

Stakeholder engagement in the development and application of a regional earth systems model: an analysis of researchers' perceptions

Elizabeth Allen¹, Jennie Stephens¹, Chad Kruger² & Fok-Yan Leung³

¹ Environmental Science and Policy Department, IDCE, Clark University, Worcester MA

² Center for Sustaining Agriculture and Natural Resources, Washington State University

³ Laboratory for Atmospheric Research, Washington State University

Introduction:

BioEarth is a regional earth systems modeling project that aims to improve understanding of interactions between nitrogen and carbon cycling in atmospheric, terrestrial, and aquatic systems in the Pacific Northwest. The project was designed to inform decision-making of stakeholders in two critical sectors of the regional economy: agricultural and forestry. Due to the complexity of the systems being investigated, stakeholder input is critical to accurately represent model attributes and guide research questions.

Many modelers, ecologists, and economists have limited experience engaging stakeholders from outside academia. A growing body of literature examines best practices for stakeholder involvement in environmental research and decision-making (Shackley 2003, Prell 2007, Voinov 2008, Dougill 2006, Cash 2000, Welp 2006). To date, however, there has been minimal analysis of researchers' perceptions and attitudes about stakeholder engagement in the development and application of earth systems models.

Communication and Engagement Objectives:

- I. Conduct research on the baseline goals, perspectives and experiences of BioEarth Principal Investigators (PIs) to inform the design of stakeholder engagement strategies for the project.
- II. Analyze information obtained from surveys and interviews conducted with the 18 co-PIs to better understand challenges and opportunities for scientific communication and contribute to the literature on interactions between researchers and non-academics stakeholders.

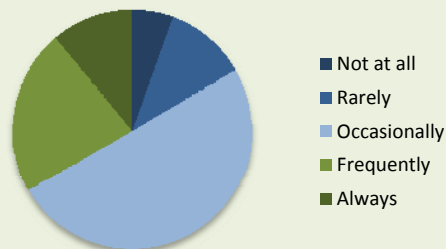
Methodology:

We conducted a brief quantitative questionnaire and a 20-45 minute semi-formal interview with each of the project's 18 PIs on the topics of stakeholder engagement and project communication. 11 of the interviews were conducted in person, the remaining 7 were conducted over the phone. Interview transcripts were coded and interpreted following a thematic content analysis approach. On the basis of survey and interview data, we outlined continuums of perceptions among researchers about who the primary stakeholders are and what their roles within the research process ought to be as well as the major challenges to be overcome. We identified various concepts of when and how stakeholders should be engaged. Continuing analysis of the interview transcripts will allow for further discussion of how PIs perceive the production and character of knowledge as it relates to their visions of successful outcomes for BioEarth. Researchers' assertions and opinions can be clustered together to create mental maps that represent different modes of perceiving the role of stakeholders in the creation and application of earth systems models.

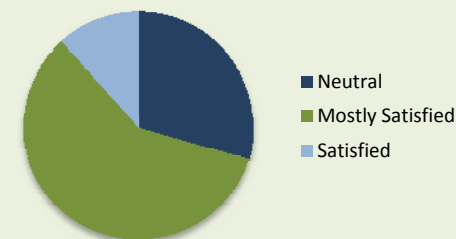


Analysis of Questionnaire Data

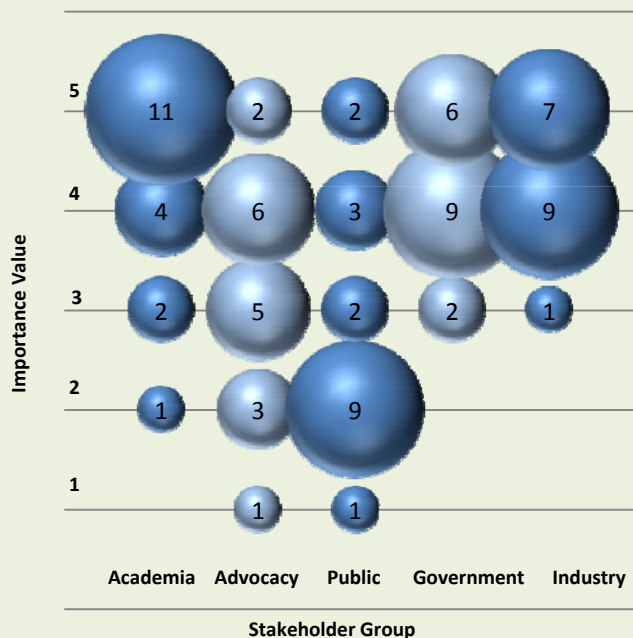
BioEarth researchers' self-reported frequency of interacting with stakeholders



