

The Architecture of Integration: Coordinated Agricultural Projects

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Agriculture & Natural Resources Science for Climate Variability and Change:
Transformational Advancements in Research, Education, and Extension Symposium

Session #5. Translating Climate Science into Actionable Knowledge: The Role of the Social Sciences

ASA, CSSA, SSSA International Annual Meeting Cincinnati, Ohio
2012 October 21-24



United States Department of Agriculture
National Institute of Food and Agriculture

U.S. agriculture is increasingly impacted by the effects of a changing climate

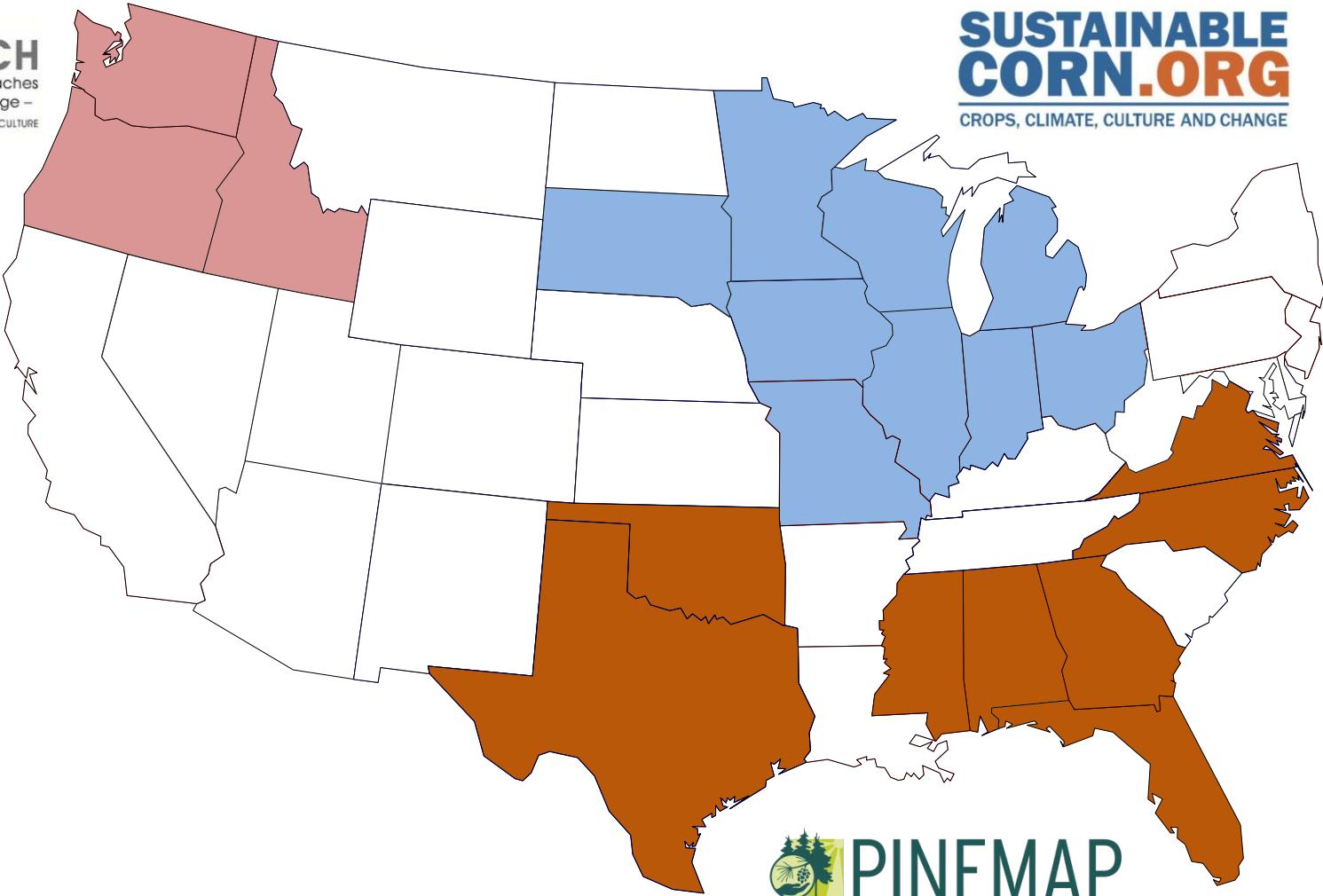


- 3 Coordinated Agricultural Projects (CAP)
- 115 PI's across 20 states



REACCH
Regional Approaches
to Climate Change –
PACIFIC NORTHWEST AGRICULTURE

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New Opportunities and Challenges

The integration of science is essential to:

1. Address **complex**, difficult problems
2. Identify processes and structures needed to answer complex questions
3. Create new knowledge
4. **Bi-directional** testing & evaluation of new knowledge with stakeholders
5. Prepare the next generation of scientists



February 2012 Pendleton, Oregon

Directing three separate projects while working to integrate science goals, learn from each other, and finding ways to connect our teams.

