

## **Public scholarship—linking weed science with public work**

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## 50th Anniversary—Invited Article

# Public scholarship—linking weed science with public work

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Weed scientists face complex and difficult challenges. Within our discipline, we must increase the sustainability of current weed management approaches and help respond to invasive plants as a component of global change. There also are major challenges that we share with other agricultural disciplines, such as mounting comprehensive efforts to address the problems of current agriculture. We believe that any effective response to these challenges will require public work, i.e., projects in which a diverse group of people work together—across lines of difference (professional, cultural, etc.)—to produce broad-based, systemic innovations that meet complex challenges. We propose that weed scientists should join relevant public-work projects by practicing “public scholarship.” We define public scholarship as original, creative, peer-evaluated intellectual work that is fully integrated in a public-work project. By full integration we mean that the scholar’s work serves to fuel the social (i.e., collective) learning of the public-work group. This condition requires that the scholar be a full participant in the group rather than just being in a consultative or advisory role. We present several case studies of weed scientists practicing public scholarship. These scientists found this mode of scholarship to be a highly effective means by which to address their professional priorities. Barriers to the practice of public scholarship include the lack of relevant guidelines and norms within academic culture, e.g., with regard to quality-assurance standards. But public scholarship offers weed scientists a new way of responding to increasingly urgent demands to show that our work effectively produces public value in return for public investment. We believe that graduate programs in weed science should begin to offer students opportunities to learn skills that are relevant to public scholarship.

**Key words:** Integrated weed management, social learning, civic science, public science, sustainability science.

In this article, we aim to add to the stream of reflection on the nature of weed science research and scholarship and on effective and ethical professional practice by weed scientists. We aim to help enable critical thinking and dialogue about what weed scientists should be doing, as we practice our science. First, we take stock of the context in which weed scientists work, highlighting a number of powerful factors that are affecting weed scientists. Next, we suggest a means of proactive response to these factors through the practice of “public scholarship.” We then explore several case studies of efforts to practice public scholarship in weed science. We close by proposing tentative conclusions and identifying some open questions.

### The Current Context Surrounding Weed Science

What are the notable features of the “landscape” in which weed science is practiced? First, expressions of the importance of sustainability in agriculture are becoming increasingly commonplace and mainstream, as indicated by mission statements of agricultural colleges and departments, etc. (e.g., University of Minnesota College of Agricultural, Food and Environmental Sciences 2002). Sustainability concerns are motivating questions about the profitability, long-term efficacy, and environmental safety of our discipline’s histor-

ical focus: herbicidal weed management (Liebman 2001; Sheley et al. 1996).

Secondly, there is rapidly growing recognition that invasive plants are a highly troublesome component of global change—i.e., of large-scale changes that degrade ecological systems providing a wide range of ecological services to humanity (Daily 1997; Mack et al. 2000). Weed scientists are actively considering their response to this problem. We have the opportunity to expand and deepen the scope and range of our science to meet the much broader challenge of invasive plants in managed ecosystems of all kinds.

A third landscape feature is an issue shared with other agricultural scientists: the status of agricultural colleges in land-grant universities (LGUs). These colleges have led in the development of weed science and generally are stewards of the public capacity for agricultural research. Presently, these colleges are working in a climate of ambiguous public purpose and diminishing public support (Meyer 1995). This situation has provoked certain administrators to describe their role as managing decline. Yet, the public importance of agricultural colleges has never been greater; more than ever before, they are vital trustees of public welfare. Our food and fiber systems present a thick knot of challenges. These include reconciling profitable production and environmental protection, insuring food quality and safety, producing a range of foods that support public health, participating in sustainable rural development, and adapting to

possible climate change. Collectively, these challenges—the domain of agricultural colleges—have great public importance. Accordingly, we believe that weed scientists have a responsibility to work with other agricultural scientists to renew the vitality and viability of our agricultural colleges. These colleges must clearly identify their public mission and actively restore their base of support.

Finally, we call attention to a fourth feature of the landscape: the national dialogue about the fundamental qualities and purposes of public universities, focusing in particular on the LGUs (Kellogg Commission on the Future of State and Land-Grant Institutions 1999). The leaders of LGUs are increasingly emphasizing the importance of institutional “engagement” with local and regional communities to assure the quality and integrity of LGU education, research, and outreach work (Boyte and Hollander 2000). This effort to define and practice civic engagement expresses values that have deep roots in the legacy and tradition of LGUs (Peters 1996). In the LGUs, public agricultural research has always been a centerpiece. For this reason, weed scientists and other agricultural scientists should help to identify, proclaim, and implement the public purpose and mission of these institutions.

