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LANDSCAPE SCALE MANAGEMENT IN THE OUACHITA MOUNTAINS—WHERE OPERATIONAL PRACTICES MEET RESEARCH[1]

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Abstract-implementation of ecosystem management on National Forest System lands in the Southern Region requires that the best available science be applied to support forest management practices. On the Ouachita National Forest in Arkansas, personnel from the Jessieville and Winona Ranger Districts and the Southern Research Station have developed working relationships that demonstrate how to conduct research in an operational context. Research projects on the districts' lands include GIS applications as well as landscape studies of vegetation, wildlife, hydrology, aquatic ecology, and social sciences. Advantages to the research community include in-kind staff support, study designs that reflect real-world issues, permanence and protection of plot identity, and opportunities to tap into monitoring funds. The cultural differences of time constraints and expected resource outputs that exist between Federal land managers and the research community are more challenging to overcome. The key elements outlined in this case study have application to research on National Forest System lands throughout the South.

INTRODUCTION

In 1992, then-Forest Service Chief Dale Robertson defined ecosystem management as *"managing National Forests in a healthy, diverse, productive, and sustainable manner."* But how, exactly, to implement ecosystem management is the subject of vigorous debate.

The practice of silviculture is changing from one of traditional, timber-production-oriented practices to a means of managing resources by ecological principles, process restoration, and habitat management. As a result, there is a pressing need for meaningful research to support a new foundation for evolving operational practices.

Under ecosystem management, the challenge for the research community is to provide scientific support for management alternatives. Opportunities for innovative research are many and varied. Ecosystem management implies a need not only to explore untested silvicultural practices, but also to consider a wider variety of resources at a variety of scales. Federal land managers seek timely reseaitch results that support, or that quantify the attributes of, new management practices. Scientists who can work within such constraints are enjoying an enhanced ability to participate in responsible management of the National Forest System (NFS) lands.

However, research under the auspices of ecosystem management must be useful if the results are to be widely applied. The best studies have the following attributes:

1. An operational scale;
2. The flexibility to work within, or to modify existing rules, regulations, standards, and guides;
3. The production of timely results;
4. Accessibility to a variety of customers; and
5. Pertinence to emerging issues.

The more attention researchers give to these principles when designing their studies, the more likely will national forest managers elect to work with them.

The goals of this paper are to help researchers better understand NFS management perspectives, to identify opportunities for more effective cooperation, and to discuss the effects of collaborative stewardship on both communities.

METHODS

In the Interior Highlands of Arkansas and Oklahoma, the Ouachita Mountains Ecosystem Management Research Program was established following the August 1990 "Walk in the Woods." The "Walk" was a field tour of the Ouachita National Forest (NF) for Sen. David Pryor (D-AR), hosted by then-Forest Service Chief Dale Robertson, then-Regional Forester Jack Alcock, then-Southern Research Station Director Tom Ellis, then-Ouachita Forest Supervisor Mike Cur-ran, and Southern Research Station research forester Jim Baker. All participants agreed that the Ouachita NF should reduce the use of clearcutting and planting as a standard reproduction cutting method, and turn to alternative reproduction cutting methods that retain a portion of the overstory and that rely on natural regeneration. However, they recognized that research supporting alternative rnethods in shortleaf pine (*Pinus echinata* Mill.) and pine-hardwood stands of the Interior Highlands was virtually nonexistent.

As a result, Southern Research Station scientists began developing a research program that would support the changes upon which the Ouachita was to embark. After some debate and supplemental research funding obtained by Sen. Dale Bumpers (D-AR), scientists developed a three-phase research approach.

Phase I was a demonstration that explored not only different silvicultural practices, but also new ways for scientists and land managers to interact. Phase I demonstrations provided valuable, high-profile field tours. More than 2,000 people viewed Phase I stands early in the project.

Phase II was an experimental phase conducted at the stand level, and established the most likely reproduction cutting

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alternatives in a statistically rigorous, replicated scientific study. Phase II was conducted in 52 40-ac stands, in which four sets of 13 reproduction cutting treatments were applied across the Ouachita and Ozark National Forests in Arkansas and Oklahoma. These sites reflect an intensive sample design that included pretreatment and post-treatment monitoring by more than 50 scientists in seven research groups. Treatments were applied during the summer of 1993, and regeneration establishment and development commenced with the 1994 growing season. In the summer of 1998, the study was in its fifth growing season after treatment.

