CCPS Workshop on Enhancing US contributions to IPCC WG2 AR5
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As Delivered

Thank you Roger and Chris! Distinguished colleagues, friends, and guests: good morning! It is a pleasure to be here on behalf of NOAA at the august Carnegie Institution.

I am delighted to open today's workshop on Climate Science for the 5th IPCC assessment by first recognizing and thanking the individuals responsible for this event. This workshop grew out of a proposal by Chris Field with Roger Pulwarty taking the lead in organizing this event.

They saw the need to plan ahead, to ensure that the US climate science community would be ready for the 5th assessment report by the IPCC Working Group 2. I thank you both for your insight in convening and organizing what I know will be a very productive meeting.

The purpose of this workshop is to identify and prioritize the research that will be needed for the IPCC to provide actionable information to decision makers. A very high bar has been set overall by the 4th IPCC, and yet, even more useful guidance will be required from the 5th. The task at hand is so extraordinarily important that the scientific community must rise to the challenge. What, indeed, are the knowledge and information that society will need to make informed choices about climate change in 2014 and beyond?

You will each have your ideas about this, and the workshop should prove fascinating and productive. I take this opportunity to offer three thoughts for you to consider.

1. Consider the users and blend what you think they need to know with what they are likely to ask in 2014. There currently is a serious disconnect between what users are asking and what scientists can deliver. How can we bridge that gap? What research now will enable the next Working Group 2 report to be maximally useful? Most citizens and many policy makers are more interested in changes at the local and regional scale – things in their own back yards – than in changes at national or international scales.

Your choices will be useful not only to the next IPCC but also to ongoing efforts to deliver useable information to policy and decision-makers. Momentum is growing for a National Climate Service – an ongoing mechanism to provide credible and authoritative climate information to assist the nation in developing and evaluating policy options for mitigation, and to enable decision makers to better anticipate, plan for and adapt to impacts for a changing climate. One particularly important challenge is to provide reliable and timely information at the regional scale. NOAA has embarked upon an effort to work with a range of partners to help fill this gap and your discussions will be valuable in the development of a NCS.

2. Make ecosystem services a focal point of your efforts because the state of our life support system will be what ultimately matters. As you are aware from the Millennium Ecosystem Assessment, 60% of global ecosystem services are already being lost or degraded. Our life support systems are even more vulnerable in a carbon-disrupted world. Climate change and ocean acidification interact with the broad sweep of other changes underway – habitat alteration, loss of biological diversity, nutrient and chemical pollution, overfishing, introduction of invasive

species and more. What research is needed to better understand the likely impacts of these global changes on ecosystem services, and what research is needed to inform society's choices about restoring and maintaining them in a carbon-disrupted world?

3. Expand the thinking about 'adaptation'. The corollary of a focus on ecosystem services is the need to think more broadly about 'adaptation'. In most discussions about adaptation, the focus is squarely on modifying human infrastructure – bridges, roads, cities, etc, and on the need to develop new strains of crops to thrive in future worlds. These are both highly important. But I believe the thinking about adaptation needs to be expanded to consider two additional things: (1) the steps needed to maximize the likelihood that the biodiversity underpinning our ecosystem services can adapt, and (2) the steps required for our policy and management institutions to be able to respond to unanticipated and rapid changes. There will be surprises. How do we prepare for them? How do we manage differently knowing that surprises are likely? One example is the ocean ecosystems along the west coasts of many continents that are changing in surprising ways. Coastal upwelling ecosystems in the Pacific Northwest since 2002 has had what are commonly called dead zones, areas of seasonal, severe

hypoxic being caused by coastal winds. The changes are most likely climate related but were a surprise. Areas like this along the world represent 1% of the ocean surface area but they are 20% of the world's fisheries and 1 billion people depend on them for protein.

Each of these three suggestions:

- Consider the users
- Make ecosystem services a focal point of your efforts, and
- Expand the thinking about 'adaptation'

entails considerable new research as well as integration and synthesis of existing knowledge. Moreover, each has concomitant communication challenges.

One of those challenges is to describe complex scientific concepts in terms that are relevant and understandable to users. For example, the term 'ecosystem services' is not particularly user-friendly. However, the underlying concepts can easily be described in ways that resonate with lay audiences. Take ocean ecosystems for example,

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- Provisioning services-seafood
- Regulating services – protection of shores from battering by storms
- Cultural services – recreation, heritage, education
- Supporting services – nutrient cycling

I had a eureka moment when we traveled around the country for two years asking people what they want from the ocean as part of the Pew Ocean Commission. The 5 things they were:

- Clean beaches
- Safe, healthy seafood
- Abundant wildlife
- Stable fisheries
- Vibrant coastal communities

There are all ecosystem services. They are products of the interaction between people and the physical environment.

These services are being lost or put at risk as biological diversity is lost, as biogeochemical cycles are disrupted, and oceans become more acidic, as the ocean is overfished, and as habitat is being destroyed.

It is possible to make complex concepts more accessible and relevant to citizen's lives and I challenge you to do so. Science must be relevant and accessible.

Today is a time of rapid changes. The pace and nature of the changes only enhance the need for ongoing useful climate information at the appropriate scale to guide effective decision making.

Producing the next IPCC and the research underpinning it is an effort that will demand considerable sacrifice, but is of the highest importance to society. If you are successful, your efforts will guide the decisions that will determine the path society takes. I take this opportunity to thank each of you for your willingness to engage in not only this workshop but our collective efforts to provide the knowledge that society needs, and in ways that society can understand and use. This is your social contract with society.

As this workshop progresses I would ask you to keep in mind the three questions that the workshop organizers have proposed:

(1) What expanded or new research is needed to improve impact assessments, adaptation planning and services?

(2) What tools or services are needed to transition existing or new science into actionable information for decision makers?

(3) What kinds of adaptation or impact assessments and evaluations are needed?

Climate change in one of the greatest challenges of our lifetime. It will permeate every aspect of our lives. What we choose to do about it now will define us for generations to come. The IPCC has challenged the world to step up to the climate challenges we face. We must ensure that the U.S. is leading the way forward with the best science we can produce.

In closing, I would like to once again thank the organizers of this workshop. I hope it will lay out the scientific path for the future.

Thank you.