

An Approach for Delivering Research Results In the Southern United States¹⁵

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Introduction

The USDA Forest Service¹⁸ research and development program (R&D) consists of five regional stations, a forest products laboratory, and a tropical forestry institute that, taken together, comprise the largest network of natural resource research organizations in the world. Within this network is the Southern Research Station, which serves a 500-million acre (202-million hectare) area stretching from eastern Texas to northern Virginia, roughly the distance from Helsinki to Rome. Established in 1926, the Southern Station employs approximately 135 paneled¹⁹ research scientists and a support staff of nearly 300 professional, technical, and administrative employees. An annual budget of about \$50 million supports these employees in forestry sciences laboratories, experimental forests, and natural resource departments on university campuses. Their disciplines range from silviculture to hydrology to economics.

Until late in the 20th century, the terms research and publications were synonymous. Like their university colleagues, our scientists were evaluated on the quality and number of their publications. Supporting their efforts were staffs dedicated to technical editing, styling manuscripts and submitting them to journals, and publishing the manuscripts that the scientific journals did not want, either because they were too lengthy or because they had limited scientific value.

For nearly a century, Forest Service scientists were taught that they produced the research findings and that somebody else—usually somebody in the agency's State & Private Forestry program—found ways to deliver those findings. Although individual scientists made individual efforts to deliver their findings beyond what could be found in their research papers, those efforts were ad hoc, not supported by headquarters staffs, and often resulted in career setbacks because of the “publish or perish” ethic that pervaded the reward system for scientific accomplishments. People needing information could order station series publications or reprints of journal articles, all of which were highly credible but with uneven levels of accessibility and readability. As late as 2003, a polling of principle investigators in the South showed that journal articles and conference proceedings were ranked as the two most important science delivery mechanisms.

But what works for individual scientists' careers has begun to work against their ability to attract funding and support for their work. Members and committees within the U.S. Congress have become less inclined to spend dwindling natural resource dollars to fund science for the sake of science. The Office of Management and Budget has questioned our ability to demonstrate the value of our research to the public. And leaders in our own Department of Agriculture have expressed frustration with a science organization that could only raise questions without providing some practical answers to those questions.

Most significantly though, the South was changing from a predominantly agricultural and rural environment in which the forestry community represented and closely communicated with forest land owners. The new South is an environment of rapid urbanization, dramatically changing demographics both in cities and small towns, and the divestment of vast industry-owned forests with unpredictable results. Recent customer surveys have shown that our science, though still highly credible, was becoming less relevant to the needs of the South and that our research products were not keeping up with the needs of potential users.

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¹⁸ The Forest Service is an agency within the U.S. Department of Agriculture.

¹⁹ Under the Research Grade Evaluation system used throughout the Forest Service, all research scientists undergo a rigorous peer review of their progress every five years. Based on their findings of creativity, productivity, relevance, and leadership, the panel of peers will recommend that the reviewed scientist be promoted, passed over, or demoted.

Unfortunately, when we looked around for help from our colleagues in the forestry community, we found that the capacity for science delivery had diminished greatly just as demand was growing. We also came to the recognition that our previous strategy of making findings available to a relatively small group of professionals had limited value in a region dominated by a multitude of landowners whose holdings, though small at the individual level, in aggregate comprised the best hope for forest sustainability in the South. These landowners rarely, if ever, received the services of forestry professionals.

Clearly change was needed. The objective of this paper is to describe changes in the science delivery program at the Southern Research Station—a \$6 million effort that represents a little more than 10 percent of the Station budget. The paper summarizes the steps being taken to incorporate science delivery work into the fabric of the Southern Research Station, both in the Station's research units and in the Station's Science Delivery Group at Station headquarters, and describes a few of the products and partnerships that are emerging from that effort. The paper concludes with a discussion of how we are engaging with partners, customers, potential customers, and other stakeholders in a systematic effort to make the adoption of research results a regional priority.

Changing the culture

The growing pains we were experiencing in the South were not unique to us—throughout the Forest Service R&D program discussions were held at all levels about improving both the relevance and the delivery of research. Over a six-month period in 2004 scientists, communications professionals, and research administrators convened a series of sessions to identify measures of success in science delivery. The result of those sessions, called A Logic Model for Science Delivery, was twofold. First, was an affirmation that Forest Service R&D has a responsibility to ensure the adoption of its findings, and second was the development of a behavioral model that would improve the likelihood of adoption: (1) engaging users and partners in identification of research needs, priority-setting, and program delivery planning; (2) providing information seekers with understandable, rapid answers synthesized from current and past findings; (3) developing products that meet users needs, are easy to locate and apply, and are supported throughout their life cycle; (4) building user confidence through consistent branding that associates R&D products with the established credibility of the R&D organization

These new exigencies have brought change to the Southern Research Station, where the consumers of our products can be sorted into three major categories. First is the science community, including teachers, students, and researchers in universities, government agencies, and international organizations. Second are the policy makers and influencers, including law makers, regulators, NGOs, industry associations, and the general public. And third are people who use our information to manage land, including forest industry, government agencies, landowners, consultants, conservation organizations, and Indian nations. Of these three categories, we believe that the greatest opportunities for improvement are in the policy arena, where better integration of research is needed, and in the land management arena, where service is uneven.

