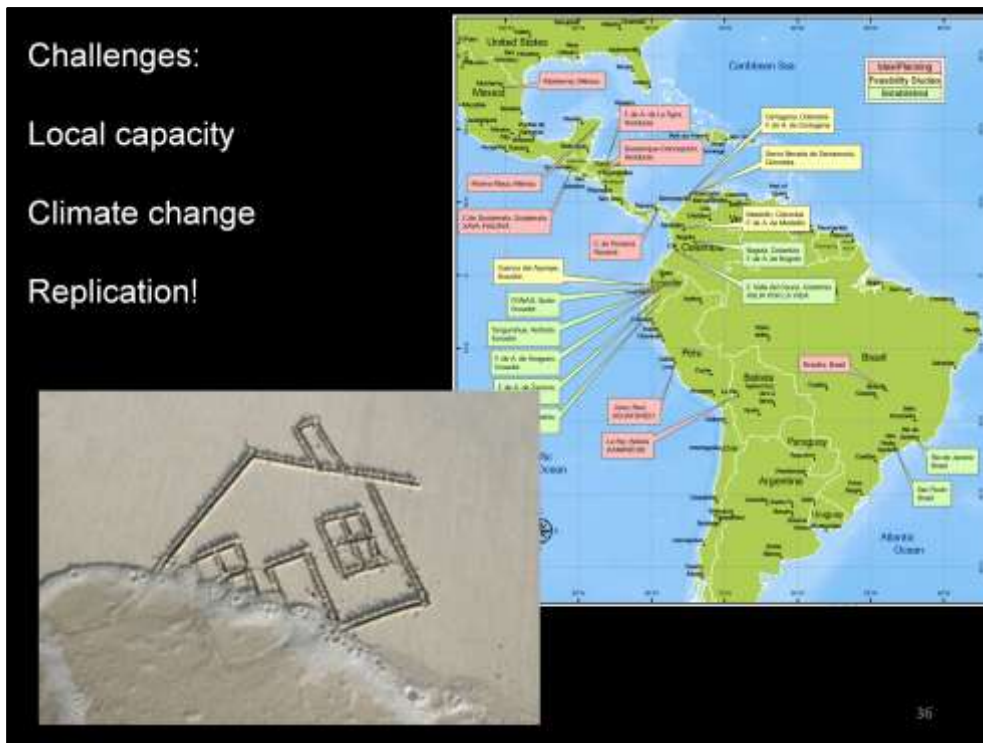
~\$500K invested in portfolio areas

map current and vision for future uses & resultant services

enable MSP



- In both cases, there is a lot of local ownership because people have been involved from the beginning and helped to set objectives.
- In Colombia, they invest annually and look and ask landowners to voluntarily come forward and ask for funding to improve practices based on the map we devised. They are starting to implement this and have invested \$500K so far.
- In the British Colombia example, we brought very disparate groups (native and commercial fishermen, tourism, etc.) together to talk to one another and map out a unified vision. They have a much better shared understanding of what they have and how it might be changed. They are using our maps and alternative futures to advise the MSP process.



- I agree with Carl and Lydia's lists about future challenges; we can make long lists of challenges.
- I think we do need to focus on the question of how to incorporate ES information into practice.
- Local capacity can be bolstered with some basic accounting tools and maps to show where benefits are distributed and how they will change in the future. In some cases this exists, in some it does not.
- We need to focus on making processes replicable. We do not want to take two years to work out a meek ROI; it is much too slow of a pace. The Nature Conservancy has a goal to establish 34 new water funds in Central and Latin America. This is very aggressive and exciting, but in order to do it, you need to make this process simple. There is value in generalizing this process. Figure out what metrics are needed for the decision instead of what we have the ability to calculate.
- The same thing is true for climate change. We can make models for this and we just need to simplify it and make it replicable.
- Finally, the guidance around ES are all principle-based or modeled. Lydia showed examples where people are actually measuring things. Did you see the benefits? That is virtually never done. There is a big challenge to get people to monitor. The water funds are mostly business people who want to see how their investment has an impact; they are providing money for monitoring.