Phase III is a landscape-scale study comparing different intensities of management across discrete watersheds using time rather than space for experimental replication. Four years of baseline data in vegetation, wildlife, hydrology, and aquatic ecology studies had been collected by the end of 1998, and seven different landscape treatments are being conducted in the summer and fall of 1999. This will provide a worst-case set of treatments to these ecosystems; the post-treatment data collection will provide quantifiable information about ecosystem changes that result from applying treatments across an entire landscape. Three of the four watersheds in Phase III are located on the Jessieville and Winona Ranger District of the Ouachita National Forest. The fourth is found on nearby forest lands managed by Weyerhaeuser Company.

Studies like these give research scientists a unique opportunity to advise-and be advised by-practicing land managers. Research studies on NFS lands present opportunities for researchers to work with land managers, to provide some response to questions posed by agency partners and the public, and contribute mutual support in study derign, installation, treatment, and monitoring.

RESEARCH-MANAGEMENT COOPERATION-THE RUDIMENTS OF THE PROCESS

Scientists are used to a high degree of autonomy over their studies. However, the scientist who chooses to pursue a cooperative relationship with national forest managers is in *an* unusual position; he or she must surrender *some* control over the study to facilitate its implementation in an operational context. For those scientists who can tolerate a certain loss of autonomy over their research, results can be rewarding.

Three steps can be taken to build effective cooperation between research and management. The research scientist must first develop an effective professional relationship with the appropriate national forest partner. This relationship is essential in identifying and closing the gaps in research results that affect management decisions. It provides a framework upon which appropriate and collaborative studies can be designed and conducted. Establishing such relationships requires a commitment of time, which some researchers might not want to invest. But others will welcome interaction with practicing professionals who are eager to get research results based on operational treatments.

Second, installing studies on NFS lands requires conforming with planning regulations outlined in the National Forest Management Act of 1976 (NFMA) and the National Environmental Policy Act of 1969 (NEPA). Provisions in these laws require that alternative methods for implementing a project are properly proposed and explained in an environmental assessment (EA) or, if necessary, an environmental impact statement (EIS). The alternatives must be made available for public review, comment and, if warranted, revision. Finally, they must be approved by decision-makers and made subject to the appeal process. Although some scientists might consider this a disadvantage, many are discovering that these provisions apply to their research whether the treatments they propose are to be conducted on national forests or on private lands. Ranger district personnel, who are trained in NEPA analysis, will produce better EA's in less time than researchers could.

Third, scientists will have to submit their research to an interdisciplinary team (IDT) of district personnel. Federal land managers typically use an IDT to develop operational details of a proposed project, as well as acceptable alternatives to the proposed action. The research scientist's participation in IDT meetings will help ensure that the intended treatment will be effective, efficient, and acceptable to both manager and scientist.

These steps inevitably will result in research being conducted more slowly than might be possible on private lands. Research scientists often chafe at the uncertainties of time associated with national forest operations-especially those elements that are subject to public involvement. It may often take 6 to 9 months from the development of alternatives to the closing of the appeal period.

ADVANTAGES OF RESEARCH-MANAGEMENT COOPERATION

Format cooperative relationships among research scientists and Federal land managers have a number of advantages, ranging from specific practical assets to broad, overarching goals.

The long-term stability and credibility of the research mission will be enhanced in two important ways. First, study design will improve as field managers who daily face real-world problems have access to timely research results, and as citizens are better informed to comment on the proposed treatments. For example, scientists conducting the Ouachita research were uncertain whether to include clearcutting in the Phase II research study. They got endorsement for its inclusion from an unexpected source-a handful of citizens affiliated with the environmental community, who felt that clearcutting would not measure up when compared to alternative treatments. Then insisted that it be included in the study. Similarly, national forest personnel suggested testing low-intensity site preparation and release treatments in the Phase II study. This was clearly the direction in which management practices were headed on Federal lands, and there is a shortage of data relating to low-intensity methods of site preparation and release. The study was improved markedly as a result of those suggestions.

A second long-term advantage is the stability of Federal land *tenure* compared to private lands. NFS lands are much less likely to change hands over time. Long-term studies are therefore less likely to be affected by changing management conditions or access constraints that would occur with changes in land ownership in the private sector.

Other advantages relate to the indirect operational support that research can acquire for project monitoring on NFS lands. Specific rules prohibit national forests from spending dollars on research, and vice versa. However, if national forests conduct operational practices as part of their annual plan of work, research scientists can monitor those practices if the monitoring plan is specified in a NFS administrative

study. In effect, then, research studies can benefit from in-kind support from the national forests.

