NAUFRP Research Chair Report
Summer 2021

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The NAUFRP Research Committee focused on two projects over the past year to address challenges with forest and forest products research funding and capacity in the U.S: 1) Leading a U.S. Forest and Forest Products R&D Capacity Summit, and 2) Quantifying changes in Ph.D. expertise in forest resources from U.S. university programs over the past four decades (1978 to 2017). The following progress was made on both projects:

U.S. Forest and Forest Products R&D Capacity Summit

The forest and forest products research and development (R&D) capacity of the U.S. measured in scientist years and funding has eroded substantially during the past three decades. Unless new approaches are developed, there is likely to be continued erosion of the nation's forest and forest products R&D capacity that can reduce global competitiveness of the U.S. forest products sector, as well as threaten the management and sustainability of our nation's forests.

To address this concern, we proposed holding a Forest and Forest Products R&D Capacity Summit during May 2020 to bring leaders from state, private, federal, and university forestry organizations together to discuss the problem and strategize better approaches to cooperatively identify, communicate, coordinate, and advocate for forest and forest products R&D priorities, capacities, and funding.

A one-year conference grant proposal was submitted to AFRI in November 2019 to hold the summit. It was funded in June 2020. The research team includes Robert Wagner (Purdue U.), Emily Huff (Michigan State U.), Michael Goergen (U.S. Endowment for Forestry and Communities), and Keith Gilless (U.C. Berkeley). Unfortunately, the COVID-19 pandemic forced a complete re-design of the May 2020 summit. We converted the summit to a series of online focus groups, which provided an opportunity to explore issues in more detail.

To help guide the design and delivery of the summit, a steering committee composed of representatives from leading state, private, federal, and university forestry organizations was assembled to guide organization and delivery of the summit, as well as lead subsequent actions that will follow from the meeting. The steering committee includes Alexander Friend (Deputy Chief for R&D, U.S. Forest Service), Bob Glowinski (President and CEO – retired, American Wood Council), Tom Martin (President & CEO, American Forest Foundation), Susan McCord (Manager, NCASI Foundation), Dave Tenny (President & CEO, National Alliance of Forest Owners), and the research team.

The focus groups included State Foresters, small private family and individual landowners/managers, large private forest owners and managers, forest products industry leaders, environmental NGOs, USFS National Forest System leaders, USFS Research Station Directors, and University research leaders. Seventeen focus groups were held via Zoom from fall 2020 through spring 2021. Each focus group had 3-6 members and a total of 73 participants were interviewed. Prior to each session, focus group participants were provided with a list of questions related to their organization's use, need, and priority for forest and forest products research information, the 2017 U.S. Endowment for Forestry and Communities final report of the Blue Ribbon Commission on Forest and Forest Products Research & Development in the 21st Century, and Zoom instructions. All sessions were recorded and transcribed for later analysis.

The data analysis and preparation of the final report are ongoing, but several preliminary themes emerged from the focus group sessions:

- There was remarkable consensus among the focus groups surveyed on top R&D priority areas.
- Critical areas of growth and opportunity for R&D include mass timber, climate change and forest carbon, and new markets for wood.
- Communications about forest and forest products R&D should focus on fire hazards, keeping forests as forests, and forests as a natural climate solution.
- Partnerships/coordination have become increasingly creative to help fill the gaps in forest and forest products research capacity and funding.
- There is misalignment between the incentives for forest and forest products researchers and the research needs of R&D consumers.
- While all focus groups felt there was an advantage to having a unified national voice for setting forest and forest products R&D priorities, there was also is a concern about the potential loss of advocacy for regionally important issues.
- There are existing convening organizations (e.g., AFF, NAFO, SAF, NAUFRP) that should be leveraged in identifying and communicating forest and forest products R&D priorities.
- Communicating the value of forests to the public and policy makers is vital before advocating for specific forest and forest products R&D needs.

Once the report is complete, the steering committee will use results of the Forest and Forest Products R&D Capacity Summit to determine next steps in how to improve identifying, communicating, coordinating, and advocating for U.S. forest and forest products R&D priorities, capacities, and funding.

Changes in forest resources Ph.D. expertise from U.S. university programs over four decades (1978 to 2017)

Given the significant reduction in forest and forest products R&D capacity that has occurred over the past three decades, we were curious whether expertise among forest resources disciplines also was changing while this reduction in national R&D capacity was occurring. In addition to overall capacity, changes in subject matter expertise can affect the kind of capability that is available to address specific problems that forest resource managers face across the country.

To address this question, we examined changes in forest resources expertise in the U.S. over the past several decades as measured by changes in Ph.D. dissertation topics produced by university forestry programs. We selected changes in Ph.D. dissertation topics as a key metric because it is the highest level of forest resources expertise produced in the country. The subject matter expertise developed by Ph.D. students also is important because it determines the kind of expertise that is available to: 1) lead future government, university, and industry research efforts needed to address current and future forest resources challenges, 2) educate the next generation of university forest resources students that go on to become the next employees of forestry organizations, 3) provide extension and outreach programming on forest resources issues for the U.S. public, and 4) provide scientific expertise and advice to policy makers on key forest resources issues.

We focused our study on Ph.D. dissertations published at universities with forestry programs that qualify for support under the McIntire-Stennis Cooperative Forestry Research Act, which largely includes 1862 Land Grant institutions that offer PhD-level forest science degrees. Dissertations from 56 universities were included in the study.

We selected Ph.D. dissertations from the ProQuest Dissertations and Theses Global database. Using the ProQuest search functions, Ph.D. dissertations published from 1955 to 2019 with titles and abstracts that included the keywords “forest,” “forests,” “forestry,” “silviculture,” “wood technology,” or “wood science” in the dissertation title or abstract were selected. Due to

low numbers of dissertations available in the data base before 1977 and after 2017, we had to confine our analysis period to the four decades between 1978 and 2017.

Automated content analysis (ACA) with Latent Dirichlet Allocation (LDA) was used to analyze the words in all dissertation titles and abstracts to generate topical patterns using an unsupervised clustering method. Final results from the LDA grouping of 7,742 dissertations identified 20 distinct subject groupings. Because forests are mentioned in a wide range of dissertations, the resulting topics also included forest wildlife and several other supporting sciences. To determine changes over time for each of the 20 topics, we regressed number of dissertations published per year with the year of publication from 1978 to 2017 for each of the 20 topics.

Significant trends in the number of dissertation topics produced annually were found over the past four decades. Preliminary results indicated which topics have increased, decreased, or remained relatively stable over this period:

Increased

- Forest policy, politics, and social science
- Forest modeling, biometrics, and statistics
- Forest fire history, ecology, and impact
- Wood science
- Forest vegetation ecology
- Avian ecology
- Watershed ecology and management
- Climate and landscape change
- Genetics and systematics of plant and animal populations
- Atmospheric and soil science

Stable

- Forest economics
- Forest entomology and pathology
- Wetland ecology

Decreased

- Forest growth and silviculture
- Tree seedling propagation, physiology, and regeneration
- Forest soil nutrients, ecology, and management
- Terrestrial wildlife ecology and management
- Ungulate, carnivore, and livestock ecology and management
- Fish ecology and management
- Wildlife food and nutrition

Changes in forestry expertise indicate a significant reduction over the past four decades in fields related to forest growth and silviculture, tree seedling propagation and regeneration, and forest soils and nutrition. Increases in number of dissertations produced include forest policy and social science, forest modeling, forest fire, wood science, and vegetation ecology.

Results from this study are being prepared for publication and will be submitted for publication in a forestry journal later this year. The authors are Robert Wagner, Kristen Bellisario, and Ningning Nicole Kong.