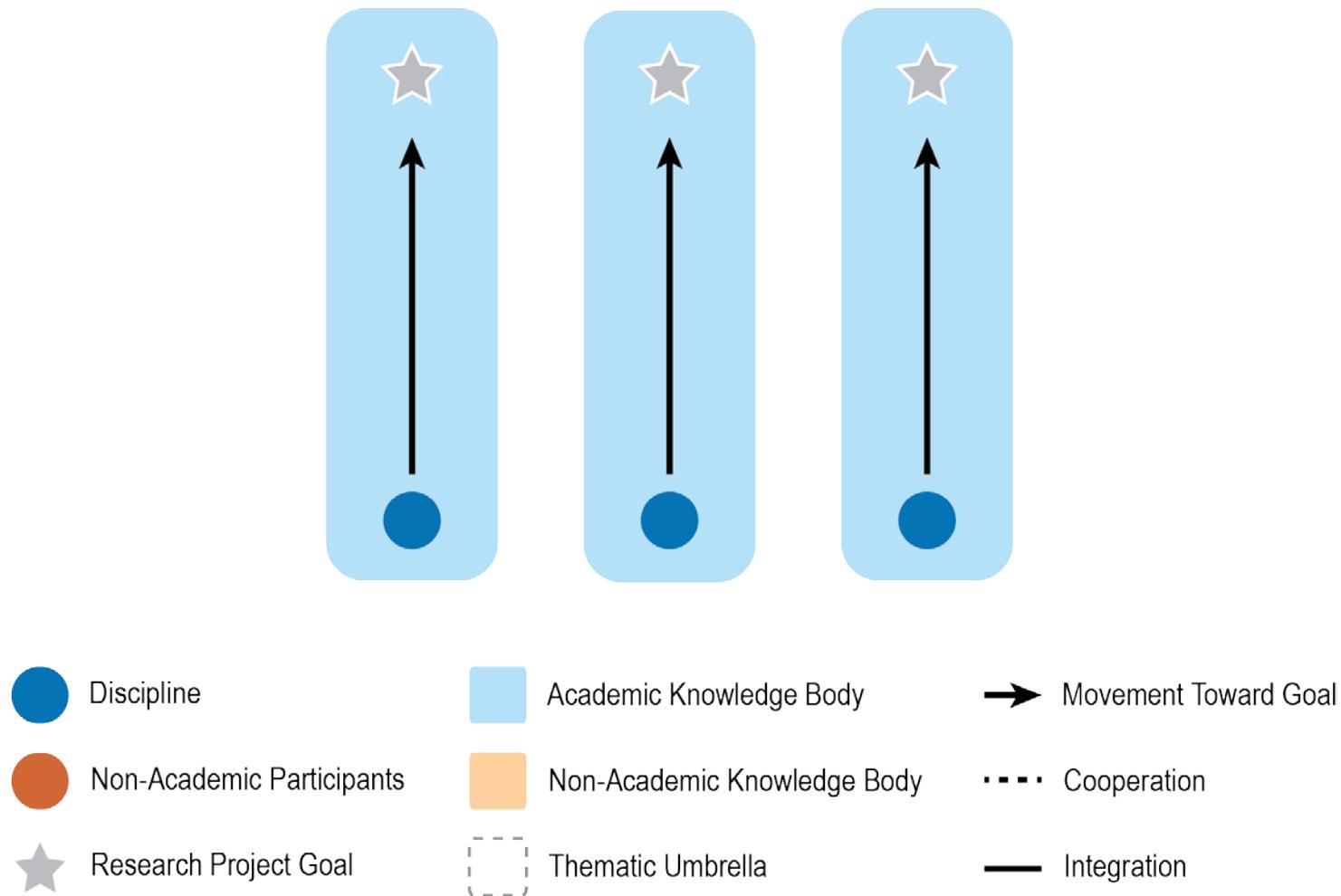
Team Integration Architectures

Are highly complex and diverse with similarities and differences. Understanding these architectures provide operational guidance to leadership and offer a valuable **platform** for exploration, innovation, and achieving the practical work of the team.



USDA-NIFA Climate & Corn-based Cropping Systems CAP; 2012 Annual Meeting in Wooster, Ohio.

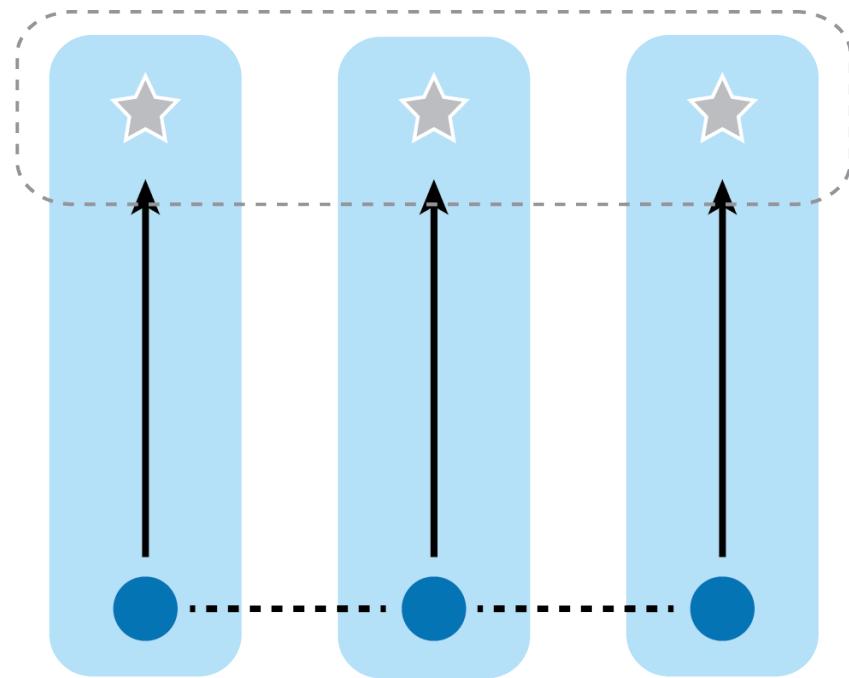
The trend to classify cross-disciplinary research is useful to generate dialogue that illustrates relationships



