

***Social Science Research Planning: Climate Change, Bio-Energy, and Natural Resources Workshop***  
***National Institute of Food and Agriculture***  
***Executive Summary***

On May 11, 2010, the National Institute of Food and Agriculture (NIFA) hosted a workshop to identify the role and unique contributions of social sciences to a systems approach in conducting research/education/extension projects and to discuss effective strategies for NIFA to foster transdisciplinary collaboration. The workshop participants consisted of nationally renowned scholars of multiple disciplines and NIFA National Program Leaders (NPLs). Success of NIFA's programs in climate change and bio-energy requires effective integration of social sciences with other scientific work in order to advance knowledge in meeting these societal challenges. This workshop focused on three questions designed to identify the needs and means for strengthening social sciences inclusion into NIFA programs. With each question are recommendations summarized from workshop discussions.

**1. How do social scientists contribute to NIFA's achievement of long-term measurable impacts from projects in the priority areas of climate change, sustainable bio-energy, natural resources and the environment?**

- Social scientists focus on human behavior, response to incentives, and decision-making, including the evaluation of trade-offs within institutional and cultural contexts. Through these unique perspectives, social sciences help frame researchable questions and inform policies that can change human choices.
- Successful collaboration is more likely to be achieved when the nature of the regional and local scale problem to be addressed informs program priorities and defines relevant contributions, i.e., problem-based scholarship, rather than requiring a pre-determined set of disciplines or fields.
- Social scientists consider institutions, policies, incentives, and regulations as variables with both the potential for change and influence on human behavior and outcomes.
- Social scientists can make good project leaders as they have a broad frame of reference that allows focus on the social, economic, behavioral, and political context in which a problem often takes place.

**2. How can NIFA incentivize/foster/support transdisciplinary teams and how can social scientists more effectively work with other disciplines as a part of these teams?**

- There are crucial differences between transdisciplinary and multidisciplinary research. To be successful, a transdisciplinary project requires participants who are aware of this distinction and who are also strong in their respective disciplines, leading to a unity of knowledge beyond individual disciplines.
- Long-term benefits can be achieved if social and biophysical scientists work closely together throughout the duration of a project, not just on the 'edges' or in parallel fashion. Transdisciplinary cooperation should be incorporated in framing the problem, team leadership, and program management, as well as in the research/outreach/teaching components of a project. This will allow the team to address the nature and complexity of real-world problems, and lead to reliable outputs and impacts.

- Every discipline, including social sciences, should bring its best science to transdisciplinary teams and its contributions to this team work should be recognized and rewarded.
- Social scientists can, and should, provide leadership in clarifying the ways in which personal and social values enter into problem-solving scholarship.
- Collaborative environment should be provided or created to build respects for all disciplines.
- All scientists need to listen carefully to the knowledge, perspective, and the framing of questions by other disciplines to understand why other scientists are undertaking specific activities, beyond a description of the activities.
- All scientists should realize the importance of key stakeholders being actively engaged in meaningful ways from the beginning of project planning to the end as users of research results.

**3. What strategies can NIFA undertake to facilitate the development and success of research/education/extension systems approaches to address societal challenges such as climate change and sustainable bio-energy?**

- NIFA should encourage experimentation, recognizing that there may be some failure. The ability to learn from failure is an important piece of the adaptive management (both passive and active) needed to move forward.
- NIFA should incorporate transdisciplinary approaches in defining research/education/extension needs by involving social scientists at the beginning with other scientists to identify issues.
- NIFA should ensure that review panels incorporate both qualitative and quantitative expertise across disciplines, including social sciences, as part of the total team.
- NIFA NPLs, including social scientists, should be an active, engaged part of the transdisciplinary team throughout the lifetime of a project.
- NIFA should support education for graduate students in learning how to work in inter- and transdisciplinary teams to encourage problem-solving scholarship, even though the students may specialize in one discipline.

In summary, addressing societal challenges through systems approach can be framed as achieving sustainable systems with economic, environmental, and social components. Workshop participants see significant opportunities for NIFA to implement strategies within program design and the funding processes to further foster transdisciplinary systems research, extension, and education.