Examples of the indirect operational support that ranger district personnel provide includes the time spent in project planning, project administration, purchasing and contracting, contract inspection, sale preparation, and other work to complete an approved project. In addition, the benefits that research scientists gain from access to local knowledge of the area, and to analytical tools such as Geographic Information Systems (GIS) and data bases, represent valuable contributions to monitoring studies.

Indirect financial support can be provided as well, subject to very specific conditions. Certain elements of the monitoring plan may qualify for proceeds from commercial timber sales under the Knutsen-Vandenberg (K-V) Act of 1933. Under that law and the administrative guidelines by which it is implemented, proceeds from a commercial timber sale can be invested for up to 5 years following harvest if such monies are spent on monitoring within the context of an administrative study by national forest personnel.

There are, of course, very specific constraints on what can be monitored, the geographic area within which monitoring can occur, and the time frame within which monitoring is to occur. However, there are no constraints on who designs the administrative study, nor on whether the study can be designed with statistical rigor. If the monitoring of K-V-funded treatments is designed in a statistically robust manner, and if that monitoring meets national forest management objectives, all parties benefit by having a research scientist use those monitoring data to test hypotheses in an experimental context.

The funding available under the K-V Act can be substantial. For example, three 40-acre stands containing an average harvest of 5 thousand board feet (mbf)/acre might sell for $200/mbf, or $120,000. After required allocations to the U.S. Treasury and county governments, remaining funds can be made available for improvements to the sale area, and to monitor the effects of those improvements. If monitoring were conducted according to a valid statistical design, the scientist would be able to apply the data not only in ways consistent with statistical principles but also to receive the in-kind support of national forest personnel charging their time to K-V funds.

The critical link is to develop a plan for data collection that meets both the strict definitions and guidelines set forth by agency policy, and the accepted principles of experimental design. A researcher must therefore prepare a study plan for national forest managers that qualifies as a NFS administrative study. The study plan must specify the monitoring to be conducted, the statistical design to be used, and the costs that will be incurred.

DISADVANTAGES OF RESEARCH-MANAGEMENT COOPERATION

There are some disadvantages that might impede fully cooperative relationships between scientists and national forest management staff. Four of the most common points where problems might occur deal with the process-related issuesdescribedabove.

First, scientists and managers may be unable, by reason of distance or access, to develop the close working relationship required to develop research approaches to management issues. Proximity promotes cooperation. For example, in the Ouachita Ecosystem Management research study, one key element of success was locating Southern Research Station scientists with the Supervisor's office staff on the Ouachita National Forest in Hot Springs in order to develop mutual trust and support.

Second, some research projects simply cannot proceed under time delays that occasionally slow the course of forest planning. For example, research budgets cannot easily or reliably be carried over from one fiscal year to the next. If a study is planned, and scientists allocate funds to conduct the study in a given fiscal year, funding may be lost if the study is postponed. Repeated deferrals of projects may degrade cooperative relationships.

Third, a scientist may find that public scrutiny and management modifications would result in unacceptable changes to the study design, invalidating the statistical basis upon which the study is founded. In such circumstances, the best option for conducting good science might be to withdraw the study from the operational process. On the other hand, it may provide the opportunity to design alternative approaches during public scoping and IDT meetings that would retain the quality assurance and quality control of the experiment.

Finally, it may be impossible to modify a study plan so that it can be executed within the context of a national forest administrative study or monitoring framework. Some experimental designs, for example, require collection of time-dependentdata, and the forest manager may not able to guarantee the personnel or resources necessary to collect the data in a timely manner. Similarly, some data collection protocols are fairly complicated, and it may be difficult to find national forest personnel who have the technical skill to implement monitoring that ensures data quality.

SUMMARY

Collaboration between research scientists and national forest managers is increasing, due to both an increasing diversity of management practices and a growing uncertainty about the effects of those practices. Cooperation undoubtedly benefits both sides. National forest managers can build credibility for their management programs by enlisting research scientists to study current practices and techniques, and to quantify their effects. If practices involve timber harvest, monetary proceeds can help meet ranger district and national forest resource targets, as well as support the monitoring necessary to generate data. Research scientists and managers alike gain from their mutual association; researchers by tempering ideas with practical applications, and managers by exposure to cutting-edge science and different perspectives. Finally, all will benefit from programmatic diversity, collaboration, and cooperation, which are proving to be key administrative concepts in implementing ecosystem management.

There may be disadvantages to developing the necessary cooperative relationships to make this work. But when conditions fall into place, as we think they have in the Ouachita Ecosystem Management Research Project, the benefits reward everyone involved.

REFERENCES

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