Committee for the Expert Review of Synthesis and Assessment Product 4.3:
"The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity"
U.S. Department of Agriculture
1400 Independence Avenue SW, Room 4433
Washington, D.C.
June 19-20, 2007

The Committee for the Expert Review of Synthesis and Assessment Product 4.3, The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity, convened at 8:30 A.M. on June 19, 2007 in room 4433 of the USDA South Building in Washington, D.C. In accordance with the provisions of Public Law 92-463, the meeting was open to the public for all but individual chapter reviews by subcommittees.

Reviewers present:
- Thomas Lovejoy (CERSAP Chair) - The H. John Heinz III Center for Science, Economics, and the Environment
- J. Roy Black - Michigan State University
- David Breshears - University of Arizona
- Glenn Guntenspergen – United States Geological Survey
- Brian Helmuth - University of South Carolina
- Frank Mitloehner - University of California, Davis
- William Sommers - George Mason University
- Soroosh Sorooshian - University of California, Irvine
- Eugene Takle - Iowa State University
- Carol Wessman - University of Colorado

Global Change Program Office staff present:
- Margaret Walsh
- William Hohenstein

Authors present:
- Peter Backlund
- Jerry Hatfield
- Tony Janetos
- Dennis Lettenmaier
- Mike Ryan
- David Schimel (via telephone)

Tuesday, June 19, 2007
The meeting began with introductions and a welcome from Mr. Hohenstein. Dr. Walsh introduced the report, discussing the Synthesis and Assessment Product (SAP) process, the scope of this report, and the questions the report should address. She also outlined the schedule for next steps and report completion. Mr. Chen from the U.S. Department of Agriculture's Office of the General Council then briefed the group on Federal Advisory Committees Act responsibilities.

Mr. Backlund provided an overview of the process from the authors' perspective. The authors see the current product as a rough draft. He laid out three key questions for the reviewers to consider: 1. Is the literature review adequate? 2. Are the findings and conclusions a fair

reflection of the literature? 3. What are the key cross-cutting issues and connections between chapters that need to be addressed?

Dr. Janetos then presented an overview of the report itself. He discussed the purpose of the 21 SAPs, as well as the specific charge for SAP 4.3, which focuses on climate impacts on agriculture, land resources, water resources, and biodiversity. The report is meant to be an evaluation of the peer-reviewed literature. No policy advice or recommendations are provided in the report, but alternatives and options can be evaluated when appropriate.

The timeframe addressed in the report is weighed toward the near-term, but will include limited discussions of longer-term issues. The authors focus on documented changes, and emphasize a timeframe that is most meaningful from a management perspective. Intergovernmental Panel on Climate Change (IPCC) scenarios do not differ much from one another over the next few decades, so this period of time is pretty well known no matter what emissions reduction policies are adopted. However, many processes will play out over longer time periods, so there needs to be a balance between short and longer-term impacts.

Dr. Janetos also mentioned that the report will primarily be written for general readers, land and resource managers, policymakers, and other decision-makers. Therefore, accessibility and utility are important considerations.

Dr. Helmuth commented favorably on the report's emphasis on nonlinearities between climate and responses. Dr. Janetos agreed – wants the report to say something about the likelihood of hitting various thresholds and tipping points. Dr. Walsh pointed out that a separate SAP focuses on thresholds. Dr. Wessman thinks this report can serve as a resource for the report on thresholds.

Dr. Hatfield provided an introduction to the chapter on agriculture. Critical features include temperature, carbon dioxide, and water. The most critical aspects are extreme events and the ability of crops and livestock to adapt. Shifts in insect, disease, and weed populations can be expected. The literature is not extensive enough to provide definitive statements on the impacts on pasture species, but growing season may be extended, and the interactions induced by grazing add a new dimension to understanding plant response. Water availability is a primary factor on rangeland production. Temperature effects are dominant in livestock responses.