***Social Science Research Planning: Climate Change, Bio-Energy, and Natural Resources Workshop  
National Institute of Food and Agriculture***

***Workshop Report***

**Introduction**

The complex nature of contemporary issues facing agriculture and natural resources is illustrated by the global interactions of human and natural caused phenomena such as global climate change, resource use, and the transition from fossil-based to biobased energy sources. The National Institute of Food and Agriculture (NIFA) is responding to this complexity with an increased focus on integrated, transdisciplinary<sup>1</sup> scientific endeavors to provide sustainable and viable solutions to societal challenges. This emphasis requires a systems approach to fully comprehend the nature of problems, guide multiple facets of science in a more collaborative and interdependent manner, and demonstrate valid, reliable, and tangible outputs and impacts. On May 11, 2010, NIFA hosted a workshop of nationally renowned scholars of multiple disciplines and National Program Leaders (NPLs) to identify the role and unique contributions of social sciences to such systems approach research/education/extension and to discuss effective strategies for NIFA to foster transdisciplinary collaborations.

**Workshop Rationale**

Mandated by the 2008 Farm Bill, the USDA Cooperative State Research, Education, and Extension Service (CSREES) became the National Institute of Food and Agriculture (NIFA) as of October 1, 2009. The Institute works with research/education/extension institutions by providing federal assistance (grants) and program leadership. With the NIFA reorganization comes an expectation that grant funding will be increasingly oriented toward fewer, larger, longer-term awards in societal priority areas as well as some additional basic (or “foundational”) science areas. NIFA’s overall goal is to focus on systems-type projects, which include a mix of extension and/or education along with transdisciplinary research, addressing societal challenges. Dr. Roger Beachy, NIFA Director, has emphasized the need to develop systems approaches which incorporate multidisciplinary research, education, and extension efforts to address societal challenge areas, including climate change, sustainable bio-energy, natural resources, and the environment.

The May 2010 workshop built upon results from several previous NIFA (prior to October 1, 2009, CSREES) efforts.

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<sup>1</sup> Transdisciplinary projects engage investigators from a range of scientific fields, including physical/natural sciences, economics, social and behavioral sciences, to capitalize on expanding knowledge and simultaneously address societal problems with a holistic - rather than reductionist - approach. Transdisciplinary implies complex interactions and collaborative effort of science, education, and innovation towards specific societal outcomes and signifies a unity of knowledge beyond individual disciplines. (Adapted from Blazer, D., et al., 2006, *Genes, Behavior, and the Social Environment*, National Academy of Sciences; and Pohl, C., 2008, From Science to Policy through Transdisciplinary Research, *Environmental Science & Policy*, Vol. 11-1.)

On July 17, 2008, a panel of noted economists from academia, government, and the private sector met with the then CSREES administrator and agency staff to discuss the role of social sciences. Key points that emerged from the meeting include the following:

Many of the traditional economic/social science issue areas are still important and should continue to be addressed through improved traditional research and education. The most challenging new problems will require creativity, leadership, and multi-disciplinary cooperation. Most arise from the complex interactions of what may appear to be disparate current issues challenging the science community and the body politic. These include the interrelations of climate change, environmental and resource sustainability, and the performance of resource/energy markets.

On July 21, 2009, the agency hosted a workshop to identify strategic directions in the area of climate change. Workshop recommendations included an increased emphasis on gaps in areas relevant to climate change science, especially in economics and social sciences. Also included was the need to recognize contributions from multiple fields within the social sciences (i.e. economics, sociology, behavioral science, geography, anthropology, political science, etc).

#### **Workshop Objective: May 11, 2010**

While NIFA acknowledges the merits of, and supports, single disciplinary studies, the objective of this workshop is to identify effective strategies to enhance transdisciplinary-oriented projects in the priority areas of climate change, bio-energy, and natural resources/environment. Primary questions addressed in the workshop were:

1. How do social scientists contribute to NIFA's achievement of long-term measureable impacts from projects in the priority areas of climate change, sustainable bio-energy, natural resources and the environment?
2. How can NIFA incentivize/foster/support transdisciplinary teams and how can social scientists more effectively work with other disciplines as a part of these teams?
3. What strategies can NIFA undertake to facilitate the development and success of research/education/extension systems approaches to address societal challenges such as climate change and sustainable bio-energy?

#### **Question 1**

**How do social scientists contribute to NIFA's achievement of long-term measureable impacts from projects in the priority areas of climate change, sustainable bio-energy, natural resources, and the environment?**

*A focus on human behavior*

Social scientists focus on human behavior, response to incentives, and decision-making, including the evaluation of trade-offs within institutional and cultural contexts. In order to achieve outcomes, there must be a focus on how behavior (individually or collectively) is influenced and/or changed. Identification of how individuals gather and process information to make decisions is an important

contribution. In addition to the hard (or technological) solutions to an issue (supply-side perspective) normally considered by biophysical scientists, social scientists generally incorporate greater focus on demand-side perspective and valuation on a public policy level. Inclusion of human behavior and institutional structures should be an ongoing conversation involving multiple social science disciplines (e.g., anthropology, behavioral science, economics, philosophy, psychology, sociology).