Tress, Tress, & Fry 2004

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Multidisciplinary



● Discipline

■ Academic Knowledge Body

→ Movement Toward Goal

● Non-Academic Participants

■ Non-Academic Knowledge Body

··· Cooperation

★ Research Project Goal

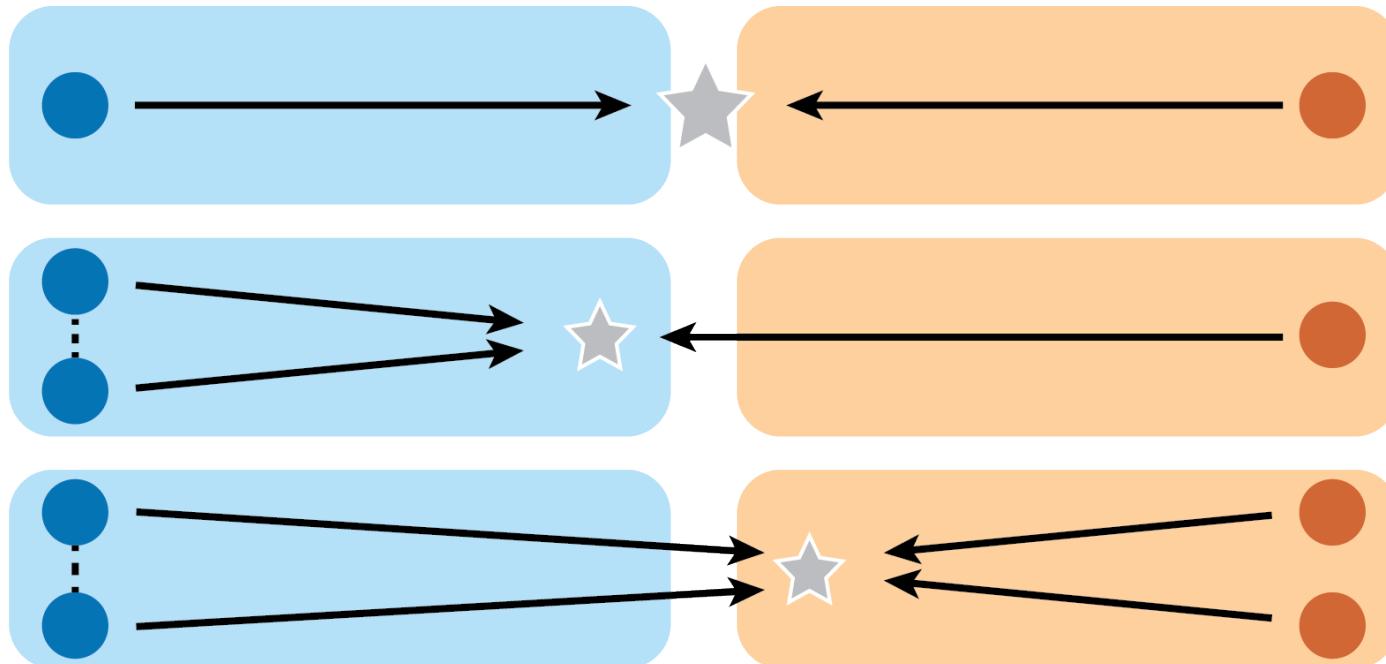
□ Thematic Umbrella

— Integration

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Participatory



Discipline

Non-Academic Participants

Research Project Goal

Academic Knowledge Body

Non-Academic Knowledge Body

Thematic Umbrella

→ Movement Toward Goal

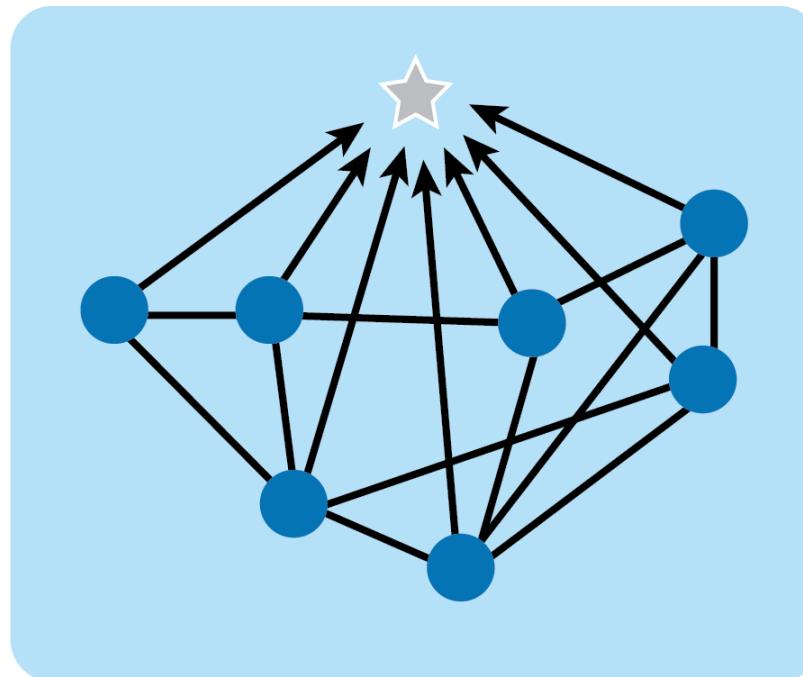
··· Cooperation

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Interdisciplinary



● Discipline

● Non-Academic Participants

★ Research Project Goal

■ Academic Knowledge Body

■ Non-Academic Knowledge Body

□ Thematic Umbrella

→ Movement Toward Goal

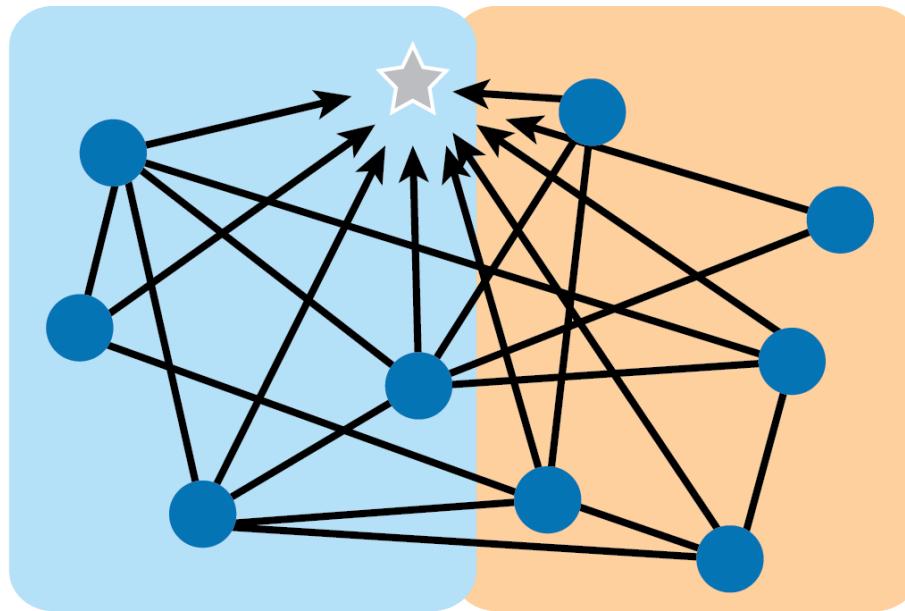
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Transdisciplinary



