

education & communication

Extension Forestry in the United States: A National Review of State-Level Programs

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Landowner education is the foundation of a broad suite of public investments designed to encourage sustainable forest management. Extension Forestry programs are the primary providers of landowner education in the United States. We report the results of a census of the 50 state-level Extension Forestry Program Leaders on status, trends, and innovations in their programs. These programs employ 249 full time equivalent (FTE) state specialists, educators, and support staff. Reported cuts in base funding from public sources have led to reduced FTE capacity as vacated positions remain unfilled. A majority of state-level programs report increased use of digital communication tools compared to 5 years ago. Over half have increased instruction on forest health and invasive species, intergenerational land transfer, and the effects of climate change on forests. These trends and innovations create both challenges and opportunities for efforts to encourage sustainable forest management on private lands.

Keywords: extension, education, private lands, nonindustrial private forest, communications

Many benefits of sustainable private forest management, including forest health protection, supply of raw materials to wood-using manufacturing industries, and wildfire protection, accrue to both the landowner and to broader society. Public investments to enhance these benefits have supported a wide variety of interventions (Skok and Gregerson 1979, Alig et al. 1990, Kluender et al. 1999). Landowner education tends to be the preferred and most common approach in combination with other tactics (Bliss and Martin 1990, Ellefson et al. 1995, Kilgore and Blinn 2004, Schaaf and Broussard 2006).

Extension Forestry programs, part of the land grant university system, are the primary sources for the design and delivery of education programs supporting sustainable private forest management (Jones et al. 2001, Baumgartner et al. 2003). Reed et al. (1997, p. 118) describe Extension Forestry as

an informal educational system to meet the needs of identified forestry audiences (learners), carried out by a partnership of the [National Institute for Food and Agriculture] (federal), universities (state), and county governments (counties), profit and nonprofit businesses and the learners themselves using a variety of educational methods suited to the learners.

The purpose of Extension Forestry is to make land grant university-based research more accessible to landowners and land managers because “informed and knowledgeable landowners make better decisions toward both maximizing their own forest satisfaction (financial and amenity benefits) and providing the greatest net economic and environmental benefits to society” (Jones et al. 2001, p. 4). While program content and audiences vary, a focus of Extension Forestry programs is to offer research-based classroom, field, and online education designed to encourage adoption of sustainable forest management practices on private lands by landowners (Harmon et al. 1997, Jones et al. 2001, Reed 2001, Baumgartner et al. 2003), as well as the loggers and natural resource professionals who serve them.

What does a typical Extension Forestry program look like? In many cases, state-, regional-, and county-level Extension educators and agents deliver content that is developed with leadership from campus-based state Extension specialists. Extension specialists may have research or teaching, in addition to Extension, responsibilities. Extension educators, or agents, are based either in county or regional offices and tend to have responsibilities exclusive to Extension. Com-

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mon among Extension Forestry programs targeting landowners is the master volunteer model, in which a relatively small group of committed volunteers is trained on focused content, then commit as volunteers to reach out to their peers to further disseminate what they have learned (Snyder and Broderick 1992, Fletcher and Reed 1996, Kueper et al. 2013a, Kueper et al. 2013b). Several state Extension Forestry programs manage logger and natural resource manager education programs as well.

This research was designed to answer the following questions: What is the current state of Extension Forestry programming in the United States? How are state-level Extension Forestry programs changing to meet the need to deliver educational programming to encourage sustainable management on private forest lands? How have budgets changed, and how have those changes affected Extension Forestry programs? The purpose of the study was to take stock of state-level Extension Forestry programs nationwide. In doing so, we are able to describe the size and capacity of Extension Forestry programs, their adoption of new communication and instructional technologies, and their adaptation to address emerging issues in their educational programming. Greater insight into these issues can inform the effectiveness of future investments in Extension Forestry programs to promote sustainable private forest management.

Methods

Given the focus on state-level data, we sought a single respondent able to supply accurate data about each state's Extension Forestry personnel, program content, and program delivery methods. We believed the best source of these data was the individual with lead responsibility to administer each state's Extension Forestry program. While the specific nature of each state's Extension Forestry program leadership appointment varies, in many cases program leaders (PLs) are active in both supervision of other Extension Forestry staff and program development and delivery. Many PLs are campus-based faculty. These individuals are, thus, expected to be well informed about both personnel and program-related Extension Forestry activities. Using data provided by the national Extension Forestry program leader, we contacted each state's designated Extension Forestry PL. However, in some states, particularly those with relatively small

Extension Forestry programs, the identity of the PL was unclear. In these cases, we contacted known Extension Forestry faculty in the state to identify the individual who best fit that role.