Given that weed scientists face major challenges—some unique and others shared—how should we go about our work? The current situation challenges weed scientists to expand both the scientific and social scope of our work. Our belief is that weed scientists should direct more thought and action in two important directions. First, and fundamentally, we should become a more reflective discipline. Weed science, like any other applied science, must make an ongoing effort at careful, constructive self-evaluation and critique (Radosevich et al. 1997).

Second, it is crucial for our profession to participate in public work, i.e., broad-based, visible efforts by a range of people aiming to create public good by achieving lasting improvements in problematic situations that have major public significance (Boyte and Kari 1996; Peters et al. 1999). Public work is crucial to weed scientists and other agricultural scientists because of the great complexity and difficulty of the major challenges facing the food and fiber systems, as noted above. To meet these challenges, only coordinated efforts among many sectors of society—the essence of public work—will be sufficient. A fundamentally important outcome of public work is the development of concerted innovations—i.e., new professional practices, produced in coordination among interacting sectors—that are now seen as the basic to sustainable development of all kinds (Engel 1997; Rölting and Jiggins 1998; Vandenabeele and Wildemeersch 2000; Woodhill and Rölting 1998). If public work is essential to sustainable development of our food and fiber systems, then applied sciences that address these systems—such as weed science—must ensure that their efforts contribute to public work.

More pointedly, public work is essential to progress toward sustainable weed management (Jordan et al. 2000; Shaver 2001; Svejcar 1996). Clearly, the development and maintenance of integrated weed management (IWM) programs require the concerted and organized provision of knowledge, resources, and actions from farmers, researchers, extension workers, input and equipment suppliers, and farm advisors (Shaver 2001), that is to say, IWM requires

public work to succeed. Similar concerted efforts have been the basis of other major technological changes in agriculture, e.g., the widespread adoption of synthetic fertilizers (Engel 1997).

Participation in public work will allow weed science to pursue what we see as its highest goal: to serve as a civic profession that helps address major issues facing society. But in facing up to public work, our discipline encounters a dilemma like that recognized by Schön (1995) when he pointed out that scholars in many disciplines find themselves—often in midcareer—at a fork in the road. They can work either on relatively well-defined problems within their disciplines or on messy, ill-defined problem situations in which possible solutions—or even the nature of the problem itself—are complex and controversial. The first path is more straightforward and immediately productive and is more readily evaluated by current norms. The second path is more difficult but engages public problems and public work, whereas workers on the first path are likely to remain much more remote from these public matters. Weed science needs some workers to take each path and to insure creative interchange between the paths.

If we can develop our discipline in this dual fashion, we will contribute to the renewal of agricultural colleges and LGUs by helping to increase the capacity of these institutions for public work and civic engagement.

### **Public Scholarship: Bringing Weed Science into Public Work**

Can we find ways to do weed science that move us into the thick of public work, as full participants in struggles with knotty public problems, while still upholding roles, norms, and values that we see as essential to our science? In response to similar questions, scholars in other broad areas—humanities and social sciences—have proposed new models of scholarly practice, which are often termed public scholarship (e.g., Matthews 1997). In ecological science, sustainability concerns have spurred proposals for new forms of scholarly practice (Ison et al. 2000). Examples include Agroecosystem Analysis (Conway and Barbier 1990), Post-Normal Science (Funtowicz and Ravetz 1993), Second-Order R&D (Ison and Russell 2000), Ecological Knowledge Systems (Rölting and Jiggins 1998), and certain aspects of Complexity Theory (Bradshaw and Bekoff 2001). These proposals share a crucial premise: science is most helpful to public work when it is practiced in cooperation with other ways of knowing (e.g., nonscientific rationalities such as ethical, artistic, spiritual, etc.) and through such cooperation supports the development of a coherent, shared, and effective worldview (Bradshaw and Bekoff 2001). Subsequently, we offer a working model that integrates these proposals with our own, in the hope of assisting the practical and conceptual development of a public weed science (Peters et al. 1999). Such a discipline will enable weed scientists to stand with the public in work that takes seriously our most complex and socially important agricultural challenges.

### **A Model for Public Scholarship in Weed Science**

The essential feature of our model of public scholarship is a certain committed relationship that the scholar builds

and maintains. This relationship is one of obligated membership in a group of people engaged in public work on agricultural and food systems. The obligation associated with membership is to work on an ongoing basis and to help create public goods, i.e., contributions to the greater commonweal. We term scholarly work that is informed and guided by this obligation as engaged scholarship.

