

# Silviculture: What Is It Like, and Where Have We Journeyed?

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**Abstract.**—The philosophy of ecosystem management calls for a new way of doing business. It represents an evolution of thinking and acting that began during the era of dominant use, and continued through the time of multiple use. As such, ecosystem management represents a maturing of thought about silviculture and other aspects of natural resources management and use. It stresses creating and maintaining a predetermined set of ecosystem conditions that serve well-defined objectives. This places a new emphasis on silviculture, but will not require a new silviculture. Rather, it means applying silvicultural knowledge and experience in new and unique ways to address new sets of objectives and opportunities.

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## A TRANSITION, NOT A SUDDEN CHANGE

I have been puzzled at times over the past few years with the oft-heard phrase *paradigm shift*. At times it comes across as a statement suggesting that we try something new .... some radically different way of thinking and acting. It has often been heard as a condemnation of traditional ways, and a message about intellectual inertia and inflexibility. In fact, some provocateurs have approached the philosophy of ecosystem management in that way, implying that we should cast off past ways and put on new and different technical vestments as we prepare for the future. They suggest that the old proved bad, and ecosystem management at last will make it all good.

In many ways, such an argument upsets us. It really says, "You failed! You messed up, so now get it right!" And this happened with the initial statements by some critics of what the US Forest Service has called *new perspectives* in forestry, and more recently *ecosystem management*. In fact, upon hearing the call for a new way of doing business many of us have reacted with self-justification responses. After all, hadn't we entered the ecosystem management era with a wonderfully dynamic and bountiful forest that spread extensively across the nation to the east and west of the prairie? Hadn't the area of forest cover actually increased, bringing American society greater access to the many values that we ascribe to forested lands? Don't we even find before us a forest resource so good and so desirable that more and more people want even increased opportunities to benefit from the legacy of the past?

So as the dust has begun to settle, and I could take the time to think more deliberately about this so-called new philosophy, I really have come to see it as an evolution .... a maturing of the way we think about forests, and of the values that they provide. I see in the ecosystem management movement a new spotlight on silviculture, and even yet

another opportunity for us to provide important leadership to the forestry community.

## THE NATURE OF OUR EVOLUTION

We all came into forestry at different times and bring to the present a wonderfully divergent array of experiences to share and draw upon. For me, entering forestry in the 1950's, it was an initial emphasis on timber, and rightly so. The nation had entered a post-war era of expansion and growth, with a mushrooming population that needed thousands of new units of affordable housing. Our industries and commerce demanded increased amounts of wood and wood-based products to sustain their growth. So a national policy emerged that emphasized timber on most private and public lands, and sought to insure a non-declining sustained yield of accessible commodities. We put a high value on creating stand- and forest-wide *uniformity, consistency, and homogeneity*. And we did it.

Yet even during the timber-dominant era we never forgot the other values. We knew about the needs to protect water supplies and prevent erosion. And we did. We recognized the values that people derived from wild plants and animals, and we incorporated measures to improve their habitats. But we did it as an adjunct to our timber management. In many cases it worked. We heard the demand for increasing the abundance of prime game animals and fishes, and saw the opportunity that timber cutting provided for improving conditions for those creatures. Also, we recognized that people would use our roads and trails to access the forest for recreational use, even though they primarily came for hunting and some camping. So we added parking areas and turn-arounds, and used construction standards that led to roads people could traverse in their automobiles. That worked, too, and helped to promote a dramatic increase in recreational use of forests.

Despite this broadening of effort, we really saw these opportunities as tangential to and a consequence of our timber management. In similar fashion, other resource professionals worked as diligently to set aside special areas for wildlife management, recreational use, watershed protection, and grazing. And they followed a parallel philosophy: to optimize whatever single purpose a landowner assigned to the land, but to also take cognizance of side effects that would have value to people.

