

Enhancing Coordination and Collaboration Across the Land-Grant System

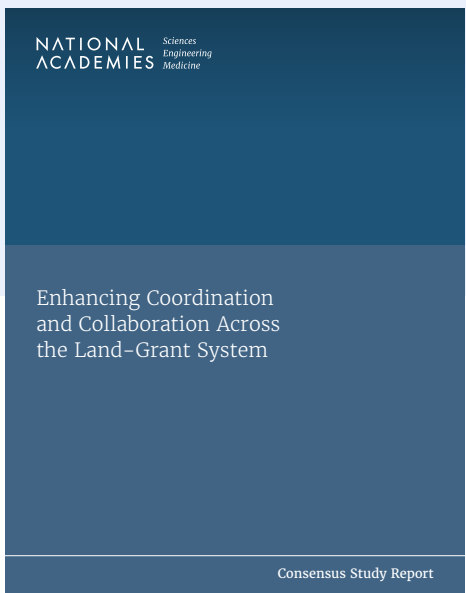
ENHANCING COORDINATION AND COLLABORATION ACROSS THE LAND-GRANT SYSTEM

The U.S. land-grant system is a crucial asset supporting the nation's agricultural production. Under the Morrill Act signed by President Lincoln in 1862, states were given land to support the establishment of public colleges and universities that provided educational opportunities to working people in practical subjects such as mechanical arts and agriculture. The initial universities are known as the "1862s." Further legislation expanded the system to include Historically Black Colleges and Universities, the "1890s," and Tribal Colleges and Universities, the "1994s." Today, 111 land-grant colleges and universities across all states and many U.S. territories carry out the system's tripartite mission of agricultural research, education, and extension, funded through grants from the U.S. Department of Agriculture's (USDA's) National Institute of Food and Agriculture (NIFA).

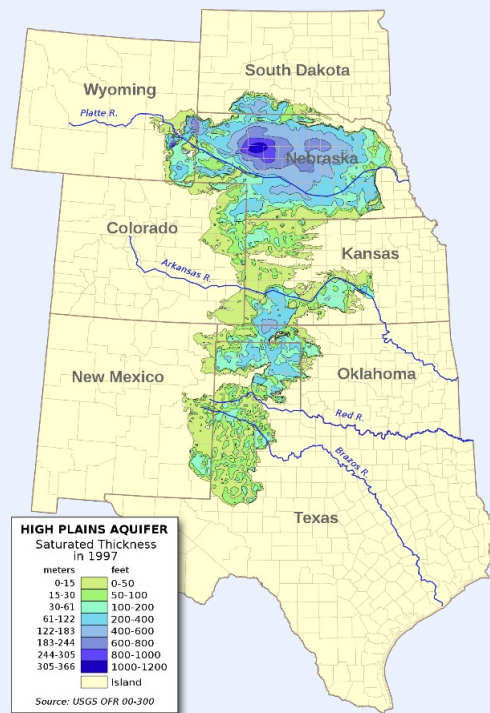
In response to a congressional directive in the 2021 Consolidated Appropriations Act, NIFA established a Blue Ribbon Panel to examine how cooperation in the land-grant system could deepen and expand the impact of its work. NIFA turned to the National Academies to convene the Panel to examine how knowledge generation, problem solving, and opportunity creation across the food and agricultural knowledge system can be increased by enhanced collaborative activity.

COLLABORATION IN THE LAND-GRANT SYSTEM

Collaborative projects between faculty members at different land-grant colleges and universities occur frequently using both capacity-building funds given to land-grant institutions legislatively or awarded through a competitive grants program. The Panels' analysis found there are currently 247 active multistate projects supported by Congressional appropriations directed to 1862 universities. Once these projects are established, they are open to other institutions, including other land-grant and non-land-grant colleges and universities, federal agencies, and the private sector, which bring their own sources of funding to participate. There are also collaborations supported by competitive grants, such as the multi-institutional Ogallala Water Coordinated Agriculture Project (see Box 1). However, participants from the 1890 or 1994 institutions are seldom involved.



BOX 1. THE OGALLALA WATER COORDINATED AGRICULTURE PROJECT



The Ogallala aquifer is a vital natural resource in the western United States; it underlies parts of Texas, Oklahoma, Kansas, Nebraska, Colorado, and New Mexico.

In 2016, NIFA funded the Ogallala Water Coordinated Agriculture Project (OWCAP) to address a large-scale regional problem of national importance to the agricultural supply. It is focused on developing and sharing practical, science-supported information relevant to best management practices for optimizing water use across the Ogallala region. Groundwater pumped from the Ogallala aquifer has transformed this region from a dustbowl to an agricultural powerhouse, producing more than 30 percent of U.S. crops and livestock and significantly increasing domestic and international food supplies. However, extensive groundwater pumping has led to significant depletion of the aquifer and declining water quality in certain areas. The 70-member interdisciplinary team from 10 institutions and six states catalyzed new understanding to identify and promote management of the Ogallala resource and support the region's communities.

The team's work focused on multiple scales of water management, including individual producers; local and regional entities, such as groundwater management districts; and the broader multistate aquifer region. Novel outreach mechanisms such as a producer-led irrigator certificate program (producers instructing other producers) and efforts to develop an economic benefit of marketing a brand of beef raised using water-conserving practices are associated with this project.