● Discipline

■ Academic Knowledge Body

→ Movement Toward Goal

● Non-Academic Participants

■ Non-Academic Knowledge Body

····· Cooperation

★ Research Project Goal

□ Thematic Umbrella

—— Integration

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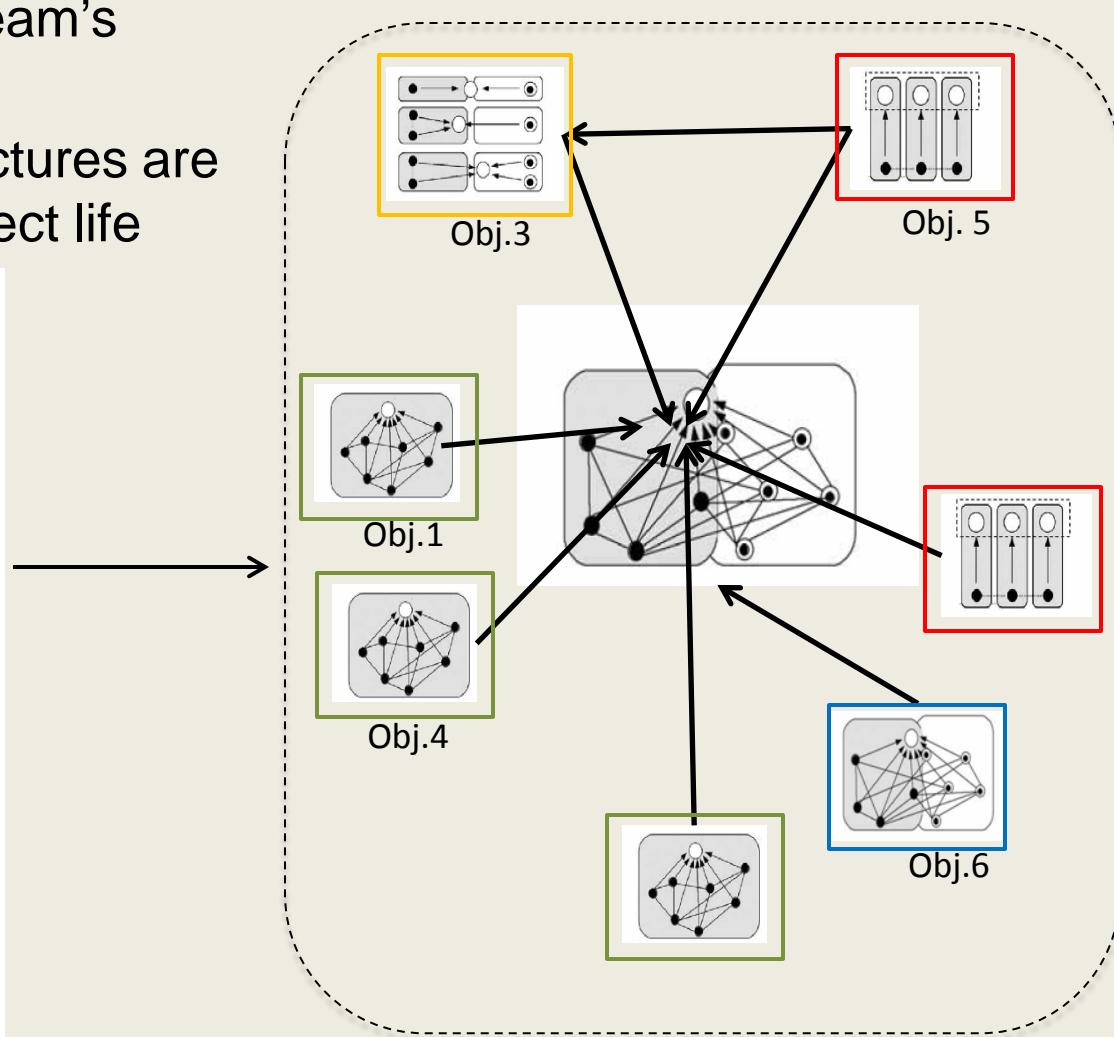
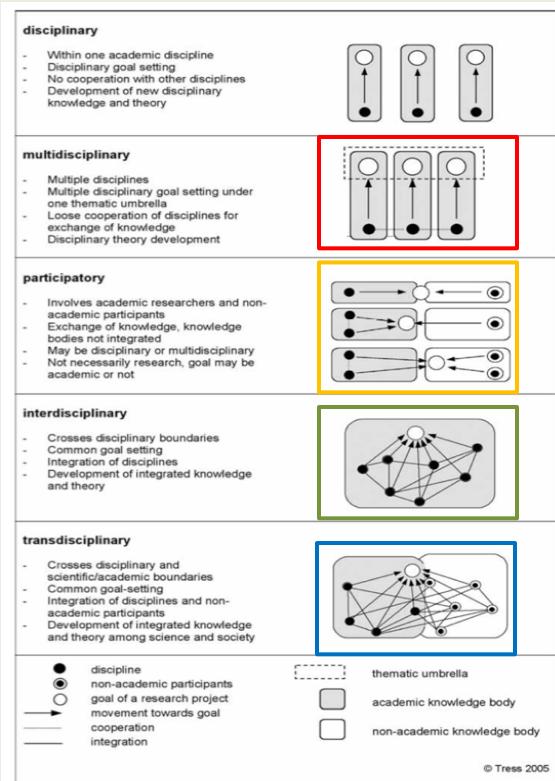
Categorization serves as a start...