#### *A focus on problem-based scholarship*

Addressing societal challenges through systems research can be framed as achieving sustainable systems with economic, environmental, and social components. Regional and local scale problems should be used to inform program priorities within that context. Successful collaboration is more likely to be achieved when the nature of the problem to be addressed defines relevant contributions (problem based), rather than requiring a pre-determined set of disciplines or fields. Social scientists can nurture full co-framing of broad challenges and researchable problems as they tend to focus on problems that are inherently transdisciplinary. In the spirit of building true transdisciplinary teams, questions would be better framed in the context of how to achieve long-term measurable impacts, without distinction of specific disciplines, before addressing what social scientists (or any single discipline) can contribute.

#### *A focus on institutions*

Social scientists consider institutions, policies, incentives, and regulations as variables, with both the potential for change and influence on human behavior and outcomes. In most cases, researchers from other disciplines tend to consider these as fixed constraints. Social scientists understand that the information systems guiding adaptive management<sup>2</sup> in climate change and sustainable bio-energy are endogenous and affected by economic and social institutions as well as technical options.

#### *Contributions to project leadership*

How project objectives, questions, and activities are framed and who frames them are important components for project success. All disciplines need to find a way to push frontier intellectual knowledge into wisdom that can be used to address a problem. Investigators must agree on the core components of a project and then be held accountable to each other and to the grantor for delivery on those components. There are crucial differences between transdisciplinary and multidisciplinary research. The more applied the work, the more likely it will be to generate transdisciplinary - as opposed to multidisciplinary - assessments. Successful transdisciplinary projects require participants who are aware of this distinction and approach, and who are also strong in their respective disciplines as well as respectful of other disciplines' assumptions and contributions.

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<sup>2</sup> Adaptive management is a structured, iterative process of optimal decision making in the face of uncertainty, It is often characterized as "learning by doing" as a way to accrue information needed to improve future management.

Social scientists can make good project leaders as they have a broad frame of reference that allows focus on the social, economic, behavioral, and political context in which a problem often takes place. This broad frame can help keep research centered on the problem to be resolved, rather than a single technical solution. There is concern that social scientists may not have the technical knowledge needed to be sole administrators of a project that is biophysical in context. Likewise, there is concern that biophysical scientists may lack the social science context needed to be sole administrators of a project that depends on behavioral and/or institutional adjustments to implement the technical solutions developed. Co-leadership is valuable and can lead to stronger project outcomes.

## Question 2

**How can NIFA incentivize/foster/support transdisciplinary teams and how can social scientists more effectively work with other disciplines as a part of these teams?**

### *Disciplinary and transdisciplinary*

There was much discussion over the synergies and/or disconnects for individual researchers (of any discipline) and projects when scientists worked on disciplinary advances or on transdisciplinary teams. There was general agreement among workshop participants that excellence in transdisciplinary work requires excellent disciplinary work. However, if a scientist works only in the context of his/her discipline, he/she may deal only with people in that discipline; whereas a scientist who works beyond the boundaries of his/her own discipline is more likely to be engaged in transdisciplinary projects. When achieved, the integration of a team across disciplines is often more fruitful than multiple individuals working with a single focus on their respective disciplines, especially when addressing complex problems such as climate change.

With these problems – sometimes referred to as wicked problems – the normal science approach of problem-solution-application must give way to a messier process of consensus goal setting, joint knowledge creation, and reflective learning.<sup>3</sup> It is possible to contribute to disciplinary advances and work with scientists from outside the discipline, however, project definition and design are critical as ideally each scientist needs to carve out a piece of the problem for themselves and then also have a piece to share. This is particularly relevant in the context of single-discipline publications and recognition. It is important to combine frontier intellectual models with transdisciplinary experiences. True cooperation requires close partnerships and frequent interactions to co-create research and outputs. This requirement does not mean that a scientist must give up his/her own disciplinary boundaries, but it does mean that information and context must be allowed to constantly integrate to influence the project as well as maintain that scientist's perspective on his/her own discipline.

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<sup>3</sup> For more discussion see Batie, S., 2008, Wicked Problems and Applied Economics, *American Journal of Agricultural Economics*, Vol. 90-5; Lazarus, R., 2009, Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future, *Cornell Law Review*, Vol. 94; and Peterson H.C., 2009, Transformational Supply Chains and the Wicked Problem of Sustainability: aligning Knowledge, Innovation, Entrepreneurship, and Leadership, *Journal on Chain and Network Science*, Vol. 9-2.

