

RESEARCH AND EXTENSION STATEMENT

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My research and extension interests include the sustainable management of forests, the industrial ecology and economics of forest products, and geospatial analysis of forest systems. I am inspired by the Cooperative Extension (CE) specialist's dual roles, spanning both research and extension. The position's explicit directive to address current problems with applied research ensures that academic inquiry remains relevant and leverages the considerable resources and capacity of the Land Grant university. Perhaps the central challenge of our time is to extract meaningful conclusions from the immense proliferation of data now available, and to use that information to effectively address the issues of resource use, energy, and climate change. I believe that effective extension means conducting research with near-term benefits; effectively communicating motives, methods, results and findings; and informing the public and policymakers about forest management, wood products, climate and energy.

Applied research

Drawing on my skills and research experience, my research priorities will center around the sustainable development of existing and new markets for wood products, and quantification and communication of the role of wood products and wood energy in environmental, public health and climate policy. As a CE specialist, I will build a robust applied research program around the following themes.

Carbon cycle of wood products Wildfire, economic value, conservation ethic, and climate policy, among other factors, make California's forests unique in the world. Recently, California's policymakers have emphasized sequestration as a primary role of forests through initiatives such as carbon offsets for reduced harvesting. While such programs have demonstrably increased carbon sequestration within the geographic scope of the program, it is unclear how such programs impact storage of carbon globally [1]. I'd like to shed new light on these programs and investigate some of their implicit assumptions through the following areas of inquiry,

1. cost/benefit analysis of wood bioenergy, including impacts on forest health and emissions,
2. evaluation of the climate impacts of forest carbon offset programs using both empirical and mechanistic modeling,
3. net greenhouse gas emissions from the California forest sector inclusive of stochastic processes e.g wildfire, and mortality

Efficiency and conservation in the forest products sector California's forest product sector at present is underdeveloped in relation to the scale of the resource when compared with other regions rich in forest resources. The majority of timber harvested in the state is used to produce dimensional lumber or exported as raw logs [2]. Residuals from saw-milling are used in biomass power or mulch and soil. Consumption of engineered wood products continues to increase [3] and innovations in wood product technology such as Cross-Laminated Timber (CLT) and Mass Timber are expanding markets for structural wood products into mid-rise and high-rise construction [4]. California has had the largest fleet of biomass power plants in the nation but this capacity is rapidly diminishing as other renewable sources of electricity become less costly. A second focus of my research program will be on exploring new markets and improving efficiency in the forest product supply chain. Specific themes in this area include,

1. evaluation of innovative applications for wood and expansion of existing wood markets through outreach to design, construction, and technology sectors
2. investigate and quantify the range of impacts associated with the use of wood biomass in energy applications
3. evaluating public perceptions of the sustainability of wood products
4. identification of barriers to forest market participation spanning the entire supply chain from landowner to product developer
5. evaluation and testing of new approaches to harvesting and logistics in forestry.

I believe strongly in ensuring the integrity of academic research through the well established practice peer review and publication. In addition, new tools are becoming available to assist with transparency and reproducibility which I will use in the specialist role. These tools include online version-control sites that host code and technical documentation, and metadata repositories, such as [Data.gov](https://data.gov) and [cal-adapt](https://cal-adapt.org), which allow curated access to datasets. The principle of reproducibility in research is well aligned with CE research as verifiability and accessibility of datasets, methods and interpretation facilitate knowledge dissemination and capacity building. In my experience the use of open, standards-based data formats, as well as the use of free and open source software (FOSS) facilitate reproducibility and accessibility. I will actively support and encourage involvement in and development of FOSS as a tool for rigorous reproducible research.

Extension

My extension interests focus broadly on two themes,

1. building the base of public understanding of the role of wood and forests in meeting emissions reduction targets while meeting the material demands of the world's sixth-largest economy
2. providing technical tools, domain expertise, and applied research to the CE client base.