Members of the study sample were then contacted and asked to complete a survey addressing program capacity, content focus, trends in use of educational and communication methods, and expected future program changes. Survey data were collected between November 2011 and February 2012. Surveys were administered based on the Tailored Design Method (Dillman et al. 2009), including a hard-copy letter and consent statement followed by reminders and associated communications via e-mail and telephone. Usable surveys were received from all 50 state PLs to complete the census.

After all surveys were received, two 90-minute focus groups were administered via telephone conference call in May and June 2012. We chose a focus group approach to add depth and clarity to survey responses and also to draw out respondents using a data collection format that enabled discussions not only between researchers and subjects but among subjects as well. This enabled subjects to build on or react to others' responses in a manner not possible in individual interviews. A limited budget and scheduling constraints precluded administering in-person focus groups. While rare in natural resources research, telephone focus groups were successfully implemented in recent research by Brown et al. (2012) with a similar audience. We thus adopted this technique in the current study.

One focus group included PLs from

states with relatively large Extension Forestry programs, the other with relatively small programs based on full time equivalent (FTE) capacity. The former included leaders of state-level Extension Forestry programs with at least nine FTE, the latter with 1.7 FTE or fewer. Program FTE capacity was used as the selection criterion because we expected there to be more similarity in perspectives among programs with relatively similar access to human resources. In each case, five focus group participants were recruited to achieve geographic representation within the constraints of program size and stated (on the survey) willingness to participate. After introductory statements, the moderator encouraged a conversational flow but did ensure that each participant responded to each question. Focus group recordings were transcribed and thematically coded based on focus group questions, preliminary analysis of survey data and themes that arose from preliminary examinations of transcripts. Coded material was then summarized into descriptive themes.

Results

Survey Results

Survey results are summarized below according to Extension Forestry FTE capacity, audiences and content, instructional design and program delivery, and partnerships.

Extension Forestry FTE Capacity

The total reported capacity of all Extension Forestry programs was 248.6 FTE. This includes Extension specialists, educators (agents), and support staff. Based on regional groupings of states following Butler

Management and Policy Implications

Landowner education is key to the success of a variety of public investments designed to encourage sustainable private forest management, including technical assistance, cost sharing, and preferential property tax treatment. State-level Extension Forestry programs employ 249 full time equivalent (FTE) faculty and staff dedicated to education and information dissemination to landowners, loggers, natural resource professionals, youth, and other audiences. These programs are innovating to leverage new communication technologies, primarily digital education and communication tools. They are also addressing emerging issues such as forest health, intergenerational land transfer, the effect of a changing climate on forests, and global positioning systems and online mapping. However, Extension Forestry program leaders report challenges associated with reduced FTE capacity and a transition from relatively stable base funding to short-term competitive funding. Together, these challenges impact land grant universities' role in providing targeted education to encourage sustainable private forest management. Because families and individuals own about 35% of the nation's forestland and because their management decisions provide public as well as private benefits (or potentially costs), the status of Extension Forestry programs should be of great interest to the forestry community as well as the public.

Table 1. State-level Extension Forestry (EF) capacity in full time equivalents (FTE) and forested land area (N = 50 states).