The Panel found that inter-institutional collaboration happens mainly at the state level. In Virginia, extension is a shared responsibility of Virginia Tech (an 1862) and Virginia State University (an 1890), and in Alabama, through the Alabama Agricultural Land Grant Alliance, statewide extension activities are jointly conducted by Auburn (an 1862) and Alabama A&M and Tuskegee University (both 1890s). In some places, a high-level partnership agreement creates the foundation for building trust and familiarity as a prerequisite for collaboration. An example is the Michigan Inter-Tribal Land Grant Extension System (MILES), which reflects the commitment of the state land-grant colleges and universities (1862s and 1994s) to the success of each other, the tribes, and the collective benefit of the public in the state. The 1890 Centers of Excellence, established at HBCUs to leverage disciplinary diversity among institutions, provide a unifying space for collaborative activity.

VALUE OF COLLABORATIVE AND MULTIDISCIPLINARY RESEARCH

While there are already many active collaborations in the land-grant system, collaboration deserves additional attention because the problems facing agriculture today are more complex than in the past. Changes in climate, land use, population growth, and other factors are stressing water, soils, and other resources that support food production. These challenges require "convergent" solutions that integrate knowledge from life and health sciences, physical, mathematical, and computational sciences and engineering disciplines to create tools that enable systems research. Examples of such tools include field-deployable sensors for rapid and dynamic monitoring of biophysical phenomena across multiple scales and geographies; artificial intelligence (AI) to increase predictive abilities; and soil, plant, and animal microbiome manipulation to improve crop

production, transform feed efficiency, and increase disease resistance.

Diverse backgrounds, cultures, community relationships, and scientific expertise reside in all of the land-grant colleges and universities. Collaborative vehicles are one way to take advantage of that richness and put technology to use. For example, through platforms like AI for Future Agricultural Resilience, Management, and Sustainability (AI-FARMS), researchers from Illinois, Michigan, and Alabama share data and put tools to use in diverse farming situations.

OVERCOMING BARRIERS TO COLLABORATION

The Panel developed a set of principles needed to foster successful coordination and collaboration in the land-grant system (see Box 2) and recommended actions to overcome barriers that prevent successful collaboration.

- 1. It is urgent that Congress take action to facilitate the participation of all land-grant colleges and universities in multistate research and extension projects.**

Historical and current funding disparities have prevented many 1890s and 1994s from being full partners in

collaborations with the 1862s. If unifying the land-grant system around common national pursuits is important, Congress should address the need to provide dedicated funding to support participation in collaborative activities.

- 2. Land-grant administrators should examine how to reduce the variability in committed support for faculty participation in collaborative activities.**

Institutions have differing approaches for supporting faculty involvement in collaborative research. That creates varying expectations about the nature of the activity and the role of participants. For example, some institutions use multistate research funds to support salaries while others may use them to support travel to participate in meetings.

- 3. Faculty members in academic departments should reflect on how collaborative activities fit into an academic career and advocate for their reward.**

Like many, if not most, academic entities, land-grant colleges and universities have traditions emphasizing and rewarding competitive, rather than collaborative, research projects. Departments should modify

BOX 2. ENHANCING THE SUCCESS AND IMPACT OF LAND-GRANT COLLABORATION

The Panel identified a set of conditions that, if met, would help foster successful coordination and collaboration in the land-grant system:

- Support for large-scale collaborative projects at the highest administrative levels in the various institutions;
- Targeted financial resources to enable planning and communication among institutions;
- Focused operating resources, including administrative support and trained project and data management support, in addition to directed funds to support research, teaching, and outreach;
- Incentive structures that enable faculty to participate in large-scale projects without compromising on their other responsibilities;
- Uniform, shared data management systems that enable seamless access to emerging information; and
- Outstanding communications support to inform the public, including legislators, of the outcomes of their financial investments.

evaluation criteria for promotion and tenure to ensure that achievements in team science are appropriately recognized and rewarded.

4. Funding agencies should help faculty find partners for collaboration.

To increase knowledge of where relevant expertise exists across the land-grant system, NIFA could encourage collaboration by convening information exchange or sandbox workshops. These could highlight funded research projects or new areas of research and allow investigators to share information about work they may be doing in topical areas that are of interest to other scientists in the system.

5. Land-grant colleges and universities should help build capacity for collaboration by introducing faculty to the science of team science.

Establishing collaborations requires team building, emotional intelligence, and project management skills, for which many faculty are unprepared and untrained.

There is a scientific basis for understanding the human behaviors that foster successful teams, and academic institutions should use that knowledge to promote team dynamics and train team leaders.

COMMUNICATIONS TO AMPLIFY IMPACTS

Impact can take many forms (e.g., catalyze behavior change, create commercial opportunity, etc.), but having impact is also associated with recognition and awareness of the work that contributed to these outcomes.

Documenting the economic, environmental, and societal impacts and benefits of collaborative research is a way of raising the profile of this information for producers, policy makers, and the public. Creating specific messages using graphics and story-telling for particular audiences is most effective. To improve communications, the committee recommends that **NIFA support a collaborative research and extension activity of social scientists and science communicators in the land-grant system to develop outreach strategies. In addition, land-grant colleges and universities should organize novel messaging vehicles to reach specific audiences about the outcomes of collaborations.**

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