Future Challenges



- I want to leave you with this one idea today. It is about the metrics.
- What everyone wants to know are what the metrics are.
 - Is it the dollar value?
- In many cases people do not want the dollar value, they just want to say “No, that area is off limits.”
- Everybody wants metrics that relate to livelihoods.
- In the US, it is about job numbers, in other places it is about how many people can rely on the system.
- These are very hard to link to ES.
- Economic disciplines do not typically talk to one another. Working on the methodology is challenging, but we need to continue to do it.
- They all want livelihoods.

Audience Questions

- Participant
 - We need provisions made for monitoring and feedback, but it does not happen because you do not learn anything. I liked your emphasis on replication. So much more can be done if you can take one experience and move part of it to the general base. I was so struck by the value of economics and your discussion of it.
- Participant
 - Is there anything on the horizon or are there areas you are working in that have opportunities to work with foreign policy?

Mary Ruckelshaus

- Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) is essentially a United Nations (UN) body that has just been established. IPBES is essentially the Intergovernmental Panel on Climate Change (IPCC) from the Millennium Ecosystem Assessment (MEA). It is in its early days, but it is making progress. They are setting up to do the next round of ecosystem services assessments around the world. We need to think about how we are going to monitor and what those metrics will be.

Lydia Olander

- Corporate sustainability efforts have a lot of overlaps with ES and what it is trying to achieve.

Carl Shapiro

- One of the readings recommended for today's session, on domestic policy is very relevant to our domestic policy. Please see:
 - President's Council of Advisors on Science and Technology. Executive Office of the President. *Report to the President Sustaining Environmental Capital: Protecting Society and the Economy*. July 2011.

Participant

- I found that these case studies are very helpful because they are very different from one another. To recap from the last one back to the first, Mary talked about spatial linkages and interests, Lydia talked about temporal interests solving problems before and after development and the issues that arise later on, Carl started talking about responsiveness of stakeholders and the need to link to the momentum of large-scale interest, and finally, Heather talked about the importance of good governance, which to me, was a warning sign. Strong governance is what we do not have in most of the world. In places where it has been strong, it looks like it is weakening.
 - Where does ES offer the promise of strengthening governance and where does it not? What do we do in those place where ES does not offer the promise of strengthening governance?

Carl Shapiro

- Externalities are at the heart of the whole concept of ES; it gives us an opening to this whole issues of governance. In some cases, our property right structure does not give us an opening into governance. We need to focus on ways through governance instead of having additional studies relating to them.
 - How can we make them part of the routine processes? What government approaches can internalize this?

Participant

- The discussion of property rights is also very interesting. In REDD, you are trying to create new property rights. Creating and enforcing property rights is different from policy.

Lydia Olander

- REDD, and other processes like it, do have a role in transparency. In the US, the push is for performance-based approaches. The Farm Bill is an example where there is a lot of talk about transitioning from handouts to something that has a real impact. In both public and private property, there are ways to affect this.

Participant

- I was struck by the four times improvement by understanding where to target investment. Issue with the Farm Bill is that there are “random” scenarios; we are not looking at where we are investing money, which is really remarkable. I would like to learn more about how it happens and how it can be applied to other expenditures.

Mary Ruckelshaus

- One thing I liked about the difference of comparisons is that there are huge potential benefits if we can get there and provide the tools. Different places have different entry points where people can work and provide the necessary nudges. There are lots of places where we can work.



Seminar 6 Discussion Synthesis

October 6, 2011

This document is a synthesis of important topics and questions discussed during the question and answer and discussion period immediately following the panelists' presentations. Please keep in the mind that the following is only a recap and speaker identities have been removed, except for those of the panelists. We hope that the following notes and discussion questions will be used as resource to advance further discussions about ecosystem services.

Below you will find a summary to specific key questions and topics covered during the seminar discussion.

Question 1

In your experience, what has been the policy draw for the work you carried out and what metrics have been of interest? Supply, service, value metrics? How have you been able to or plan to insert this work into a decision-making context?