State	Total EF capacity (FTE)	Total forest area (1,000 ac) ^a	Private forest area (1,000 ac) ^a	EF FTE/MM ac total forest	EF FTE/MM ac private forest
<i>North:</i>					
Connecticut	3.50	1,794	1,383	1.95	2.53
Delaware	1.75	383	351	4.57	4.99
Iowa	0.75	2,879	2,552	0.26	0.29
Illinois	1.50	4,525	3,730	0.33	0.40
Indiana	5.30	4,656	3,888	1.14	1.36
Massachusetts	1.45	3,171	2,179	0.46	0.67
Maryland	3.00	2,566	1,957	1.17	1.53
Maine	3.00	17,673	16,575	0.17	0.18
Michigan	2.40	19,545	12,117	0.12	0.20
Minnesota	9.50	16,391	7,114	0.58	1.34
Missouri	1.10	15,078	12,393	0.07	0.09
New Hampshire	16.00	4,850	3,646	3.30	4.39
New Jersey	1.30	2,132	1,322	0.61	0.98
New York	9.15	18,669	14,438	0.49	0.63
Ohio	4.75	7,894	6,973	0.60	0.68
Pennsylvania	7.80	16,577	11,738	0.47	0.66
Rhode Island	0.40	356	303	1.12	1.32
Vermont	1.60	4,618	3,864	0.35	0.41
Wisconsin	11.50	16,275	11,117	0.71	1.03
West Virginia	3.00	12,007	10,418	0.25	0.29
<i>North total:</i>	<i>88.75</i>	<i>172,039</i>	<i>128,058</i>	<i>0.52</i>	<i>0.69</i>
<i>Pacific Coast:</i>					
Alaska	2.35	126,869	35,875	0.02	0.07
California	8.00	32,817	13,202	0.24	0.61
Hawaii	1.25	1,748	1,155	0.72	1.08
Oregon	23.00	30,169	11,059	0.76	2.08
Washington	4.00	22,279	9,806	0.18	0.41
<i>Pacific Coast total:</i>	<i>38.60</i>	<i>213,882</i>	<i>71,097</i>	<i>0.18</i>	<i>0.54</i>
<i>Rocky Mountain:</i>					
North Dakota	2.75	724	510	3.80	5.39
New Mexico	0.25	16,682	6,331	0.01	0.04
Arizona	0.00	18,671	7,381	0.00	0.00
Colorado	0.00	22,612	5,360	0.00	0.00
Idaho	3.00	21,430	2,553	0.14	1.18
Kansas	1.50	2,106	1,994	0.71	0.75
Montana	4.00	25,014	7,026	0.16	0.57
Nebraska	0.25	1,245	1,092	0.20	0.23
Nevada	0.00	11,089	212	0.00	0.00
South Dakota	0.40	1,682	492	0.24	0.81
Utah	1.70	17,962	3,013	0.09	0.56
Wyoming	1.50	11,445	1,942	0.13	0.77
<i>Rocky Mountain total:</i>	<i>15.35</i>	<i>150,662</i>	<i>37,906</i>	<i>0.10</i>	<i>0.40</i>
<i>South:</i>					
Alabama	23.50	22,693	21,264	0.66	0.71
Arkansas	5.20	18,830	15,156	0.28	0.34
Florida	4.55	16,147	11,427	0.28	0.40
Georgia	4.00	24,784	22,440	0.16	0.18
Kentucky	9.00	11,970	10,647	0.75	0.85
Louisiana	5.95	14,222	12,512	0.42	0.48
Mississippi	15.35	19,622	17,320	0.78	0.89
North Carolina	5.00	18,447	15,497	0.27	0.32
Oklahoma	2.00	7,665	7,000	0.26	0.29
South Carolina	8.80	12,746	11,189	0.69	0.79
Tennessee	5.50	14,480	12,310	0.38	0.45
Texas	1.00	17,273	16,204	0.06	0.06
Virginia	16.00	15,766	13,000	1.01	1.23
<i>South total:</i>	<i>105.85</i>	<i>214,645</i>	<i>185,966</i>	<i>0.45</i>	<i>0.52</i>
<i>US total</i>	<i>248.55</i>	<i>1,287,811</i>	<i>660,088</i>	<i>0.19</i>	<i>0.36</i>

^a Source: Butler (2008)

(2008), state-level FTE capacity was highest in the Pacific Coast states (averaging 7.7 FTE, median 4.0), followed by the southern states (mean 7.5 FTE, median 5.5), the northern states (mean 4.4 FTE, median

3.0), and lowest in the Rocky Mountain states where three states reported not having any staff (mean 1.3 FTE, median 0.95). The five states of Alabama, Mississippi, New Hampshire, Oregon, and Virginia collec-

Table 2. State-level Extension Forestry capacity in full time equivalents (FTE) by type of position (n = 50).

Type of position	Total FTE	Mean FTE	Std. deviation	Range
State specialists	110.4	2.21	2.320	0–9
Educators/agents	101.3	2.03	3.060	0–13
Support staff	37.0	0.74	1.060	0–6
Total	248.6	4.97	5.560	0–23

tively accounted for 93.8 FTE, almost 38% of total FTE capacity. These states averaged almost 19 FTE each compared with an average of 3.4 FTE among the other 45 states (Table 1). In at least one case, interstate variation may be explained by unique funding arrangements: in New Hampshire, Extension Forestry is a partnership between the land-grant university and the state natural resources agency. The higher than normal Extension Forestry FTE capacity in New Hampshire is, thus, balanced by less staff dedicated to private landowner service at the state agency. The northern states had the highest average Extension Forestry FTE capacity per million acres of private forestland.

Nationwide, slightly more Extension Forestry FTE capacity was dedicated to Extension specialists than educators or agents (Table 2). The total FTE capacity of specialists and educators or agents (excluding support staff) was 211.6. A 1995–1996 national Extension Forestry directory (USDA Cooperative State Research, Education, and Extension Service 1996) listed 356 individuals contributing to Extension Forestry programs but did not estimate total FTE. A 2007 version of the same directory listed 316 individuals, a drop of 14% (Cassidy 2007). However, we lack data to directly compare FTE capacity nationwide between 1996 or 2007 and today.

A weakness of the research is possible differing interpretations of what does and does not constitute Extension Forestry capacity. The question used to elicit FTE capacity data read: “Please indicate in the table below your total Extension Forestry program capacity (expressed as number of Full Time Equivalents, or FTEs) for each personnel category listed.” What is counted as Extension Forestry capacity varies from state to state, with some programs including wildlife, for example, and others not. In some states agents serve broadly in “agriculture and natural resources” and there is no specified FTE for forestry.