Terminology and framework provides a useful start but doesn't represent complexity of large projects like the USDA-NIFA Climate CAP's



Big Project Integration Architecture

- Each project and each team's collaboration is unique
- These collaborative structures are dynamic throughout project life



How to cultivate and enhance team capacity to accomplish big science?

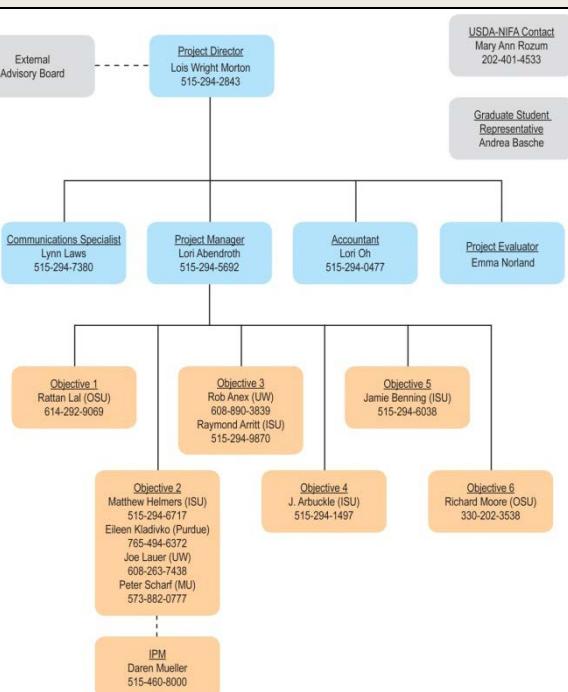


Create a team structure that:

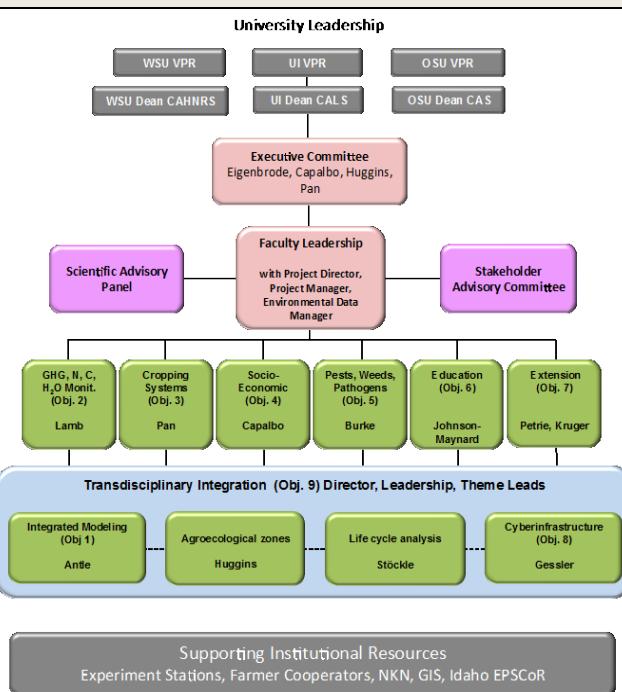
- Functionally **meets objectives and goals** specific to the team
- Has clear connections and lines of **accountability** between and across individuals
- Places individuals into specific **working groups** based on their expertise
- Places individuals in **“gaps”** - key roles to help bridge and connect working groups
- **Boundaries, but flexible**