DR. RUCKELSHAUS

- I gave a few examples of this and what I am seeing in our 12 demonstration sites (and what we are trying to do with the Natural Capital project) is to bundle services and considerations for the decision-making context.
- In China, for example, where they have a strong central government, they have funding and planned management for the national and provincial levels. That is an example of a strong government mandate where we have been working in.
- In Vancouver, it is very bottom-up; community groups and mayors in the province got together and began initiative. Revenues and economy depend on environment and the political landscape is quite opposite of a strong central government.
- The Colombian water fund was spearheaded by private investors and as you can guess, the policy context dictates metrics. Return on Investment (ROI) curves are essential for this group. The y-axis was not dollars, which is unusual for ROI curves. The group was entirely satisfied with expressing the return in quality of clean water and level of stream flow as their indicators. It does not always have to be dollar to dollar, which is one important lesson we have learned. In fact, in Vancouver, they actively resist monetizing some of the ecosystem values. They do not want cultural and existence values to be monetized at all.

DR. SHAPIRO

- As we develop and think about metrics for ecosystem services, one thing that hits me is the need for ecosystem services to be broadly understood and accepted. The notion of ecosystem services cannot be an exclusive commodity for the conservation community. As we develop metrics, we need to think about this and simple efforts such as defining what services are and developing accepted methods for measuring them, whether in dollar or physical ecological terms. We need to be able to explain these ideas to people. This would go a long way to making ecosystem services operational.

PARTICIPANT

- Responsiveness and timing also jump into my mind because this affects significant land banks in California. The adaptiveness and responsiveness of metrics and this effort coupled with getting it into state policy and to decision-makers in a concrete way is important. There is an opportunity to build from a small framework; I am thinking in relation to the Williamson Act and correlated issues.

Question 2

Do you have a suggestion to increase adaptiveness and responsiveness?

PARTICIPANT

- I have been thinking about it. We are just thinking about it. At a statewide level, we have good leadership with our natural resources secretary, but we need the economic experts to help and commit the funding to look at this more seriously.



PARTICIPANT

- In terms of engagement, there is an area people forget to engage and that is the insurance agency. We need to talk about the National Association of Insurance Commissioners and the Office of Management and Budget; let's get them involved and get national economic advisors to focus on this. The insurance industry is watching this, but people forget to bring them in.

DR. SHAPIRO

- That is very interesting especially considering property rights and getting insurance involved.

PARTICIPANT

- Business loss is what gets insurance industry involved.

DR. OLANDER

- On my way to California, I stopped in Milwaukee for a conference of water leaders. The conference discussed the work that is needed on our water systems and gave a presentation on the new green jobs report. The report says that the new green jobs are in water. They presented some substantial numbers; they recognize our crumbling water infrastructure and the need to repair it. There will be money there and making it green by utilizing ecosystem services is another avenue.

PARTICIPANT

- In the work that we do with government, we want to see what nature's value is. Often, we encounter the dilemma of not having the data to show livelihood metrics. There is a universal interest in quality of life metrics; it is an omnipresent force, not just in U.S. The census could be a great tool; if we could convince the Census Bureau and Department of Statistics to collect data on relevant information, it would be huge. We need data over time; I think that is an interesting vehicle.

DR. SHAPIRO

- I think that this consistent with the idea that we need to find a way to account for services, which brings in concern about monetizing activities. Without a calculation or expressed value, it will be zero automatically. What I am struggling with is the forcing of dollar values when it may not have much use. Are there other values that have an importance? By finding some way of measuring the service, it will get us to a point where we answer these questions. Mary brought this up and I think it is very valuable and needs addressing.

DR. OLANDER

- I have been learning more about the corporate side and one thing we talk about are product categories, what if we had service categories and had a way we could track them?

DR. RUCKELSHAUS

- The World Bank is leading a group to define service categories. The point made about census data and methodologies gets at the crux of the issue. For instance, Tanzania has amazing census data and has a time series. Once those methodologies are better tested, it would be great to get a mechanism to collect data so that we can add questions to the census and ask more relevant questions.
- The problem I have with national system of accounts is that they do not know how they will use what they are collecting. You will have lots and many different metrics.

DR. OLANDER

- I wanted to note that a project at Duke that is trying to link census data in Indonesia.