Table 3. Audiences specifically targeted by state-level Extension Forestry programs (n = 50). Audience categories are nonexclusive; several programs target multiple audiences.

Audience	Number of states and percent
All family forest owners	40 (80%)
Natural resource professionals	40 (80%)
General public	30 (60%)
Urban foresters or tree care specialists	23 (46%)
Youth	23 (46%)
Logging contractors	22 (44%)
Public officials	22 (44%)
Small-acreage landowners	15 (30%)
Landowners by residence location	12 (24%)
Other audiences ^a	12 (24%)
Large-acreage landowners	10 (20%)
Landowners by land location	9 (18%)
Women landowners	8 (16%)
Landowners in specific ethnic or cultural groups	5 (10%)

^a Tribal communities, educators, 4-H volunteers, and members of the wood products industry.

Audiences and Content

State-level Extension Forestry programs targeted a broad diversity of audiences. Total state-level Extension Forestry FTE capacity was positively correlated with the number of audience segments “specifically targeted” ($r = 0.591$, $P < 0.001$). In other words, states with larger Extension

Forestry programs had offerings that specifically targeted a larger number of audiences than did states with smaller programs. Relatively few states had programs that specifically targeted relatively narrow audience segments such as large-acreage landowners or owners of land in specific geographic locations (Table 3).

PLs compared program outputs at the time of the survey with their recollection of similar outputs 5 years prior. State-level Extension programs were providing educational opportunities on a wider variety of topics at the time of the survey than 5 years prior (Figure 1). The largest percentage of states report increasing their instruction on topics related to forest health, intergenerational land transfer, climate change, and GPS/online mapping. Open-ended survey responses frequently reflected the connections among these topics. A northern PL mentioned “stronger integration of climate science and attendant issues, including rain/drought cycles and invasive species.” A southern PL plans for his program to “spend a greater percentage of time on forest impacts, health, and resiliency as pertains to climate and climate variability.” These topics have apparently been added rather than substituted in most Extension Forestry curricula. State-level programs report teaching all but three of 21 topics more now than 5

years ago (Figure 1). The topics taught less often by the largest percentage of states were harvesting and selling timber, recreational trail design, and seedling establishment/tree-planting. After creating three equal-sized groups of states based on FTE capacity, analysis of variance (ANOVA) revealed no statistically significant differences among groups in the number of topics taught more or the number taught less at the time of the survey than 5 years before ($P = 0.458$ and $P = 0.567$, respectively). In other words, the largest state Extension Forestry programs were no more likely to have increased instruction on the listed topics than the smallest states.

Instructional Design and Program Delivery

State-level PLs reported a number of changes over the past 5 years in instructional design and content delivery strategies. Most common were increases in the use of digital media (Figure 2). Extension Forestry programs appear to be moving toward more cost-efficient but also less direct and personal means of communication with their audiences. Four of the five instructional formats used more at the time of the survey than 5 years previously involve digital media and the fifth is peer-to-peer information exchange, through which Extension faculty and staff engage with audiences indirectly