Then came the 1960's. The continued period of prosperity and peace had brought higher wages and more leisure time to all of us. Automobiles and roads improved, and more and more of the countryside became readily accessible. Particular change occurred near the newly emerging interstate system that provided opportunities to travel long distances in a short time, and to escape the urban centers to find weekend refuge in the forest. People liked what they saw, and began visiting the forest more and more.

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Concurrently, people also took new interest in environmental quality, and increasingly connected the condition of the environment with the quality of their lives. They saw the forest as a place to realize quality opportunities for relaxation, and began interacting directly with our timber, wildlife, and water management. This brought us face to face with conflicting demands that we had to address and somehow resolve. And we began to do it.

Over time as more and more people moved to the urban areas and employment increased in industry and commerce, they became detached from agriculture and its concepts of production from the land. Gradually, new issues emerged, such as a lessened awareness forests as the source of paper and solid wood products for their homes and places of business. And many people lost sight of the need to both cut trees and grow them to insure a steady supply of the requisite solid wood and fiber products. At the same time, people demanded more of the non-commodity benefits that forests provide, and increasingly came to view tree cutting as a conflict with the values of primary concern. In response, we began looking for ways to mitigate the conflicts between timber cutting and recreation, and to deliberately manage lands to integrate a complex of *uses* in stands and across forests. We reasoned that by following a philosophy of multiple use, everyone could realize a fair share of a broad array of benefits, and that would prove satisfactory for the objectives.

In the process, we continued to focus on *uses*, and upon optimizing a package of complementary benefits that people could derive from the lands. This represented an evolution from the period when we tried to deliberately optimize a single kind of use, into a new era where we tried to optimize some predetermine package of benefits that included an appropriate mixture timber, wildlife, water, recreation, and anything else of concern to the people.

This change didn't happen over night. It evolved as we recognized the shift in public and landowner interest, and as we adapted our management and broadened our silviculture to accommodate the changing objectives for forestry. We still focused on *uses*, and we did not always find well-proven schemes for integrating the opportunities of interest, or even for understanding what people wanted. We had to figure out what they meant, and how that would translate into different kinds of stand conditions or use opportunities. It took creativity and imagination in the 1960's, and an adjustment in how we had "traditionally" done business.

This metamorphosis into the multiple use management didn't come easy for many of us. Really, we asked questions like:

*But what have we done wrong?*

*Haven't we left the forest in good condition and highly productive?*

*Aren't the animals and flowers thriving, and doesn't abundant amounts of high quality water flow from the land?*

Through hindsight, I see that we went through a time of transition when we struggled to find an appropriate direction for the future, and as we took stock of what we had accomplished in the past. The new philosophy of multiple use had come about through a long period of change and evolution, but to many it all seemed so sudden and so different, and somewhat confusing.

This concept of multiple use didn't require a drastically new silviculture. Rather, we evolved in our thinking and management over time, gradually shifting from a somewhat simplistic approach of concentrating on *one* resource at a time, to recognizing that as we managed for one value we could also manage for others simultaneously. In the process of wrestling with these ideas, we became increasingly skilled at identifying the kinds of forest and stand conditions that would have value in serving the divergent interests of people. And in the process we became adept at developing forest management plans and silvicultural prescriptions to bring those desired conditions to reality. We continued to gear our management to satisfy a set of well-defined objectives, but ones that had become more diverse and more multi-dimensional. Said another way, we matured from practicing silviculture *on an ecological basis*, to doing silviculture *by taking an ecological perspective*, to eventually seeing silviculture *as a process of ecosystem maintenance and renewal*. Yet through all this change, we still developed our silviculture based upon well-defined objectives that addressed well-recognized needs and opportunities.

## **PUBLIC INTEREST CHANGES AS WELL**

Through later stages of the multiple-use era, people began to ask how we could keep our forests healthy and robust, and how we could sustain a broad array of benefits into the future. They asked about sets of values that we had not yet recognized as common to forestry, as well as the ones that we routinely derived from the land. And these questions increasingly dealt with non-marked values, even to the point of assigning them more prominence in some places than the people gave to commodity benefits. That added confusion, too. After all, how would our nation continued to thrive unless we provided the wood-based products that supported so many aspects of our business and private lives?