Traditional Organizational Charts

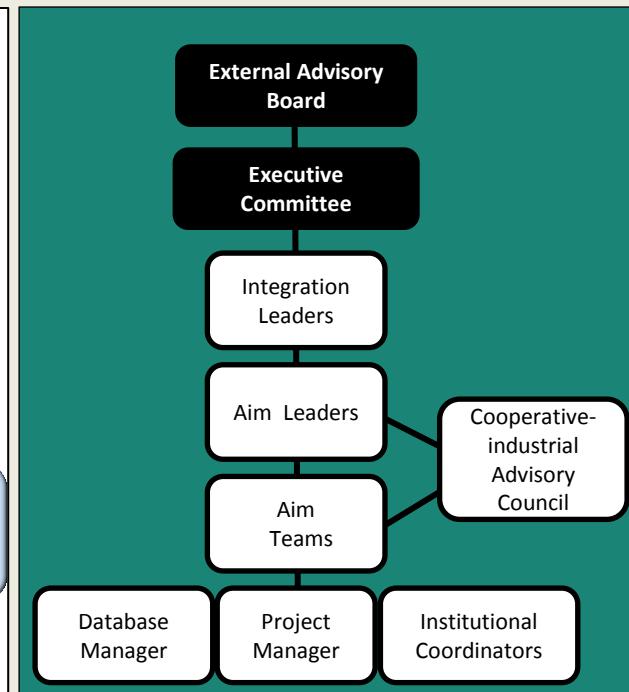
CSCAP Organizational Chart



REACCH Organizational Chart



PINEMAP Organizational Chart



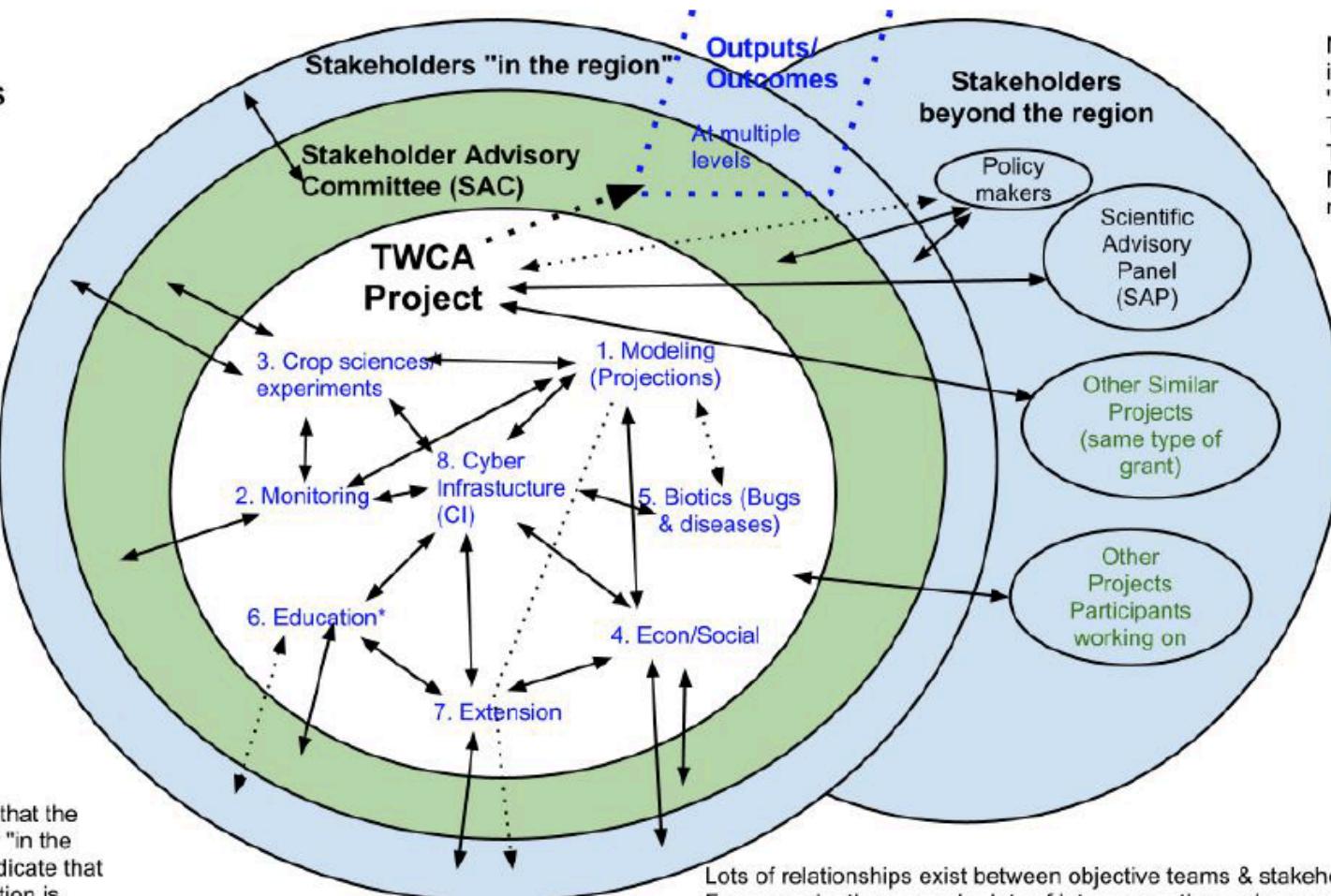
Organizational Reality

Interactions emerge dynamically within a project

Figure 3. TWCA Connections

TWCA Connections (Feb, 2012)

The connections shown in this diagram are primarily about communication and interaction, with associated potential for integration/TD activities throughout the duration of the project. However, some lines begin to point to "outputs" as well, such as modeling tools to assist with farm management and recommended guidelines



* Project members from all teams will provide input into the Education Team; this drawing does not include all the lines for those connections.

Numbered items are called "Objective Teams."
Team 9, Project Management, is not shown.

Lots of relationships exist between objective teams & stakeholders. For example, there may be lots of interconnections w/growers - some from current project, some from history of ongoing relationships. Similar relationships exist to "other projects" that people work on. (Almost no one is "full time")

Ways to Document & Understand Team Processes and Integration

Multiple data sources available to identify areas of integration and discover where, when, and how future integration can be encouraged:

- Surveys
- Focus groups
- Qualitative interviews
- Archival analysis of meeting activities and action items/or lack of
- External evaluator observations
- Social Network Analysis
- Ethnography

Baseline Team Assessment

- Online survey of project participants
- Pre-existing multi, interdisciplinary relationships

Collaboration questions modified from the Transdisciplinary Research on Energetics and Cancer Initiative, published in American Journal of Preventive Medicine, 2008

	Never	Once or twice a year	Quarterly	Monthly	Weekly
a. Read journals or publications outside your primary, secondary, or third disciplines (listed in response to Question #2)	12.4%	21.5%	19.8%	28.9%	17.4%
b. Attended meetings or conferences outside your primary, secondary, or third disciplines	38.8%	45.5%	12.4%	3.3%	0.0%
c. Participated in working groups or committees with the intent to learn from researchers in other disciplines	24.8%	40.5%	20.7%	12.4%	1.7%
d. Submitted grant proposals, <u>other than the CSCAP</u> , in partnership with colleagues or others outside your primary, secondary, or third disciplines	51.2%	36.4%	10.7%	1.7%	0.0%
e. Received grant funding awards, <u>other than the CSCAP</u> , in partnership with colleagues or others outside your primary, secondary, or third disciplines	57.0%	36.4%	6.6%	0.0%	0.0%
f. Obtained new insights into your own work through discussion with colleagues from other disciplines	10.7%	26.4%	23.1%	18.2%	21.5%
g. Modified your own work or research agenda as a result of discussions with colleagues from other disciplines	18.2%	32.2%	28.1%	18.2%	3.3%
h. Established links with colleagues from other disciplines that led to or may lead to future collaborative work	14.0%	47.1%	18.2%	14.9%	5.8%

Baseline Key Findings & Next Steps

1. Learn about each other's science
2. Find **connections** among our sciences
3. Ask complex questions that our sciences, when integrated, might answer
4. Create **clusters** of individuals willing to ask new questions and seek new solutions

Greenhouse Gases and Agriculture
Dr. Michael Castellano, Iowa State University

Agriculture is a significant source of greenhouse gases (GHGs) and a major contributor to climate change. This report provides an overview of the sources of GHG emissions from agriculture and the potential for mitigation. It highlights the role of soil management, crop selection, and energy use in reducing emissions.