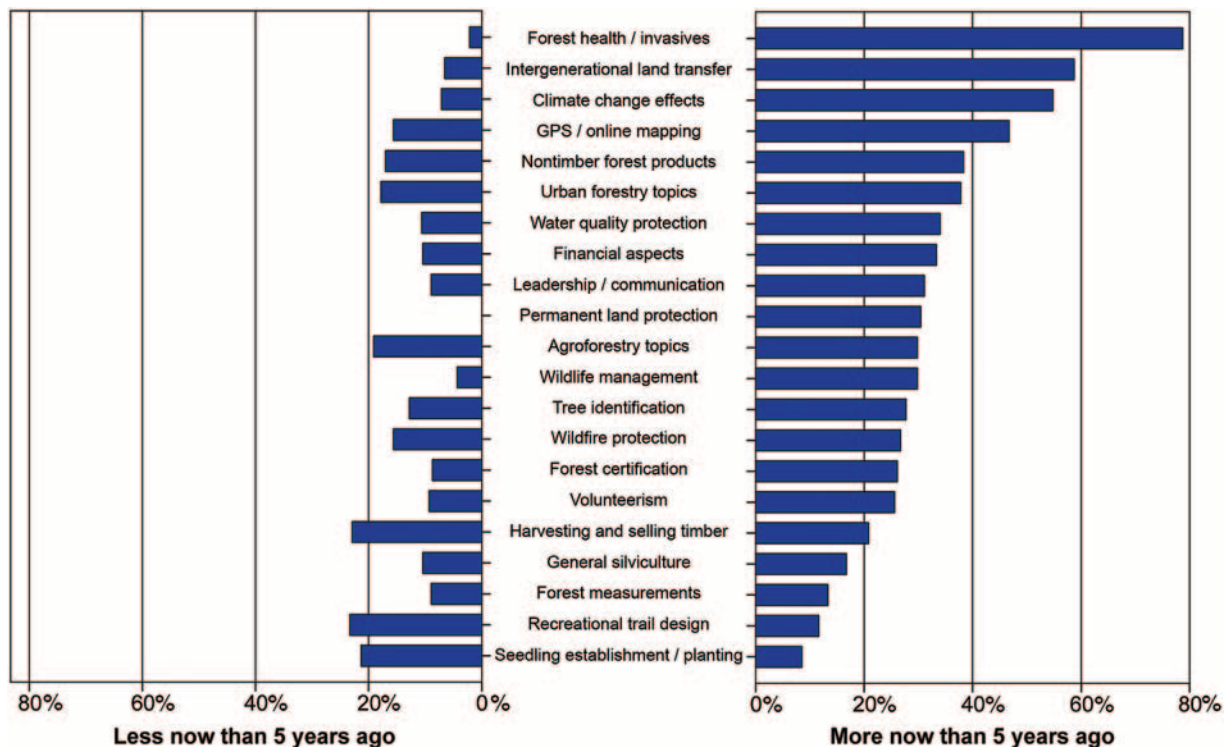


Figure 1. The percentage of state-level Extension Forestry programs teaching specified topics more and less frequently now than 5 years ago.

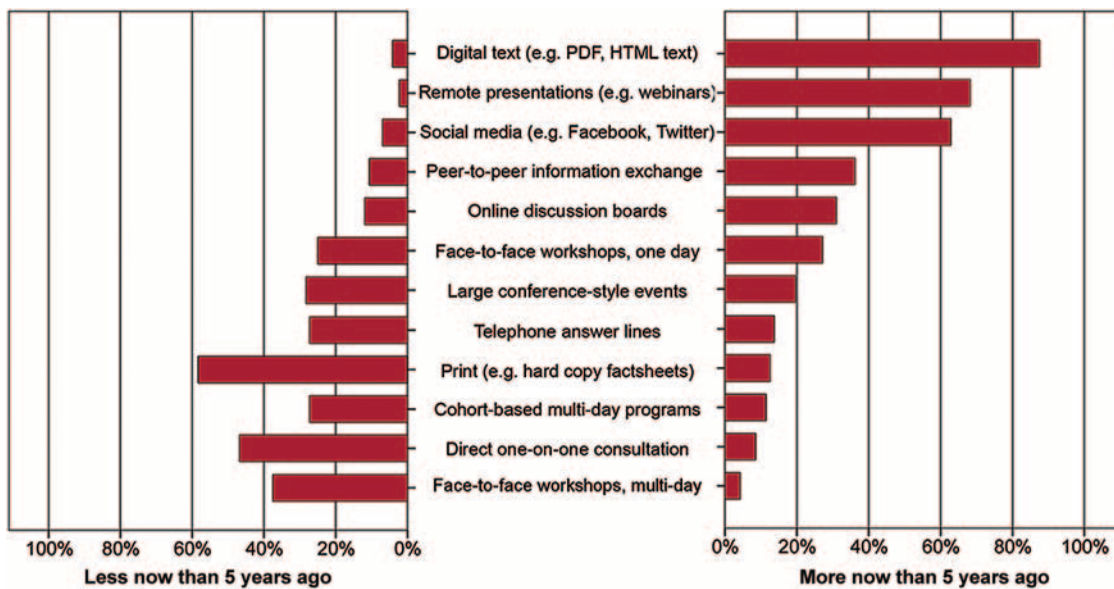


Figure 2. The percentage of state-level Extension Forestry programs using specified communication and instructional formats more and less frequently now than 5 years ago.

through the work of trained volunteers. Prominent examples of digital media used increasingly in Extension Forestry programming include live and interactive Web-based presentations or “webinars,” e-mail newsletters, and social networks moderated by Extension faculty and staff. By contrast, formats that involve direct personal interaction between Extension faculty or staff and learners, particularly those involving one-on-one and extended contact, seem to be declining among Extension Forestry programs. State-level FTE did not predict the number of instructional formats used more or less often at the time of the survey than 5 years before (ANOVA: $P = 0.444$ and $P = 0.716$, respectively).

The trend toward increased use of digital media in Extension Forestry appears driven in some states by reduced resources but in others by a desire to reach new learners and enhance educational opportunities. In an open-ended survey response, the leader of a northern state program with less than two FTE of Extension Forestry capacity expects a change toward “more Web-based content as university support, state forestry agency support, and legislative support for forestry continues to erode precipitously here in our state.” Similarly, a much larger southern program plans to “improve and increase electronic programmatic delivery, primarily individual and county level webinars, [as well as an e-mail] newsletter and Web offerings.” Other open-ended survey responses emphasized the value of digital communications in offering greater flexibil-

ity for learners, including creating customized learning certification, ensuring convenient access to Extension content, and “use of social media to connect with the demographic that are big users.”