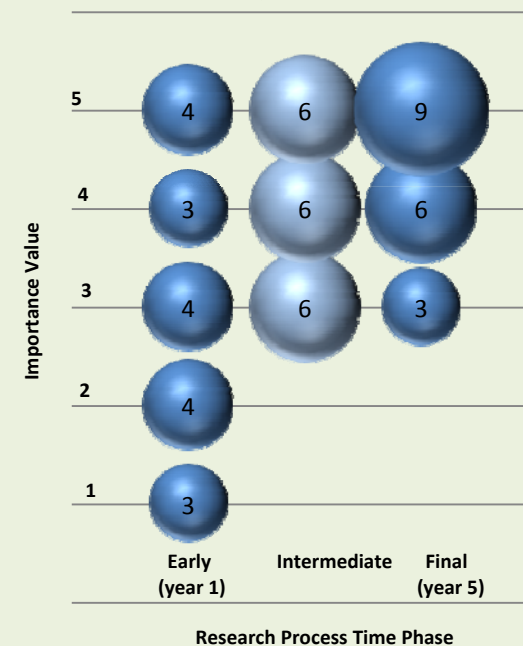
BioEarth researchers' level of satisfaction with previous stakeholder interactions



Perceived importance of engaging various stakeholder groups



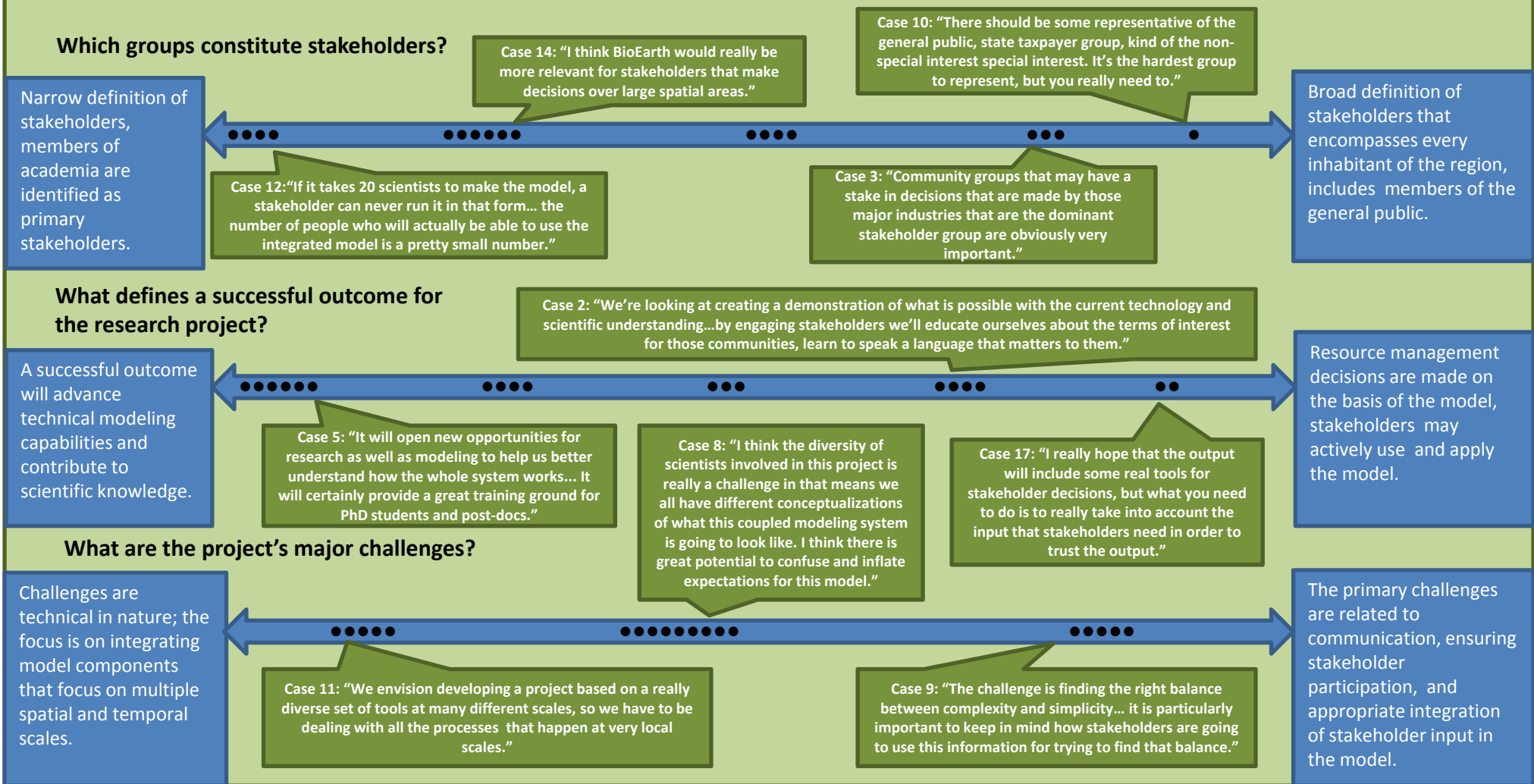
Perceived importance of stakeholder engagement at various phases in the project