So toward the end of the multiple-use era as we saw a change in societal attitudes toward natural resources, we began to put less stress on *use* and more on asking *what kinds of conditions* would sustain the desired values into the future. Through the findings of science we also had assembled more evidence about the complexity of forested ecosystems, and the interdependent nature of components that make forests unique and valuable. And these emerging realizations led us to a new kind of philosophy ... one recognizing that the actions we take at one place might affect the nature of things across a broader expanse of the countryside as well. We have also come to better appreciate that when planning the silviculture for one stand, we must think about how that meshes with aspirations for the forest as a whole. And we have learned that when planning the management for a single forest, we must also look at the possible effect on conditions

within the surrounding landscape. All together, this has meant moving one step beyond the traditional boundaries for planning, and learning to better recognize how our activities would fit into the bigger scheme of things that surround us, both in the present and for the future.

## SO WHAT HAPPENED TO THE TIMBER?

When all of this began to surface, I had an opportunity for conversations with two people who helped greatly to forward my thinking. First, Winifred Kessler suggested that we could now concentrate on creating desirable ecologic condition across the landscape .... ones that kept the ecosystems robust, dynamic, and diverse. She also argued that human uses or benefits would flow from these desirable conditions. So we would concentrate on managing forests to create and maintain some desired combination of vegetal attributes in stands and across landscapes, knowing that many benefits would accrue from having those conditions in place.

I still don't fully understand exactly how to measure success with this evolved venture, or even what indices to use in making assessments of the outcomes. But that will come. For the interim I can think about factors like ecosystem resiliency, continuity, complexity, interdependence, and renewability. Perhaps we might take stock of their condition by assessing attributes like:

1. the health and continued productivity of vegetation and faunal communities over the long run;
2. soil stability and nutrition;
3. consistency in soil and land form conditions that might affect water cycling, regime, yield, and quality;
4. sustained availability of suitable habitats for indigenous plants and animals, or acceptably altered communities of them; and
5. continuance of acceptable visual qualities for the intended non-commodity purposes.

Allen and Hoekstra (1995) articulated a set of indices in somewhat different terms, using:

1. *Response indicators*—changes in the status and condition of organisms, communities, and systems
2. *Exposure indicators*—measures of exposure to stress factors
3. *Habitat indicators*—changes in or abundance of conditions that support living organisms
4. *Stress indicators*—development of hazards or a tendency toward actions that stress an ecosystem

Whatever we settle on, we would reject those actions that will not likely have a neutral or positive effect.

The other help came from a conversation with Hal Salwasser. He argued that we could only realize the desired results if we practiced silviculture, and probably more intensively than we had in the past. Especially where features of the vegetation community determine the desired conditions, we would often need to manipulate the density and structure of stands, as well as the species composition. And that means silviculture. So I have come to recognize that we must do it *one stand at a time*. Oh, we don't forget the forest- and landscape-wide needs and opportunities. In fact, we begin by defining what we need across larger areas, and how to intermix different stand conditions to realize a desirable result. But we need to create the desired conditions stand, by stand, by stand .... until we have finally realized an appropriate balance at a broader spatial scale.

This new philosophy doesn't ignore the timber, the game animals, the hiking trails, or the way things look. Rather, it says that we finally can approach these opportunities in different ways. We no longer need to maximize the package of uses a forest can provide. It really says that we have moved away from seeking *simplistic* solutions for optimizing the special interests of a particular group of clients. It says that we stand in an era of more complex silviculture that addresses more long-term opportunities. And what a wonderful challenge that affords.