Partnerships

Collaboration and partnerships were mentioned frequently in response to an open-ended question about planned changes over the next 5 years. One Pacific Coast PL plans to “develop a coordinated forestry education program that collaborates with state and federal forestland managers to address issues facing private forest landowners.” A Rocky Mountain PL mentioned plans to “focus more on landowner education in cooperation with [neighboring states] to reduce costs.” Likewise, a southern state PL plans to “look at more regional or multistate efforts.”

Focus Group Results

Focus group results are summarized below; themes include funding and partnerships, a transition to more digital delivery, and other issues. Selected anonymous quotes are included to support the thematic result.

Funding and Partnerships

Changes to Extension Forestry funding was a major theme. Most participants reported real reductions in base funding from state and federal sources. These changes led to lost capacity, primarily because vacated positions remained unfilled. Virtually all focus group participants discussed positions recently lost that would not be refilled, with

one describing major reorganization as a consequence of lost capacity.

“...In the case of [one of the largest state Extension Forestry programs],... we’ve lost people significantly. We’ve lost three key Extension specialists, and three field agents with no money to replace any of those people. So, you know, the work has just been spread around among the people that remain.”

Budget challenges also led to enhanced efforts to compete for external funds. While some programs, particularly the larger ones, reported success in obtaining competitive external funding, others did not. The leader of a large southern state’s Extension Forestry program said that

[we]’ve been able to secure funds that generally support what we do anyways. And that has been a *huge* boost for us. You know, we’re... making a lot of actually new connections with folks that we had never met before, again, *through* these programs. And so, for us, I mean we’re actually... in terms of soft money,... we’re almost drowning in it. And so, we’re very fortunate.

Echoing this idea, the leader of another large program described a situation in which competitive funding led to increased coordination across agencies and ultimately better programming:

We brought together in the state all of the organizations that are somehow involved with education for landowners and professionals providing services to those landowners. So we’ve got the State Forestry Agency, and the US Forest Service, and Extension and a bunch of others now all working together on projects. And this was largely fu-

led by the [Forest Service] State and Private Forestry 'Redesign' competitive grants program. That thing has turned our program around, and I think maybe it's had quite an impact around the rest of the country as well.

Focus group participants consistently reported increased volatility in annual base-level funding from public sources, which created challenges for long-range planning, in particular hiring permanent staff. One leader of a large western state-level Extension Forestry program, facing budget cuts for four of the previous 5 years, discussed the need to sunset programs at the end of grant funding cycles because staff hired for those projects could not be retained on base funding. As this PL put it, "I look at these as being, sort of issue-based or initiative-based; they'll be around as long as they are meeting a need and there is funding to support them." While this approach has obvious advantages, the uncertainty that it creates can present challenges recruiting or retaining quality faculty and staff. One western PL said he struggled to confidently hire for the long-term now, as he was once able to do.

Increased dependence on competitive external funds has also affected faculty and staff morale. The leader of a large southern Extension Forestry program, while reporting substantial success obtaining competitive external funds, lamented that he hoped to get back to "doing what they hired me to do" rather than spending the bulk of his time writing grants to fund his program as that took time away from designing and delivering educational events. However, he feels bound to that work, because after reductions in base funding, "for us, the soft funding is absolutely critical. If we lose it, you know we're going to be... in a world of hurt, because we've just come to rely on it so much."

Leaders of smaller state-level programs viewed a transition from hard to soft funding as a dire situation. With less than two FTE on board statewide, these PLs tended to have a relatively large percentage of their faculty and staff funded externally and, hence, dependent on successful grant pursuits. They described situations in which they felt compelled to accept grant funding for projects that were not top priorities but provided necessary funding for operational expenses or other support. While these PLs had been successful competing for funds in the past, one felt that Extension Forestry goals were not valued on a national level and that even

competitive funding sources were becoming difficult to find. While some saw the transition from base to competitive funding as positive, forcing the culling of offerings that generated less value to Extension or its audiences, on balance the transition was viewed as a barrier to program planning and delivery.

The leaders of both large and small Extension Forestry programs reported challenges filling open positions due to reduced funding. One small state leader felt that his university favored teaching and research positions, limiting his ability to grow Extension Forestry capacity. Another said that he'd been successful obtaining competitive grants, "but we're one funding cycle away from real problems." A third discussed the difficulty keeping faculty and staff "excited and interested in their work when they know that there isn't that support there and that part of their work is now going to have to be looking for funding."