Climate Change Beliefs, Concerns and Support for Adaptation and Mitigation among Corn Belt Farmers
Dr. J. Christopher Arnsdorf, Iowa State University

This report presents preliminary data on climate change beliefs, perceived risks, and support for adaptation and mitigation among farmers in the Corn Belt. The study found that 80 percent of farmers believe climate change is occurring, and 70 percent believe it is attributed to human activity. Farmers are most concerned about increased temperatures and drought, and are most supportive of conservation practices and renewable energy.

Drainage Water Management
Dr. Jane Frankenberger, Purdue University

This report explores the impact of drainage water management on soil health and water quality. It highlights the benefits of reduced leaching of nutrients and pesticides, improved soil structure, and enhanced infiltration. The report also discusses the challenges of implementing drainage water management systems, such as initial costs and equipment requirements.



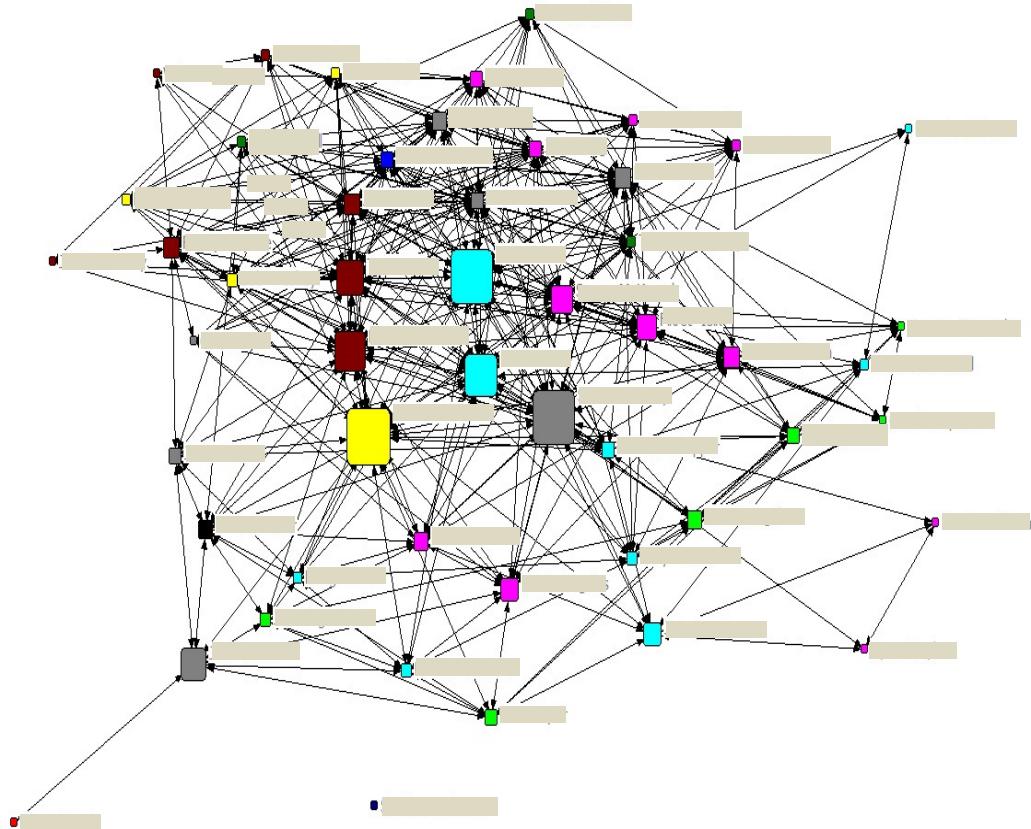
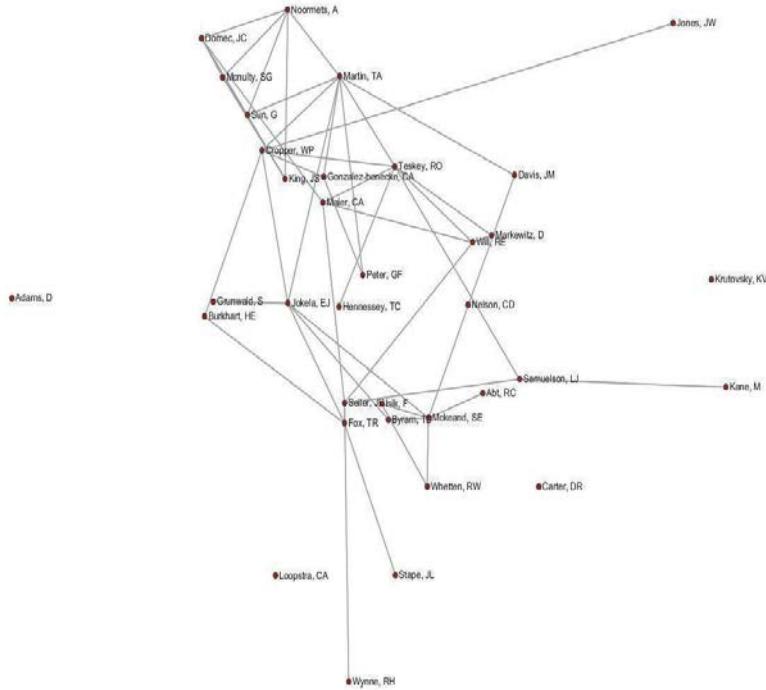
Social Network Analysis (SNA) is a tool that can be used to describe patterns of interactions in a project and to help participants understand and optimize their collaboration.