Growth of science delivery in the research units

In many of our research units, recognition of the importance of science delivery has been translated into a commitment to shift funding away from new studies and toward communicating the results of studies. Some units opted to hire science delivery "experts" while others took the approach of making science delivery a part of the scientific process.

Units working at experimental forests in the Southern Appalachians, the Coastal wetlands, the Mississippi Delta, and the mid-South conduct workshops and short courses on forest management for customers ranging from congressional staffs to professional foresters. Units that are involved in issue-related research, such as fire disturbance and southern pine beetles, have aggressively pursued a science delivery program that puts their research results in the hands of their customers.

Some of our research units provide direct services to customers. One example is in the Southern Appalachian Mountains, where our biologists organize survey teams to monitor habitats and populations on national forests. Another example is two partnerships of our wood products scientists: one with industry to recycle pallets into attractive flooring products and the other for gasifier that provides electricity to a local ranger district office and allows research into the effects of various raw materials on the yield of gases and the system performance.

Other units—especially those focusing on human-resource interactions like the wildland-urban interface unit, the urban forestry unit, and the agroforestry unit—combine direct customer service with

a wide spectrum of integrated products that include Web sites, fact sheets, newsletters, annotated bibliographies, exhibits, and professional workshops.

Revamping the science program

In recent years, our capacity to continue productive research has been threatened by declining budgets, the changing nature of research questions, and shifts in customers and their expectations. Earlier organization structures that had clearly reflected our scientists' capabilities and the uniqueness of the Southern landscape began to lose relevance when applied to the emerging issues of the 21st century. Fire, global change, nonnative plant invasions and other disturbances are replacing a single species or forest type as a research focus, while the impacts of development and land parcelation on sustainability often far exceed the impacts of all forest management options. These research problems require highly integrated research program incorporating insights from multiple disciplines.

Recognizing the necessity of organizational change, we set out to provide continuity of research units in working with partners and serving current customers, while improving our ability to conduct integrated research and broaden our customer base. Our new organization consists of 5 science areas representing the core strengths of our science program and 15 research units, consolidated from 28 to increase administrative efficiency. The shift of science planning and research selection from the numerous research units to a handful of science areas will allow more meaningful engagement with customers on issue identification, enhancing the relevance and consequence of our research results.

Support from headquarters

At headquarters, a revamped Communications Office, renamed the Science Delivery Group, has added capacity in marketing, Web presence, customer service, and design—partly through a modest increase of funding (3 percent) and partly by reengineering publications processes and redirecting the resultant savings. These new investments have strengthened our Web outreach and have allowed us to refocus part of our editorial and design efforts away from publications for scientific audiences and towards products for other user communities.

The mission of the Science Delivery Group is to develop timely, credible, and pertinent science products that contribute to forest sustainability in the South. To be effective, these products must reflect an understanding of emerging issues and crises, the capabilities of our scientists and partners, and the preferred delivery mechanisms of the widening communities of interests that collectively determine the future of southern ecosystems.

The Science Delivery Group has an annual budget of \$1.5 million, of which \$1 million is in salaries and the remaining half million is in printing, contracting, and other operating expenses. Our staff continues to provide traditional services such as strategic communications advice and planning, media and congressional relations, editing and publishing publications, and direct customer services of all kinds. In addition we have begun work in formal and ad hoc teams to: (1) prepare and publish a quarterly magazine on important natural resource issues in the South; (2) deliver research products via the Internet, and (3) work collaboratively on products, services, and systems that will increase the likelihood that research results are adopted.

New products and services

The Southern Research Station is revamping two important series of publications, General Technical Reports and Resource Bulletins, to make them more useful and easily accessible to a greater range of users. In the case of General Technical Reports, this may involve having draft manuscripts read and critiqued by representatives of user groups, and revising the manuscripts on the basis of the comments received. It may involve improving the esthetics of publications by using more color and more appealing graphics. It may also involve making publications available in multiple formats, including electronic ones, and ensuring that products are supported for multiple platforms and over the course of their useful life. Web-based products are supplementing and at times replacing paper for research reports and conference proceedings. For material that works best in paper format, more effort is being placed on tailoring products to specific customer groups. Color photographs, maps, and graphics are becoming more common for these products. The need for customer testing of products is becoming a generally accepted practice.