In some cases, for both large and small Extension programs, PLs did not feel well supported by their institutions, increasing the challenge of funding and delivering programs, describing a bleak future and concern about a "death by a thousand cuts" to the Extension Forestry program. Several PLs had been impacted not only by losses to their programs but also by capacity reductions in allied fields. For instance, the leader of one large program discussed the need for his faculty to scramble to pick up content that had previously been addressed by entomologists and wildlife specialists whose positions had since either been redirected or eliminated, causing ripple effects affecting Extension Forestry capacity.

The need to seek outside funding had apparently also spurred new partnerships both internally with county Extension staff and with non-Extension organizations. Increased reliance on partnerships rather than seeking large competitive grants seemed to be more common among leaders of small Extension programs, perhaps reflecting the challenge of competing with larger programs for funding. Small-state programs were more likely than larger ones to report intense competition both internally to their universities and externally, perhaps due to their limited FTE capacity.

Increased Use of Digital Media

Almost all focus group participants were positive about increased use of digital media in their programming. Several discussed an evolution in learner preferences

from initial skepticism to a broader acceptance of online and digital content. Their positive disposition toward digital media was based on evaluation results and their observations regarding the convenience for learners to access content from home and the potential for webinars and social media to make content more widely available online than before. PLs saw far more positive than negative reasons associated with expanding use of digital communications. According to one western PL,

[w]e feel like this is just... the wave of the future, this technology is how more and more people are communicating and getting information, and if we're not a part of this game as time goes on, we're just going to be left behind. So, we're working hard to get... our curriculum online and improving the quality of our Web delivery.

Leaders of both large and small programs were also positive about their experience with peer learning through digital media. Examples included peers answering one another's questions about plant identification on a popular social photo sharing website and an audience-built and -supported Facebook page. However, many described moving forward with digital media adoption carefully to avoid risks. The most important risks discussed were the large time commitment required, particularly for social media, but also to maintain more traditional online content. As one north central PL put it, "you can't just put content online, you need people behind it." PLs also discussed challenges in evaluating the outcomes and impacts of online instruction. Some were concerned about alienating traditional audiences less interested in online content.

Other Issues

Leaders of both large and small programs predicted a more prominent role in the future for programs involving peer learning. One, referencing a program with over 300 active volunteers supported by less than two Extension Forestry FTE, saw a bright future for these programs given what seemed like an inevitable continued reduction in Extension Forestry capacity in his state:

You know, we're going to continue with our [peer learning] program, because we've got a great network of people, and we understand the power of the network... when we evaluate it we see how many thousands of volunteer hours [we get]... And in fact, you know, as there's less and less capacity at the University, I think the argument becomes stronger for using... programmatic approaches like that.

Several PLs mentioned a challenge breaking away from “tradition-bound” programs and staff because of perceived barriers to taking on new issues, audiences, or program delivery models. This was viewed by some as a positive aspect of the transition from base to competitive funding, which might be less dependent on support from traditional sources. One western PL discussed a tension between reliance on traditional audiences for legislative advocacy and the associated need to meet those audiences’ expectations yet also expand to serve new audiences in new ways. Other states struggled to find the right balance between serving large, general audiences and smaller, more targeted audiences as some external funders favored. Several leaders of large programs discussed the “energizing” impact of younger faculty and staff in terms of their openness to new delivery models, including digital communications.

Discussion

Challenges associated with reduced budgets were a prominent theme. Several focus group participants mentioned loss of faculty and staff in recent years and positions not being refilled as a consequence of declining budgets. Funding challenges were also discussed in the context of a shift from formula funds that are not directly tied to specific foci to an increasing share of competitive funds that often require a specific focus on audience and outcomes. The leaders of large Extension Forestry programs based on FTE capacity seemed to have weathered this transition well and reported either substantial success obtaining competitive external funds or relatively smooth reorganizations. Programs with smaller FTE capacity were less positive and more likely to report challenges competing on a national level against larger programs. Those states with small programs may lack the capacity to free up the time necessary to develop competitive proposals, the expertise needed to pursue the specific focus within a proposal announcement, or the partnerships among institutions necessary for those proposals to succeed. One small-state PL lamented being unable to even find funding opportunities available to support core Extension Forestry programs.

Where competitive funding was available, PLs discussed challenges making long-term strategic investments in faculty and programs. They described 2- to 5-year competitive funding opportunities as more conducive to project-level than program-level

planning and a challenge to their ability to recruit and retain quality faculty and staff. While congressional appropriations leading to federal budget constraints may leave few alternatives to the increased need to secure competitive funding, this transition may make it more difficult for Extension Forestry programs to plan and invest in their long-term future.