I see the extension clientele for this position as having two broad categories: 1) small businesses, counties, public institutions, community groups and Non-governmental organization (NGO) in under-served and/or rural communities, working to address issues of forest health and economic development through wood product marketing/manufacturing or wood energy projects and, 2) businesses, regulators and policymakers in the forest products and wood bioenergy sector. These two client groups in some cases have divergent needs, in others they are aligned. For example, across the full spectrum of extension clientele, there is a resounding need to be able to clearly demonstrate the climate and forest health benefits of utilizing woody biomass. In contrast, the needs of Native American communities evaluating a small-log processing yard and Combined Heat and Power (CHP) plant are very different than those of an integrated forest-products company evaluating expansion into the CLT market. Both groups would fall within the service domain of my extension program.

Public Outreach and Education

California's position as a world leader in climate change mitigation and renewable energy policy reflects the average Californian's desire to be a better steward of the environment. But the connections between the sustainable use of wood products, climate change mitigation, and forest health are not well-known to the general public and thus misperceptions abound. A central interest in my extension work is to understand how these connections can be better communicated and substantiated. Issues relating to forest management are often polarized around an oversimplified version of the age-old protectionism vs. conservationism debate. It is in this context that the integrity and independence of the CE network and the UC system can serve to facilitate dialogue, disseminate information and thereby elevate the public discourse. Extension delivery in this context would focus specifically on,

1. engaging advocacy groups that commonly oppose expanding the use of wood to identify key concerns and thereby allow development of improved outreach materials.
2. conducting workshops to inform design professionals about the range of California wood products and manufacturers, building on consumer preference for 'local' products.
3. expanding social media presence and leveraging the University of California Division of Agriculture and Natural Resources (UCANR) web platform to actively engage in current events and develop a broader audience.

I am very interested in the application of web tools to deliver dynamic and engaging content from relevant research. In many cases web tools can serve both technical needs as decision support tools and provide important information to support social license for wood products. For example, I recently collaborated on a proposal to the California Energy Commission to develop a web-based tool to assist in evaluating specific geographic locations for facilities to process wood into energy and other products. Much of the same data and analytics necessary to determine economic feasibility, such as a supply curve for biomass feedstock, can quantify environmental attributes, both positive and negative, of a given project, e.g., reduced wildfire risk, avoided pollutant emissions from pile burns, and added emissions from industrial conversion processes.

Technical Assistance

My experience working with the range of stakeholders in the wood products and wood-to-energy space has made clear to me the value of CE staff in providing expertise otherwise available only through consultants. CE advisers and specialists are key members of project development teams, as they provide impartial expertise that can help reduce unnecessary, early-stage costs. In my experience, the CE specialist provides his or her own knowledge as well as that available from research by other individuals and groups.

Client engagement Fundamental to the role, I believe, is the ability to listen to clients and fully understand their goals and objectives, both immediate and long term. After these are defined, the specialist can respond as needed. In some cases this can be relatively simple, like helping evaluate technology options for a combined heat and power at an engineered-flooring plant. Often, however, the specialist may see opportunities to meet objectives in ways that the client had not considered. For example, a client requesting assistance to evaluate gasification for a small biomass power plant could be advised that direct-combustion options may be more reliable and less costly. Specialists must also ensure that the appropriate UCANR resources (RECs, advisers, specialists) are engaged.

Domain expertise While private consultants can play a useful role in evaluating project feasibility, technology due-diligence, and other aspects of project development, their interests are not necessarily aligned with those of the entity seeking assistance. The impartiality of the CE specialist ensures that clients' interests drive the advice provided.

Building a network of expertise Through my education and professional experience with the University of California (UC) system, I have developed strong working relationships with faculty and research staff. A CE specialist must recognize the boundaries of his or her own expertise and continue to build a network beyond those boundaries.

Campus Engagement

I look forward to working with ESPM faculty to ensure students have the tools to understand the complex environmental arguments surrounding the use of wood and forest products. I also want to assist in increasing awareness of CE and support career development of future CE staff through working as a mentor in the Graduate Students in Extension program.

References

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