

**Developing and Monitoring Indicators Relating to Climate Change:
Meeting the Needs of Federal Land Managers
and Other Environmental Decision Makers**

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Introduction

- These remarks will focus on the topic of information needs related to climate change adaptation
- Comments based on Heinz Center's ten-plus years of work on [*The State of the Nation's Ecosystems*](#) report and project
- Comments not limited to federal land applications. Other federal managers, regulators, and scientists face similar problems of inadequate and inconsistent information, and need to deliver information to users in an effective manner.

Context

- Our experience in developing *The State of the Nation's Ecosystems* and related activities dealing with the nation's environmental infrastructure has provided a great appreciation for :
 - o The need to work across (sometimes adversarial) boundaries
 - o Fragility of information systems
 - o The need for investment and integration in these information systems (See GAO-05-376, *Environmental Information: Status of Federal Data Programs That Support Ecological Indicators*, September 2005 and The Heinz Center, *Filling the Gaps: Priority Data Needs and Key Management Challenges for National Reporting on Ecosystem Condition*, 2006.)
- Key conclusions from this decade-plus of work
 - o ***The United States has a strong base of information collection and indicators, indicators, but the system is not adequately designed or funded to meet the information needs of coping with climate change.***
 - o Significant changes are needed to the scope, scale and integration of these systems.
- Echoing a comment from Al Sample in his opening remarks: Federal agencies are doing great and important work, but they need to evolve to meet this new challenge.

Four Key Points

1. Climate change will bring a very different world for natural resource managers. Information strategies and infrastructure need to evolve significantly also.
2. To cope with climate change (as well as with existing stresses), manager will need information at multiple scales, and for multiple users, but there are major benefit to increasing consistency across systems.
3. It is possible – and beneficial – to get agreement across divisive lines on what information is needed and how to obtain and present that information
4. “It’s the user, stupid” and the concept of the *information value chain*.

Point 1: Climate change will bring a very different world for natural resource managers. Information strategies and infrastructure need to evolve significantly also.

- Previous speakers outlined excellent examples of the kinds of challenges faced by federal land managers.
- Climate change will produce ecological and environmental changes of unusual and increasing rapidity and uncertainty. This is unknown territory.
 - o How fast will changes occur
 - o How will ecological interactions change, how will ecosystem “react”
- This uncertainty and rapidity of change implies a need for:
 - o More information
 - o More timely information
 - o More tailored to the needs of managers
- Examples of information needs
 - o Baselines
 - o Projections and Research
 - o Continue monitoring to:
 - Calibrate models
 - Validate projections
 - See surprises
- *This problem should be viewed as a long term infrastructure-development enterprise*
- *The system is not now meeting the information needs of managers adequately. Unless this challenge is met, they will be dealing with consequences not acting strategically*

Point 2: To cope with climate change (as well as with existing stresses), manager will need information at multiple scales, and for multiple users, but there are major benefit to increasing consistency across systems.

- There are good arguments for tailoring information to specific needs, scales, and uses, **BUT**
 - o Society cannot afford to keep meeting every information individually
 - o There are not enough resources for multiple and overlapping state, federal, etc. information programs
 - o There are important benefits to be gained from moving toward consistency and integration

- Economics Example
 - o In the economic arena, data from firms, households, state employment offices and other micro-scale data are collected and can be used locally, can be ultimately “rolled up” to produce the overview provided by the Federal Reserve Chair to Congress twice a year, and at
 - o 100 years ago – the financial records of companies and information presented for stock sales for were wildly inconsistent, allowing major abuses. Now there are rules for consistent and transparent reporting, allowing investors to compare individual investments (horizontal consistency) and national policy makers to get a big picture view (vertical consistency).
- ***We as a society must stop acting as if each federal agency and each state have such unique characteristics that they must have their own special measurement strategy or that their information stands alone.***
- We recognize that:
 - o Modifying information systems can be costly and sometimes disruptive
 - o But we must look seriously at the issue; for example, perhaps it would be smart to consider funding specifically for such transition activities – viewing it as a capital expenditure.
 - o Example of this recognition in practice: State wildlife managers in the Northeast have set aside a portion of each of their state budgets to deal with multi-jurisdictional needs