### *Bring the best science to the team*

Every discipline, including social sciences, should bring its best science to transdisciplinary teams and its contributions to this team work should be recognized and rewarded. Excellence can include both qualitative and quantitative methods. Greater behavioral knowledge and understanding leads to better social science contributions and better project results, just as does better biophysical knowledge and understanding.

### *Be explicit about the role of values*

Integration across disciplines is more easily achieved when conducting positive (descriptive), rather than normative (policy or exploratory) analysis. Normative analysis introduces values into the research. It is important to recognize, and account for, values that are held by the project management as well as individual academic scientists. Part of project assessment should include exploration of what it means to value something including what/whose values to use and the rules for social choice. Social scientists can, and should, provide leadership in clarifying the ways in which personal and social values enter into problem-solving scholarship. Values are relevant for the academic scientists participating in the research, project management, and the human behavioral aspects of the problem under consideration.

### *Develop broader understanding among team members*

It can be difficult to have social sciences contributions valued by team members if these disciplines are always seen in the role of project evaluation, which may be viewed only as a critic of the work. Often economics is not fully understood, beyond its usefulness for marketing or commercialization of ideas and technologies. At the same time, economists need to be cognizant that not all decisions are driven by desire for maximizing net-present-value. Social scientists can be their own worst enemies by not recognizing the value of contributions from multiple social science disciplines and/or fields. Social scientists should avoid jargon and convey the context of how people gather information and make decisions; for example, explaining how social sciences contributions can help biological or physical scientists solve problems or expanding recognition that groups which do not adopt new practices may have legitimate reasons for their choice. All scientists bring useful perspectives to the table. The specific problem to be investigated is influenced by many factors and societal desires. Early dialogue with decision makers and stakeholders can help focus the research on policy-relevant issues. Multiple scientists, disciplines, and stakeholder groups should be encouraged and engaged in meaningful ways as much as possible in addressing societal issues. Collaborative environment should be provided or created to build respects for all disciplines.

### Question 3

**What strategies can NIFA undertake to facilitate the development and success of research/education/extension systems approaches to address societal challenges such as climate change and sustainable bio-energy?**

#### *Adaptive management*

As both disciplinary and transdisciplinary sciences are evolving and as societal issues become more complex, NIFA needs to encourage experimentation, recognizing that, with experimentation, there will be some failure. The ability to learn from failure is an important piece of adaptive management (both passive and active).<sup>4</sup> It is important to acknowledge the role of transaction costs as both the Institute and Principal Investigators adapt to participate in successful systems research. Adaptive management is a relevant concept within the context of a single project as well. Many biophysical and social scientists who work on applied problems are strongly committed to participatory research with multiple stakeholders and to provide tools for adaptive management that can be used by their clientele. All members of a project team should understand and support the concept of participatory research.

#### *Problem definition and framing*

NIFA should incorporate the transdisciplinary approach in defining research/education/extension needs and framing problems. Social scientists should be actively involved at the beginning with other scientists to identify issues. NIFA should hire more social scientists in multiple disciplines and/or fields, in addition to economists and sociologists. NIFA could develop better incentives for fostering inter- or transdisciplinary teams with a focus on engaged sustainable scholarship to address identified societal challenge areas. Social scientists should realize the importance of stakeholders being active throughout the project. Stakeholders should be engaged in meaningful ways from the beginning of project planning to the end as research results are delivered and utilized.

#### *Panel/review process*

Review panels need to incorporate both qualitative and quantitative expertise across disciplines as part of the review team. Every discipline consists of multiple fields of specialization with expertise to contribute. Concerns were expressed that having only one social scientist (representing multiple disciplines and fields) on a panel of 20 or more will not be sufficient as his/her opinions may not be heard or given proper weight. The review process should ask for, as well as evaluate details on project management and leadership including potential members' past experience with transdisciplinary teams. The panel needs to check applicants' experience for their relevant credentials; include and evaluate management plans for projects; look for transdisciplinary skills in a project leader; and constitute a full fledged transdisciplinary review process with diverse panels, especially when there are major social

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<sup>4</sup> Passive adaptive management uses predictive modeling based on present knowledge to inform management decisions. As new knowledge is gained, the models are updated and management decisions adapted accordingly. Active adaptive management invokes deliberate changes to management strategies in order to test completely new hypotheses. So while the goal of passive adaptive management is to improve existing management approaches, the goal of active adaptive management is to learn by experimentation in order to determine the best management strategy (adapted from Williams, Byron K.; Robert C. Szaro; Carl D. Shapiro, 2007, *Adaptive Management: The U.S. Department of the Interior Technical Guide*. US Department of the Interior. ISBN 1-411-31760-2).

issues being addressed. NIFA could develop metrics specifically targeted toward evaluation of transdisciplinary teams/projects.

