

The 21st Century Silviculturist

BY THERESA "TERRIE" JAIN

In the early 1980s, silviculture was defined as the art and science of controlling the establishment, growth, competition, health, and quality of forest vegetation and could only be applied in a given forest cover and locality if there was a clearly defined management objective (*Dictionary of Forestry*).



In a recent silviculture textbook by Nyland et al. (2016), the authors expanded the definition. "Silviculturists apply different treatments that make forests more productive and more useful to a landowner and society on a sustainable basis, and the discipline requires integrating biologic and economic concepts to design and implement treatments most appropriate in satisfying the objectives of a landowner."

The authors continued to state that within the "context of ecosystem management, the practice of ecological forestry, or sustainable forest management, silviculturists also design and implement treatments to instill ecosystem processes that create, maintain, or restore a balance of essential components, structures, and functions to ensure the long-term disturbance resilience of ecosystems. A silviculturist designs and implements silvicultural methods to develop stand composition and structures that may be reflected in natural disturbed ecosystems and thereby fulfill objectives that produce tangible (harvestable commodities) and intangible (ecosystem structure and function) benefits."

Given this definition, a successful silviculturist in the 21st century will need broad skills to ensure a high level of innovation is used to develop and implement silvicultural systems that meet resource management demands today and into the future. A major component of this skillset is effective communication skills (oral and written).

Evolution of silviculture methods and systems

The practice of silviculture, particularly in the 1930s through 1970s within the northwestern United States, was often single objective focused, and consisted of evenaged silvicultural systems and the assumption that forest growth and development was predictable and relatively stable. However, for the 21st century, this historical paradigm is shifting to include multi-resource management objectives that integrate, for example, wildlife, fuels, recreation, and forest products. Rather than viewing ecosystems as static, we now view ecosystems as dynamic and less predictable because of invasive species (e.g., disease, plants, and

insects), wildfires, and large insect infestations. Increased public and stakeholder engagement in forest management requires continuous engagement with the public. Last but not least, not knowing how future climate will influence forest development introduces an element of uncertainty. These shifts in how we manage forests requires increased innovation in the silviculture profession.

Silvicultural terms now include "legacy trees," "green tree retention areas," "required opening sizes for regeneration establishment, competitive advantage, and free-to-grow," "individuals, clumps, and openings (known as ICO)," "clearcuts with reserves," "commercial thinning," and "precommercial thinning." This terminology is associated with silvicultural

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systems and methods that focus on leaving residual overstory trees designed to create essential components, structures, and functions that, for example, enhance wildlife habitat or restore the historical pattern of trees to increase disturbance resilience.

For example, irregular selection (an unevenaged silvicultural system) is designed to add diversity in forest structure, yet create large enough opening sizes to encourage successful regeneration of shade-intolerant species. The ICO silvicultural method attempts to maintain groups and clumps of trees separated by small openings and gaps to reflect historical ponderosa pine characteristics. As forestry progresses over time, most likely new methods and silvicultural systems, and terminology, will evolve.

The silviculturist skillset

To meet these forest management challenges, a strong partnership between science and management will become the norm. A 21st century silviculturist will need general knowledge on several subjects, particularly if ecological forestry is the foundation of the management objectives. I often state that silviculturists know something about many subjects, but rarely are experts in any one subject. Subsequently, they will need to depend on a strong science background to synthesize different sources of information (e.g., basic and applied sciences, technical knowledge, economics, and policy), combined with the management objectives and their knowledge of forest dynamics and silvics to create a vegeta-

tive management scenario. Only through a strong partnership between science and management will the silviculture profession be able to implement these complex treatments. It will become common practice for scientists and managers to work closely together to develop, implement, and evaluate silvicultural methods and systems to ensure outcomes meet multi-resource objectives in the short- (post-treatment) and long-term (decades to centuries).

People inside and outside the profession view silviculturists as leaders in forest management. With more public and stakeholder engagement, particularly on federally administered lands, a silviculturist needs to be an effective communicator in both the oral and written arenas. Today, silviculturists communicate with an assortment of forest resource specialists on interdisciplinary teams, as well as with forest management stakeholders and the public. As an effective communicator, a silviculturist spends time and energy on listening, internal and external emotional awareness, speaking clearly, and using simple language (avoiding jargon). Silviculturists must be confident, but not defensive, when speaking, be open to feedback, and take time to learn another person's perspective. As with oral communication, writing becomes paramount.

For example, a silviculture prescription is a written document that describes the series of planned treatments that are applicable throughout the life of a stand to meet a management objective. However, there are times when writing becomes particu-

larly challenging. For example, designation-by-prescription (DxP) or designation-by-description (DxD) are clearly written criteria that describe what trees should be cut or left, and then it is the contractor's responsibility to implement these criteria based on the descriptions provided. This requires silviculturists to write a clear "vision" of what post-treatment outcomes they want to achieve so a contractor, contracting officer, or sale administrator that may or may not have a forestry degree can implement the treatment. This can become challenging when a management objective requires forest structures and species compositions that enhances vegetative biodiversity, produces snags, creates nest sites for particular species, and perpetuates processes that lead to disturbance resilience. A silviculturist uses a variety of tools, including using GIS, remote sensing, modeling, and other forms of technology to understand and write their desired treatment outcomes that address these complex and multi-resource objectives.

Fortunately, the silviculture discipline is well suited to meet these challenges; the foundation of the profession has always included knowledge integration and a close relationship between science and management. Multi-disciplinary thinking will continue to be a part of silviculture, and excellent communication skills are always a component of this portfolio.

Current objectives, communication skills, and meeting the desires of the landowner today just requires a bit more art and a broad ecological, economic, and social science background. Innovation is a part of this profession; it is just what silviculturists do. It is truly a fun time to be a silviculturist. ♦

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