Quarterly science magazine

The Station's new quarterly science magazine, *Compass*, is designed to address issues affecting Southeastern forests, showcase pertinent research by Station scientists and collaborators, and make new products available to customers through a catalog listing. The intended audience includes the general public, elected officials, media, educators, land managers, researchers, cooperators, private landowners, and engaged citizens. Each issue consists of one to three feature-length articles, two to five shorter articles and sidebars around a single topic of pressing interest to the intended audience, a profile or interview with a Station scientist, a profile of an experimental forest or important research site, recommended readings related to the feature article, a toolbox to give landowners specific information they can use on their own land, news from around the Station, and the annotated list of new products. The *Compass* is designed to both structure and complement the text, and to lead the reader through the magazine. Photographs serve to illustrate stories and to feature projects not covered in the text. Illustrations are commissioned to convey complex concepts such as the hydrologic cycle.

Publishing processes. The *Compass* editorial board consists of six professionals in the Science Delivery Group with deep knowledge of the Station's research program and audiences and expertise in editorial oversight, writing, and design. They are augmented by guest editors from the research units for individual issues that require subject matter expertise. Before the stories for an issue are set, the editorial board uses input from Station scientists and other sources to decide what should be covered, the content of the major stories, and who should write them. Authors of *Compass* articles include editorial board members, Station scientists and other natural resource specialists, and freelance writers. They are expected to follow a set of comprehensive writing guidelines for writers to ensure quality.

More "bang for the buck." Some issues of *Compass* have been augmented by displays and posters for use in local and national venues. Current and archived issues of *Compass* are also available in both PDF and html format from the Station Web site at <http://www.srs.fs.usda.gov/compass/>. Web site visitors can subscribe to the magazine online and follow links from the products list to access full text versions of publications. Articles and sidebars from the magazine will be used to build a content database that will further interconnect Station projects, which are in fact highly collaborative. Because of the long-term nature of most Station research, the stories in *Compass* have a much longer shelf-life than those of popular magazines, and are written to provide usable blocks of information for other science delivery projects.

Internet services

The commitment of the Station to embrace technology that delivers its research products to the widest possible audience is best demonstrated by the Station Web site (www.srs.fs.usda.gov). This Web site offers in-depth information about the Station's areas of research, its scientists and their publications, and special projects and programs. Rather than concentrating on portal technologies that compete with other one-stop services, the Station's goal is to attract Google and other search engines by delivering well-branded products that their customers—from congressional staffers to news reporters to forestry professionals—will find to be useful. The Science Delivery Group's computer specialists analyze log files of Web site activity and continually adapt our Web presence on the basis of the user feedback received. This approach has increased our customer base from an average of 200 requests per day in 1998 to a current average of over 20,000 requests by 2,000 distinct visitors per day.

Online publications. When traffic patterns and customer feedback showed that research publications are our most sought-after products, we designed a Web-integrated database to automate the delivery of research publications. This publication database has grown to over 5,500 SRS records with links to over 23GB of full-text publications including Station series publications, journal articles, and other peer reviewed outlets. Users have the ability to view and print PDF versions of these publications and are given the option of ordering hardcopies of our Station series publications. We have also redesigned our system to accommodate other Forest Service research stations, and this database now serves as the platform for TreeSearch (treesearch.fs.fed.us), the Forest Service Web site for one-stop acquisition of research products. TreeSearch contains over 14,000 records with links to full-text publications. Growing daily, it is already the largest known collection of forestry research publications available at no cost. The information contained within TreeSearch maintains individual station identity (branding) but is presented in a unified delivery system for all agency research products.

Forest encyclopedia. The Forest Encyclopedia Network project got its start in 2000 when one of our scientists successfully competed for Federal funding to facilitate the transfer of usable knowledge from

scientific experts to managers, policymakers, and other natural resource professionals. The network has been a joint project of the Southern Research Station and the Southern Regional Extension System (www.sref.info) from its inception. Users of the network are offered what adult educators call a self-directed learning tool that enables individuals to obtain information on an as-needed basis. The Forest Encyclopedia Network currently includes six ongoing encyclopedia modules in various stages of development (www.forestencyclopedia.net): history of forest science, southern forest resource assessment, Southern Appalachian forest management, fire science in the South, bioenergy in the South, and forest threats in the United States. As of the summer of 2006, the system contained 5,236 encyclopedia pages, 2,302 images, 3,912 tables, and 10,903 citations. The network attracts approximately 2.5 million requests per year from 23,600 distinct hosts, or an average of 6,800 requests per day. Encyclopedia modules usually arise from “burning” issues that require rapid synthesis of current knowledge into an easily understandable advice and guidelines. Once identified and funded, a module can be developed “from scratch” by a team of experts or by convening a focused conference on the issue and synthesizing the resulting manuscripts into encyclopedia content. Either way, all encyclopedia entries are peer reviewed and therefore as credible as any journal article.