While Extension’s primary focus is on education rather than information dissemination (Reed et al. 1997), information dissemination and awareness campaigns led by Extension faculty and staff can help address a major constraint associated with private landowner assistance programs (Kilgore et al. 2008, Van Fleet et al. 2012). Effective use of these tools has potential to increase awareness of relevant content, to encourage participation in Extension educational programs designed for behavior change and conservation impact, and to link landowners to available conservation programs. Future research should investigate the value and roles of digital communications in both information dissemination and Extension Forestry educational programs.

Increased instruction on forest health issues, intergenerational land transfer, and climate change effects on forests suggests that Extension Forestry programs are flexible in response to emerging issues. The addition of these new topics has apparently not been accompanied by reductions in instruction on other topics. In other words, state-level Extension Forestry programs have found ways to add substantially to their educational portfolios without making proportional reductions or adding capacity. It is unclear how these additions have affected the quality of Extension educational offerings or how long the programs will be able to sustain this expansion. While not directly addressed by the data, it seems likely that increased collaboration across organizations and use of digital communication tools are enabling at least some of the increased instruction. Several PLs discussed the direct relationship between declining budgets and increasing partnerships, generally describing positive outcomes. However, other data suggest that competition for funding at both the local and national levels is a challenge that has diminished Extension Forestry capacity and outputs. There is a need for additional research on Extension Forestry responses to changing budgets and the positive and negative outcomes associated with these changes.

Natural resource professionals and logging contractors direct or implement forest management activities for many landowners and acres every year. Targeting these audiences with Extension Forestry education might more effectively lead to achieving on-the-ground impacts than targeting a general landowner audience. Similarly, larger-acreage landowners and the owners of land in high-priority areas may offer opportunities for Extension Forestry programs to increase the impact of their work. The positive relationship in our data between state-level program FTE capacity and the number of audience segments specifically targeted would suggest that larger programs may be more likely to address the needs of at least some underserved audiences such as women landowners more fully than smaller programs. While state-level Extension Forestry budget trend data are not available, Serenari et al. (2013) report that Extension natural resource faculty and administrators estimated a 10% budget reduction for their programs between 2009 and 2012. Annual federal appropriations through the Smith–Lever Act have declined steadily in real dollars since the early 1990s (APLU 2012) and Renewable Resources Extension Act (RREA) funds, designated specifically for Extension natural resources programs, have been decreasing since 2004. If, similar to state natural resource agencies (Schroeder et al. 2011), Extension budgets continue to decline, strategies that increase Extension’s ability to engage the right target audiences may become more important to its long-term success.

The positive correlation between program FTE capacity and the number of specific audience segments targeted suggests that large state-level Extension Forestry programs had an advantage over smaller states reaching and engaging specific audiences. As research into landowner segmentation and typology development advances (e.g., Butler et al. 2007), Extension Forestry programs may choose to target their offerings toward specific audiences such as larger acreage owners statewide or owners of land in high conservation value areas. This increased targeting may be necessary to achieve impacts through limited program capacity. But focus group responses suggest that Extension Forestry programs’ ability to succeed with more targeted interventions is tempered by the need to satisfy the expectations of more traditional and politically powerful audiences. These audiences may see the greatest value

in more traditional Extension offerings than offerings designed only to reach a specific focused segment of the landowner population. Some state Extension programs lack the capacity to both satisfy traditional audience expectations for general education and assistance and simultaneously develop new programs to achieve a focused impact in a defined geographic or topical area. These programs may face an uncertain future tied to eroding formula funding sources on the one hand and a highly competitive series of short-term funded projects on the other.

The two-pronged combination of more widespread use of digital media to disseminate information broadly to audiences and programs offering more personal contact through the work of peer volunteers (Kueper et al. 2013a) may become a more common Extension Forestry strategy. Facing a recent loss of already limited capacity, the leader of a small state-level program had pared down his state's offerings to these two models. This state now maintains a website designed to make its content more easily discoverable online and a master volunteer program designed to leverage interpersonal relationships to advance private lands conservation. Adoption of these tools by Extension Forestry faculty and staff is occurring, both as an efficient and low-cost way to disseminate information and as a way to proactively engage new learners. Emerging Internet-based communication platforms can aid in both strategies by making content more easily discoverable and by connecting learners to knowledgeable peers through online social networks. However, the tension between tradition-bound audiences and a need to innovate appears to be a big factor in adoption of new delivery technologies.

Conclusions

As the preferred intervention to promote sustainable forest management on private lands, forestry education is important. As a primary source of education influencing the management of private lands, Extension Forestry programs play a key role in raising landowners' and land managers' awareness of management opportunities, ability to make informed decisions about land management practices, engagement with technical assistance providers, and enrollment in long-term conservation programs. While there is evidence of innovation to address emerging issues and to employ new technologies to disseminate information and engage

large and distributed audiences, state-level Extension Forestry programs are challenged by limited capacity and steadily declining formula funding from public agencies.

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