Dr. Mitloehner commented that the chapter organization is complicated by interrelated sections – the final report should emphasize relationships between them. Dr. Takle asked about biomaterials/biofuels. Dr. Janetos pointed out this brings up tricky issues regarding policy questions and suggested looking at these issues in a text box outside the main body of the chapter to avoid ignoring the issue but acknowledging the topic is somewhat offline from the main thrust of the chapter. Dr. Walsh emphasized the need to focus on impacts rather than mitigation.

Dr. Ryan presented an overview of the land resources chapter. The chapter treats forests and arid lands. Focus is on disturbance and climate variabilities as drivers of climate change. Climate change will affect forest structure and function. Productivity will likely be greater in the near term in the eastern US because of projected increases in precipitation, nitrogen deposition, and

elevated CO_2. Productivity will likely be lower in the west, because of lower precipitation. A warming climate will increase the frequency of forest fires and large-scale insect outbreaks. Arid lands present a complicated picture of change that will respond to a combination of present and past land use, soils and location, and climate. Increased disturbance (drought, storm intensity, and fire) offer more opportunities for establishment of invasive species, particularly exotic grasses. These invasions will move arid ecosystems toward simpler monocultures.

Dr. Lettenmaier presented an overview of the water resources chapter. There have already been observed changes in U.S. water resources. However, time scale is an issue—about 50 years may be necessary to see things with current tools. Another issue is attribution of observed changes – many factors acting at once, with climate change being just one.

Dr. Janetos presented an overview of the biodiversity chapter. Terrestrial systems are being demonstrably impacted by climate change. Impacts include changes in growing season length, phenology, primary production, and species distributions and diversity. In coastal and near shore systems, effects have been dramatic (coral bleaching, sea level rise, range shifts of fish and other species, changes in sea ice coverage). In the Arctic, substantial changes are happening. Polar bear and ringed seal populations have been affected by sea ice reductions. Pests and pathogens are of particular concern because of the rapid and sweeping changes these taxa can render. Marine fisheries may be affected by climatic oscillations (e.g., Pacific Decadal Oscillation, North Atlantic Oscillation).

Wednesday, June 20, 2007

Status reports from subcommittees: Dr. Takle provided the report from the agriculture subcommittee. Dr. Breshears reported on the land chapter. Dr. Sorooshian reported on the water chapter. Dr. Helmuth reported on the biodiversity chapter.

Dr. Ryan asked for a discussion among reviewers about the biggest cross-cutting issues. Mr. Backlund mentioned water and agriculture. Dr. Sorooshian highlighted the theme of drought and its impacts –he also highlighted land-use change issues and its impacts on other issues like water. Dr. Mitloehner reiterated the suggestion of water effects on other chapters. Dr. Sommers said nonlinearity (thresholds, tipping points) is a cross-cutting issue that should be addressed. Dr. Helmuth suggested a section on moving forward in the face of uncertainty.

Dr. Lovejoy led a discussion about the executive summary. Dr. Janetos pointed out that IPCC has a summary available as a separate product from the whole report. Dr. Black and Dr. Takle said it is important to keep science/technical detail in the body of the chapter texts. Professionals will use this as an authoritative source, so it must remain richly referenced. Dr. Janetos said that significantly shortening the report may not be necessary if the executive summary is excellent. Dr. Takle emphasized the report must be a good communication mechanism for a variety of audiences. Dr. Breshears said some redundancy reflects cross-cutting themes – should be laid out at the front of the report. Dr. Janetos pointed out repetition isn't all bad because most readers won't read the whole report. Dr. Breshears said the draft was fantastic and he learned a lot. There was general agreement.

Dr. Sommers thought a CD would be a good idea, with a good search engine. Mr. Backlund stressed writing informative introductions to each chapter as well. Dr. Sommers thought USDA should put this report on a CD regardless of what happens with other SAPs, and asked authors whether they see any impending troubles in trying to find some cohesion between chapters. Dr. Hatfield answered no, but lead authors lead authors may want to discuss comments before this on a conference call.

Dr. Walsh discussed next steps, and what reviewers should do to send in additional comments. Deadline for all reviewer comments is June 29th. Some future interaction between reviewers and authors (sharing specific references, etc.) is expected.

The committee adjourned.