Other internet products. Our Web presence also supports science delivery in many other areas. We provide an online **Directory of Scientists**, and this gives our users access to experts in a wide range of sciences that serve forestry. Users are able to browse or search for scientists by area of expertise, title, or research unit and view a summary of each scientist’s education, current and collaborative research, and a dynamic link to his or her publications. The **Congressional Corner** provides a State-by-State summary of forest research in the South with information about current projects, awards, and budgets for each research unit and program. The **Study Plan Database** adds credibility to our products by allowing review of the studies that produced them. A **View of Cold Mountain** is a section of our Web site that shows real time air quality conditions in the Southern Appalachian Mountains through a continuous camcorder broadcast supported by measurements of ozone levels, temperature, wind speed, and humidity. A growing part of our Web site helps cooperators and customers navigate the unfamiliar requirements of working with a Federal science agency. Examples include our **Author and Editor Tool Kit**—an online resource for internal and external authors of Station publications—and a **Grants & Agreements** section that defines legal and accounting processes for sharing and transferring resources in research partnerships.

Working collaboratively for improved customer outreach

As a public institution, the Southern Station has responsibility for ensuring that our science knowledge is adopted and used by audiences of all types. This requires continuous engagement by users and potential users in science planning, implementation, and delivery. We intend to ensure that all customers, especially the underserved, enjoy equal access and equal treatment in the delivery of Station products and services. Our goal is to create effective outreach mechanisms, identify barriers to participation, and take affirmative steps to remove these barriers. Achieving this goal will entail a continuing coordinated assessment of target audiences, identification of the most effective means of reaching them, and analyzing the degree to which our scientific knowledge penetrates various populations, again with special attention to underserved audiences.

This is too big a job for any one organization to take on alone. For this reason, we have begun an effort to organize our internal talent—both within the Station and with other Forest Service professionals in the South—and bring in our sister agencies at the State and Federal levels. The first step toward this effort was a joint meeting that brought together more than 80 Forest Service and the Cooperative Extension Service professionals to share successes and begin to define common goals and strategies.

Among the outcomes of that first meeting in August 2006 was a joint commitment to fund a South-wide systematic assessment of target audiences and means of reaching them. With this information, the various organizations involved in science delivery can begin to set priorities for joint projects that make the best use of our individual strengths—be they in publishing, organizing demonstrations and workshops, providing opportunities for direct contact between scientists and users, or producing Web-based tools and information such as syntheses, virtual tours and short-courses, podcasts, interactive learning, and decision tools.

Another outcome is the recent formation of a region-wide science delivery advisory council consisting of representatives from Southern Station and Southern Region headquarters support staffs, research units within Southern Station’s five science areas, and the Cooperative Extension Service. This council has three primary functions: (1) to facilitate and coordinate the interchange of information, technology,

and resources; (2) to identify, prioritize, develop, and lead joint outreach and education strategies; and (3) to advise the Station Director and Regional Forester on ways of improving and enhancing science delivery in the South.

Summary

Our Station has a long history of credible science publications, both in journals and in Station series. In response to a changing customer base, the scientific and science delivery staffs are working together to shift the Station's scientific product line so that it incorporates more information about natural resource issues, direct contact with experts, practical tools, and syntheses of research results.

Successful science delivery is not a few people at Station headquarters or the brave work of a few scientists in the field but a coordinated effort that begins with how we organize or research workforce, continues with how we select the hypotheses we will test, and ends with how we select, develop, and test our products and services. The Station's Science Delivery Group will be actively involved in science planning, helping to coordinate stakeholder engagement, identifying products that have potential for delivery, and working with partners inside our agency, in the Extension Service, and in State forestry organizations to craft well focused, user-friendly products. We expect that these products will take many forms including syntheses, virtual tours and short-courses, podcasts, interactive learning, and decision tools and we intend to reach multiple audiences by crafting multiple products from the same information source.

We feel that we bring to the table the credibility of our science, some knowledge of landowner preferences, and a high level of writing, publishing, design, and computer expertise. We look to our partners for expertise in delivery methods, consensus on priorities, and hands-on work to develop and evaluate joint projects that reflect mutual goals.