Bubble size indicates the number of responses from PIs

Analysis of Interview Data: Continuums Representing Researcher Perceptions

Each dot represents the place where one PI's response falls on the spectrum being depicted



Conclusions:

A range of perceptions among BioEarth researchers regarding the kind of involvement and degree of influence that stakeholders may have in the model development process is observed. An association has emerged between how broadly stakeholders are defined and how expected project outcomes are conceptualized. Those PIs who described primary stakeholders as members of academia were more likely to focus on the capacity of the research to build knowledge of model development and integration in the scientific community. Those PIs who defined stakeholders broadly were likely to discuss the model's possible application as a decision support tool. Attitudes about the major challenges for the project correspond to perception of who stakeholders are and successful project outcomes. Those with broad definitions of the stakeholders and hopes that the model will be applied to regional resource management problems tend to focus on possible barriers to communicating with stakeholders as a central challenge for the BioEarth research team.

Increasingly, research institutions are expanding stakeholder engagement efforts for a variety of reasons: stipulations from funding agencies, calls from advocacy organizations for increased public participation and accountability in research, as well as scientists' interest in expanding the relevance and applicability of their research. This study represents an important transition toward analyzing baseline expectations and experiences of PIs in order to maximize the effectiveness of future stakeholder engagement efforts and adequately prepare for challenges. In addition to project-specific insights, it is our hope that this analysis will provide general insights into scientific communication on the subject of environmental change research.

Acknowledgements:

This research is made possible by funding from the US Department of Agriculture, National Institute of Food and Agriculture grant number 2011-67003-30346. Titled "Understanding Biogeochemical Cycling in the Context of Climate Variability Using a Regional Earth System Modeling Framework", this 5-year (2011-2016) project involves collaboration between Washington State University, Clark University, Oregon State University, University of California Santa Barbara, the National Center for Atmospheric Research, and Battelle Pacific Northwest Laboratory.

Special thanks is due to each of the 18 BioEarth Principal Investigators who participated in our research. It is because of their willingness to donate their valuable time to discuss openly perspectives on stakeholder engagement and communication that this study could be carried out.