So at least during my career we have evolved from functioning as silviculturists serving management objectives focused on *timber*, to silviculturists serving management objectives focused on *multiple uses*, to silviculturists serving management objectives focused on *creating and maintaining desirable vegetation conditions*. And where we once integrated uses, we now integrate conditions across time and space to insure the continuance of robust and dynamic forests that will have value to people. In the process we will continue to cut timber, because that frequently proves the most cost-effective way to either tend or regenerate existing age classes (the primary functions of silviculture). But we do it not for the sake of timber. Instead we do it because timber cutting helps us to create and maintain the conditions deemed important to the present and the future. Said succinctly, we now will concentrate on ecosystem maintenance and renewal, with due concern for the effects over both the short term, and for an ecologic time scale as well.

## BUT DOES THE PRESENT ALSO REPRESENT A REVERSAL TO THE PAST?

I find all of this exciting, and challenging. It gives me new opportunities for adapting to changing sets of objectives and purposes. It challenges me to anticipate how altering the structure and condition of a stand for one purpose might affect its condition for another value. It encourages me to intensify my dialogue with wildlife biologists, plant ecologists, hydrologists, recreation managers, visual quality experts, and a wide array of other resource specialists. It forces me to seek out and adopt compromises in some cases, and opens new opportunities in others.

Despite this exciting opportunity, I begin to see a bothersome trend emerging, and wonder if it reflects some kind of backlash response. For even while silviculturists and other foresters work hard at all the things that ecosystem management represents, I see an increasing tendency within some publics to suggest that we should begin narrowing the range of objectives that guide our planning and management, and begin setting aside more and more lands for special uses .... special *dominant* uses. I hear suggestions that we cannot maximize the benefits deemed important to some special interest groups if we continue to create and maintain conditions that ultimately integrate opportunities for a mixture of recreation, commodity, wildlife, hydrologic, and visual values. I see this in the tendency to demand that public foresters set aside areas to support special recreation uses, to enhance a specific group of wildlife, or to exclude commodity production activities that some publics consider incompatible with their own interests.

So I wonder if we have begun to see on the horizon an even new era that would move us back in time, a movement that would discard valuable lessons from the multiple-use era, and a movement that would put us squarely back to arguing about what should go where, and how to limit the options in order to maximize one particular set of objectives. This seems a contradiction to the evolution that brought us to ecosystem management. It makes me wonder what lies ahead ... more maturing, or a retrogression instead.

## THE SILVICULTURAL CHALLENGE

Therein I see a challenge for silviculturists. We have an opportunity to show the options for creating and maintaining desirable conditions that will prove ecologically sustainable and also institutionally, socially, and financially valuable. We can *adapt* to the opportunities that time and maturing brought to silviculture, and demonstrate how integrative approaches set up the conditions that insure long-term ecologic stability across landscapes. We can lead the way into the future by the way that we deal with the present.

In my judgment, it will not require a new silviculture, *per se*. We already have a wide array of techniques in our tool kits. Further, time has shown us what to expect from applying them in different combinations, by different sequences, at alternative times, and with varying intensities. Both research

and experience indicate much about the probable outcomes, and that allows us to show people how a variety of silvicultural systems and silvicultural techniques help to create and maintain alternate sets of desired ecosystem conditions at both the stand and forest levels. We just need to keep improving our capacity to articulate these potentials, to plan creatively how to use the techniques already available to us, and to do a better job in helping others to understand the alternatives that silviculture offers. We need to put our creativity into action, and put silviculture to work to show concrete examples of what appropriate management offers.

This will not come easily ... it has not in the past, and probably will not in the future either. But we need to do it. And we need to keep our minds open and ever expanding to encompass the new opportunities that time has brought to us. We need to stir up the courage to take the risk of continuing to explore alternative values that silviculture can provide, and what that means about trying new ways of doing business.

As we make the move, we push ourselves into the future. Then I suspect we will eventually look back on these times of ecosystem management as still another stage along the evolutionary pathway toward something yet to come .... something that matures from the past and the present, and that opens additional opportunities we can still not comprehend.

So it is *change* that challenges silviculture today. And it is continued *change* that will challenge silviculture in the future. But thanks to a collection of willing and imaginative people who take the challenge and do the deed, we will succeed. We will evolve into whatever the future brings. We have no other choice.

## LITERATURE CITED

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