MS. WRIGHT

- It is interesting that you bring up the collection of census data in developing countries because there is a discussion about adding questions to national level censuses to monitor the provisioning of Reducing Emissions for Deforestation and Forest Degradation (REDD) co-benefits, namely social and environmental safeguards.



PARTICIPANT

- In 2008, Businesses for Social Responsibility (BSR) talked about the need for ecosystem services ideas to be valuable by business, but the case studies continue to be rare. The New York City Catskills example is used a lot, Natural Capital is trying; we are doing a lot top down and trying to figure out what the mousetrap looks like. People at the county level have projects where they are working and a lot of insight into this. These are the people who need to deal with ecosystem services and we never hear that come out in the dialogue enough. If it were out there, I would love to hear about it.

DR. SHAPIRO

- Your mention of the Catskills example hit a nerve. One of the best examples we can use is one where a natural system can get the job done for less than human cost. That type of example has a lot of weight both in the U.S. and outside of the U.S.
- What I see as more complex and challenging is the issues of how we make resource management decisions. Again, I work in Department of the Interior, so what is important to me is how to determine what is the most effective use of our resources and land and how we compare tradeoffs.
- Our challenge is to find ways to address tradeoffs, particularly when there are strong interests and demands, which move in the way of economic development. The challenge is to find a way to develop metrics to measure service values and to communicate them to those who are not routinely thinking about this sort of thing.

PARTICIPANT

- We do not have a strong list of metrics. When you work in different sectors like forestry and aquaculture, there are all sorts of messy things. The people running those businesses say “tell me what you want,” but we don’t have a list of what we need. We do not put out the obvious so people can do the right thing. Some will do it if they know; others will work out payment schemes for ecosystem services (PES), while others will continue because of disincentives in the public system. The bottom line is that the obvious needs to be out there.

PARTICIPANT

- I would add that adopting approaches that are easily grafted to other approaches already in place would be helpful. We do not necessarily embrace dramatic new approaches. We are very incrementalist. Never forget that the systems are horribly flawed.

DR. SHAPIRO

- As an economist, economic indicators are used all the time (GDP, unemployment rate) and they are all flawed. They are results of imprecise data and when you look at them, you can find many flaws. Despite these flaws, they add value. We are not going to develop a perfect set of metrics, but can we develop a set that enhance our ability to make informed decisions.

Question 3

What characteristics have you seen in institutions (what is required of institutional capacity) where the ecosystem services approach has worked or is working to secure policy gains? Any specific institutional settings that work well for this type of approach?

DR. OLANDER

- One thing we talk about is how to improve the institutional setting. In North Carolina, there are a number of programs that can be combined. If we integrate different programs and coordinate them, we think we can create better outcomes and save money, which we all know is really important right now. One idea is to create an institutional way within the state to coordinate all of this.

DR. RUCKELSHAUS

- Another thing is about institutional capacity. There is tremendous learning that has to happen with all of these applications. The institutions will also need to have transparency; if there are monitoring activities, report it and make sure people see it. Often, monitoring capacity is lacking and data sharing and reporting are weak as well, but users want to see their returns.



DR. SHAPIRO

- One key point that comes to mind is that many ecosystem services have public good characteristics and there are questions of who has ownership rights. When we think about institutions, we think about incentives. How can incentives be created to address these things and provide a basis to do this. The topic of incentives and property rights go together.

Question 4

You mentioned a lot about what the United States Geological Survey (USGS) is doing in terms of incorporating ecosystem services into USGS, can you comment on interagency efforts that look at ecosystem services in an important way?

DR. SHAPIRO

- There has been a lot of activity. The United States Department of Agriculture (USDA) has the Office of Environmental Markets, which looks across federal government and elsewhere at how markets are used effectively. These are relatively small offices and small efforts. The Environmental Protection Agency (EPA) has an ecosystem services atlas, which Lydia may know a bit about, that looks at ways to identify spatial locations of ecosystem services. The Center for Environmental Quality (CEQ) was doing an inventory of ecosystem services study efforts across the U.S.
- There have been a lot of efforts, but I think there is a continuing challenge to develop a set of partnerships that brings all of these issues together in a clear direction of what is next to provide a broad set of recommendations. We have been looking case by case and making incremental changes. I am not sure we are where we need to be.