#### *Post award management*

NIFA should acknowledge the impact of transaction costs for the Institute, academic community, and stakeholders in developing and participating in large, transdisciplinary teams. The time commitment required to identify and establish trust and common understanding among team members, including participants from the funding Institute and stakeholders, needs to be recognized and facilitated. Post contract management is important, and it should be meaningful. NIFA NPLs, including social scientists, should be an active, engaged part of the team throughout the lifetime of a project, including ensuring that research results are transferred to the stakeholders in a meaningful way.

#### *Build human capital*

NIFA has an important role to play in the development of human capital (i.e., disciplinary and transdisciplinary scientific capacity) within the research community. Human capital for both academics as well as other stakeholders needs to be fostered to make the transition to this new transdisciplinary framework. NIFA could fund and incentivize effective team creation as one way to build human capital. NIFA needs to take ownership of the scholarly community, enable it to shape the science similar to programs of National Science Foundation and National Institute of Health. There must be a greater commitment to team building within NIFA, including guidance, oversight, and training. NIFA should support education for graduate students in learning how to work in inter- and transdisciplinary teams even though the students may specialize in one discipline.

Planning grants have been used successfully by other agencies to develop teams of scientists and to focus on problem definition. This is also a way for NIFA NPLs to become involved with research teams during the early phases of project and research design.

There are other opportunities for NIFA to implement strategies within the funding process (beyond planning grants) to further encourage transdisciplinary systems research, extension, and education. NIFA is most likely to achieve long-term benefits if social and biophysical scientists work closely together during the entire duration of a project, not just on 'edges' and if all team members have a basic understanding of, and appreciation for, the technologies and approaches used by other members of the transdisciplinary team. Transdisciplinary team leadership, a management plan, and an integrated work plan are becoming more and more crucial to a project's success.

In summary, addressing societal challenges through systems approach can be framed as achieving sustainable systems with economic, environmental, and social components. Workshop participants see significant opportunities for NIFA to implement strategies within program design and the funding processes to further foster transdisciplinary systems research, extension and education.

**Participant List**

***Social Science Research Planning: Climate Change, Bio-Energy, and Natural Resources Workshop***

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May 11, 2010

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**Final Agenda**

***Social Science Research Planning: Climate Change, Bio-Energy, and Natural Resources Workshop***

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May 11, 2010

Amber Waves Room, USDA Economic Research Service, 1800 M Street, NW, Washington, D.C.

8:00 – 8:30	Greetings	Amber Waves Room
8:30-8:50	Welcome and workshop framing questions	Franklin E. Boteler
8:50-9:15	<ul style="list-style-type: none"> <li>• Workshop layout</li> <li>• Starting the discussion</li> </ul>	Jan Urban-Lurain
9:15-10:30	Panel <ul style="list-style-type: none"> <li>• Bob Goodman</li> <li>• Kathy Segerson</li> <li>• Leonard Shabman</li> <li>• Rick Welsh</li> </ul>	Sandra Batie
10:30 – 10:45	Break	
10:45-12:00	<p><b>Group Conversation 1: How do social sciences contribute to achieving long-term measureable impacts from projects in the NIFA priority areas of climate change, sustainable bio-energy, natural resources, and the environment?</b></p> <p>This is a chance for non-panel participants to comment from the perspective of their own experience.</p> <p><b>Intended Outcome:</b> Engage the whole group in exploring the core elements of the social sciences value proposition for NIFApriority projects; articulate the potential role(s) and contributions of the social sciences to NIFA priority research areas.</p>	Jan Urban- Lurain
12:00-1:15	Lunch – on your own	

1:15-2:15	<p><b>Group Conversation 2: How can social scientists more effectively work with other disciplines in a research/outreach team?</b></p> <p><b>Intended Outcome:</b> Generate ideas for action that could be adopted/taken by social scientists.</p>	Jan Urban- Lurain
2:15 – 2:30	Break	
2:30 – 3:30	<p><b>Group Conversation 3: What strategies can NIFA undertake to facilitate the development and success of research/education/extension systems approaches to address societal challenges, such as climate change and sustainable bio-energy?</b></p> <p><b>Intended Outcome:</b> Generate ideas for action that can be considered by NIFA</p>	Jan Urban-Lurain
3:30 – 4:15	Wrap-up	David Ervin
4:15 – 4:30	Closing Remarks/Next Steps	Franklin E. Boteler