Point 3: It is possible – and beneficial – to get agreement across divisive lines on what information is needed and how to obtain and present that information

- The *State of the Nation’s Ecosystem Project*: has involved industry, environmental advocates, federal, state, and local governments, and academics
 - o Goal was to agree on a small number of key indicators
 - o Goal was NOT to agree on whether the trends were positive or negative, or to agree on any policy responses
- Applying this general model to the situation of climate change: This case presents
 - o Lots of users with lots of needs
 - o Limited funds
- ***The goal is to create an environment for optimizing – by which I mean that no one gets everything they want, but everyone gets what they need.***
- This approach can be extended to the conduct of research and assessment
 - o (Who is not tired of dueling experts?)
 - o NOAA Gulf of Mexico hypoxia example:
 - o In this case, a major stakeholder group didn’t accept the outcomes of what was otherwise viewed as an excellent scientific assessment
 - o Illustrates a rule originally expounded by Bill Clark at Harvard, which can be paraphrased as follows: Even excellent technical science may be marginalized in policy disputes of all parties do not accept its validity, with a corollary that “accepting its validity” is much more likely if all parties are at the table in designing and executing the science.

- The strategy? Bring together all parties to a dispute, identify key questions that must be answered, determine collectively how these should be answered and by whom.
- This approach should reduce (but probably cannot not eliminate) the likelihood of parties “walking away” from the results

Point 4: “It’s the user, stupid” and the concept of the information value chain.

- Businesses think about the value chain – the sequence of activities that turn raw material into a useful product.
- Such value chains have multiple steps, multiple actors. Businesses must ensure that this chain is kept integral or else the product won’t end up benefitting anyone (and no sales will occur!)
- Information is a product as well
 - Someone has to decide what to collect, someone has to collect it, someone has to analyze and process it and then deliver to the user in form s/he can use.
- I would assert – that the federal enterprise is better at collecting and processing than at knowing:
 - (On the front end of the value chain): What questions users have, what problems they are dealing with (and thus their real information needs
 - (On the back end of the value chain): How to best deliver the resulting information in a form most likely to be useful
- *Need to think of entire process from end end-to-end*
 - *Need to interact more and differently with the users*
- Wholesale/retail analogy
 - Federal agencies are excellent at collecting information, developing major databases. However, they often perceive that their job ends when the data are available on the web. This can be viewed as providing the product in wholesale form
 - Contrast this with an approach that relies on interactive development of products that may bring data from multiple places, with research, to apply to specific problem sets in particular areas. This can be viewed as the retail delivery of the product.
 - It is not possible for the federal government to be in retail mode everywhere, but:
 - Climate change will bring suites of major issues to specific regions. For example, in the Pacific Northwest, the major overriding issues likely to be pushed by climate change are salmon, forests, and water management. In the Southwest, drought; in the Southeast, agriculture and water and forests
 - One model would be to bring all stakeholders to the table: federal agencies, states, industry, academics, NGOs, to agree on what information is needed, what questions to ask, and what form would be most useful for delivering that information.

Conclusion

- You will notice that most of this talk not on the indicators and information *per se*.
 - The US (federal, state, NGOs, etc.) does that technical task well.

- Rather, what is needed to make these technical tools achieve their potential is an entire system, with new approaches to dealing with multiple users and multiple scales.
- We have to begin with our existing components, and knit them together to make more efficient use of resources and increase the likelihood of effective solutions.

Evolving this system will not be cost free. However, no private sector manager would manage a set of assets as valuable as those managed by the federal government and the people of the United States with as poor an information base as we currently rely on.

Collection and dissemination of environmental information has been a “bottom of the pile” priority for many years. This needs to change, or we will be sorely hampered in our efforts to cope with a changing world.