PARTICIPANT

- From our local work, I can see a big flaw. It is great that three federal agencies are working together. We run into issues while working with Fish and Wildlife and the Army Corps of Engineers (the Corps); it is hard to get them to think outside of the one species box and to think at the watershed level.

Question 5

How can agencies to start looking at level where instead of spending money just on the red-legged frog, they also work on water quality? How do we both from the state and fed level, take work that others are doing and make it work? How do you keep maximizing levels of dollars?

DR. SHAPIRO

- You cannot do that without first addressing institutional issues, which is a challenge in the U.S. How can we take concrete steps? USGS and the Bureau of Land Management (BLM) are working together; the effort is not to say what research we can do, but to determine how USGS can collectively work with BLM resource managers to better incorporate ecosystem services in decisions. This is addressing some institutional and cultural issues; it is taking science and linking it with management and addressing what has to happen for BLM resource managers to use and believe in ecosystem services as a helpful tool.

DR. OLANDER

- One reason we, in North Carolina, are interested is that we have a political opportunity at the state level to get them thinking out of the box. New leadership is asking questions about getting ecological uplift and is getting agencies involved that need to be involved. It will still take a while, but we wanted to take advantage of it.

PARTICIPANT

- I am thinking about how to integrate this from my experience with permits. There are lots of tools and metrics to measure performance, but there is a need to streamline protocols. A new protocol is created for each new local ecology. The same circumstances exist if you are trying to overlay carbon methodologies; it is incoherent. There is a leadership void and we need some fundamental principles, at least for the things we measure. We need to enable coherence for agencies to talk to one another; this is an area that needs work.



DR. OLANDER

- There is an effort in Willamette, Oregon that is trying to address this.

Question 6

We always want to know what communities are working on this and we always want to talk about business. Where is business in all of this? It strikes me is that we need a business council for ecosystem services that will walk into government and say they want to make this happen. Who are they? What business are you working with?

DR. RUCKELSHAUS

- In our case, we work with Dow Chemical Company (Dow).
- I see four categories where business is engaged. In this first example with Dow and The Nature Conservancy (TNC), the motivation is about Dow's bottom line and not about green branding. They are concerned about the water supply in Texas where there is a huge drought.
- Other category, where companies like Coca-Cola and Pepsi are involved in water funds, involves thinking about life cycle analysis. They want to determine where they are vulnerable and it also gets back to the bottom line.
- Another category involves business industry roundtables, i.e., for soy, palm oil, rice, cotton, beef, bottled water etc. Businesses have convened, some are young while some are mature, and they ask us to come and give presentations. Again, they are all thinking about their bottom lines and less about greening.
- Last thing, we have been asked twice to work with developers on both the opposing side and from developer's side. They ask us to build a sustainable development plan. Those requests are coming in, but it is not the bulk of demand.

PARTICIPANT

- In addition, I want to point out the utility sectors: oil and natural gas, energy – they all have transmission lines and all companies are very involved. Think about the BSR approach and the World Business Council for Sustainable Development (WBCSD) and U.S. Business Council. There is an opportunity to coordinate and catalyze efforts of all of the company efforts.

DR. RUCKELSHAUS

- BSR and WBCSD are very conceptual right now and are not grounded in anything so it is hard to engage business in this way.

DR. OLANDER

- In U.S. as well, agricultural commodity groups are doing life-cycle analysis and thinking about greenhouse gases and models.

PARTICIPANT

- We do see a difference in willingness to invest between Corporate Social Responsibility (CSR) communities and pre-compliance communities, which can be driving force in many ways. They are fundamentally completely different motivations but the buyers and actors are similar.

DR. SHAPIRO

- BSR recently commissioned a report on ecosystem services tools. They have been studying this and monitoring environment.

Question 7

Do you see financial services groups involved in this? What about banks?

DR. RUCKELSHAUS

- There is lots of discussion with development banks. They are all actively discussing it in their research and development arms, but I do not know about any actual applications of it.



PARTICIPANT

- Shell Oil has probably spent the most money, often from self-greening, but there is money being spent but how it is integrated into the bottom line is a question.