Sociocentric Network Analysis (SNA) as a Monitoring Tool for Reflection & Learning

1. Collect **data from members**
2. Create social network **diagram**
3. Revealed **patterns**
4. Participatory SNA **perceptions of interactions**
5. Repeat during **project life cycle**

Highlights the strength of existing networks, as well as challenges of integrating across networks and pulling “unconnected” collaborators into the network.

PINEMAP SNA



Survey to gather social network data

REACCH SNA (Connections between individuals)

No awareness: You do not know who this person is.

No direct contact: You know who this person is, but do not have direct contact with them. (You might have met them or seen them at a meeting.)

Communication/Coordination: You share (or have shared) information and/or align activities with this person, to support mutually beneficial goals.

Collaboration: You have actively worked together to set common goals, realize a shared goal, or develop integrated knowledge.

Identified wish/need for future interaction: You think there is an opportunity for cooperation or collaboration with this person, but that hasn't happened yet.

Unification/coadunation. You think there is a merging of identities, structure, and culture. Unification through growth.

1. What interaction have you had with each person?

	No awareness	No direct contact	Communication/Coordination	Collaboration	Unification/coadunation	Need for future interaction
Person A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Person B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Person C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Person D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Person E	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Done

Unexplored Territory

Understanding the architecture of integration with our teams, and quantifying or otherwise measuring that structure as we go is helping us venture out into unexplored territory.



Institutional Adaptation

- Institutional change in how we think about and do science, strengthen our capacities to better connect theory, data, and reality
- Integrate science
- Accomplish innovation



Adaptation Needed Across Many Systems

1. **Resistance** (*status quo; manage to resist change disturbance*)
2. **Resilience** (*moderate effects but retain form and function after disturbance*)
3. **Transformation** (*transition to a new system with different structure and function better suited to new conditions*)

Acknowledgements

- Project managers:
 - Lori Abendroth (CSCAP)
 - Dianne Daley Laursen (REACCH)
 - Jessica Ireland (PINEMAP)
- Assessment specialists:
 - Emma Norland (CSCAP)
 - David Meyer (REACCH)
 - Wendy-Lin Bartels (PINEMAP)

Thank You!

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SOCIAL & ECONOMIC RESEARCH

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REACCH
Regional Approaches to Climate Change –
PACIFIC NORTHWEST AGRICULTURE

SEARCH REACCH

REACCH Member Login

Welcome to REACCH!

The Regional Approaches to Climate Change project is a coordinated regional agricultural project funded by the National Institute for Food and Agriculture to improve the long-term profitability of the cereal production systems of northern Idaho, western Oregon, and eastern Washington under ongoing and projected climate change, while contributing to climate change mitigation by reducing emissions of greenhouse gasses.

REACCH includes efforts in research, extension, and education that integrates diverse elements including modeling, cropping systems modeling, economics, agronomy, crop protection, and others in a transdisciplinary manner.

The project is a partnership of four institutions (USDA Agricultural Research Service, University of Idaho, Washington State University, and Oregon State University). More than 50 scientists, students, and postdocs are participating. It also includes an educational element by developing programs for K-12 education.

We connect with farmers, industry personnel, and other stakeholders/partners to achieve the adaptation and mitigation goals of REACCH.

Goals of REACCH

- Develop and implement sustainable agricultural practices for cereal production within existing and projected agroecological zones throughout the region as climate changes.
- Contribute to climate change mitigation through improved fertilizer, fuel, and pesticide use efficiency, increased sequestration of soil carbon, and reduced greenhouse gas (GHG) emissions consistent with NIFA's 2030 targets.
- Increase the number of scientists, educators, and extension professionals with the skills and knowledge to address climate change and its interactions with agriculture.
- Develop the regional capacity for continued, long-term research, education, and extension efforts to mitigate and adapt to climate change.
- Address climate change effects with a transdisciplinary research.

sustainablecorn.org

reacchpna.org

PINEMAP
Helping the future of southern pine management in a changing world.

RESEARCH

EXTENSION

EDUCATION

Welcome to PINEMAP

Pinetree Integrated Network Education, Mitigation, and Adaptation project (PINEMAP) is one of three Coordinated Agricultural Projects awarded in 2011 by the USDA National Institute of Food and Agriculture (NIFA).

PINEMAP focuses on the 20 million acres of planted pine forests managed by private landowners in the Atlantic and Gulf coastal states from Virginia to Texas, plus Arkansas and Oklahoma. These states produce 90% of the southern pine lumber and 70% of the pine products. This is about 10% of the contiguous U.S. forest carbon and form the backbone of an industry that supplies 16% of global industrial need, 5% of the jobs, and 7.5% of the industrial economic activity of the region.

PINEMAP integrates research, extension, and education to enable southern pine landowners to manage forests to increase carbon sequestration, increase efficiency of nitrogen and other fertilizer inputs, and adopt management approaches to increase forest resilience and sustainability under variable climates.

Project & News Updates

Climate Change and Southeastern Forests: A New PLT Secondary Module
Imperial Learning Tree (ILT) partners are developing a new module on climate change impacts on southern pine ecosystems. Their intent is to make this module available to southern pine extension agents in time for people can start ...

Improved Loblolly Pine Better for the Environment, Study Finds
NC State Newsroom, April 17, 2012.
Read More

Creating Better Pine Forest Management for a Changing Climate
Mid-Atlantic Forest Agricultural Experiment Station
Read More

Year 1 Annual Report
Covered the PINEMAP year 1 annual report summarizing activities and accomplishments for the period of October 2011 through February 2012.
Read More

Future forests may soak up more
A comparison of three methods to estimate evapotranspiration in two contrasting loblolly pine plantations: Application of water use and drought sensitivity of evapotranspiration components
Domke, J.C., G. Sun, A. Noormets, M. Davatzikos, E. Treseder, and J. King. 2012a. A comparison of three methods to estimate evapotranspiration in two contrasting ...

pinemap.org