We argue that membership in a public-work group is an effective means of engaged scholarship because of a process that is now seen as crucial to effective public work: social learning (Daniels and Walker 2001; Lappe and Du Bois 1994; Steins and Edwards 1999; Woodhill and Röling 1998). Social learning—i.e., learning that occurs at the scale of a group, also termed collective cognition (Jiggins and Röling 2000)—requires that all group members contribute their perceptions and experience to the development of their joint understandings of complex situations. In our model, social learning and scholarly work are mutually supportive, resulting in several valuable outcomes.

First, scholarship and social learning together promote well-considered democratic policy decisions that have lasting public value. In its most ideal form, social learning produces good policy through the interplay of many different kinds and sources of knowledge, cultural perspectives, and ethical principles (Daniels and Walker 2001; Steins and Edwards 1999). Such social learning creates good policy by taking account of the interwoven resources and relationships needed to create and sustain a public good in its local context, with its unique profile of historical, cultural, geographical, and other dimensions (Campbell 1998; Daniels and Walker 2001; Engel 1997; Lappe and Du Bois 1994; Scott 1998). In our model, public scholars directly support democratic policy making about public goods by coupling their scholarship to social learning.

Our model envisions the public scholar as a full-fledged participant in a group doing public work, guided by social learning. We distinguish such ongoing participation from a more traditional consultative role in which the scholar has some limited interaction with a group but then withdraws. The essence of public scholarship is to form a research agenda in response to the questions and answers that arise in the social learning of a group and then to contribute research findings to fuel further learning. In our view, ongoing participation in substantive group discourse is necessary to allow a scholar to design a properly responsive research agenda. Equally, ongoing participation is needed to communicate effectively and, by dialogue, draw forth the full meaning and implications of findings from that scholarly agenda (Chamala 1995).

In our model, public scholars are free to pursue any question as long as their work effectively supports the social learning of a public-work group. If this condition is met, then public scholars have the license to undertake the full range of scholarship defined by Boyer (1990), i.e., the various scholarships of discovery, teaching, application, and integration. In weed science, public scholarship can thus range over the entire scope of our discipline, from molecular studies to landscape ecology to studies of farmer learning and decision-making processes.

The interplay of public scholarship and social learning also is significant because it addresses a difficult but increasingly pressing issue in science: the assurance of quality in

return for public investment. Contributing to democratic policy making is an important outcome of science; therefore, we believe that the magnitude of such contributions should be among the criteria applied to evaluate the quality of scientific work. Quality assurance is especially difficult and important in a circumstance typical of public work on food and fiber systems (Daniels and Walker 2001): major uncertainty or disagreement (or both) about the very nature of a problem situation affecting a highly valued public good (Funtowicz and Ravetz 1993). For example, ecological problems affecting U.S. intensive agriculture (Matson et al. 1997) are variously attributed to the lack of knowledge of more sustainable practices, problems in federal farm policy, globalization, or a number of other perceived causal factors. To assure the quality of scientific work on such complex problem situations, Funtowicz and Ravetz (1993) argue that research agendas must be formed by social learning, i.e., by engaging in dialogue with an extended peer community, defined in essence as a group of persons doing public work together. Funtowicz and Ravetz (1993) conclude that social learning promotes quality by achieving a broader understanding of the nature(s) of the public problem, enlarging the set of possible solutions, improving the evaluation of possible solutions with respect to collateral damage, i.e., unintended indirect effects and other ethical concerns, and applying a broader range of information to scientific work. Thus, relative to science practiced in isolation from public work and social learning, the interplay of public scholarship and social learning more effectively acknowledges and manages uncertainty and brings values that guide science into the open (Funtowicz and Ravetz 1993).

Our conception of public scholarship also emphasizes a second major outcome of scholarship that is closely coupled to social learning processes: the triggering of shared enthusiasm for action in a public-work group (Ison and Russell 2000; Vandenabeele and Wildemeersch 2000). Ison and Russell (2000, chap. 3) argue that the ultimate purpose and obligation of public scholarship is to motivate concerted action by a public-work group. In their view, public scholarship serves by supporting the social learning needed to construct a collective understanding of a public problem that is sufficiently convergent, purposive, and enthusiastic (Engel 1997) to enable concerted action. In particular, such shared understandings and enthusiasms are seen as the essential basis of concerted innovation by a set of interacting professionals involved in public work (Engel 1997). Ison and Russell (2000) provide several case studies demonstrating that public scholarship can indeed have such outcomes.

We note that public scholarship should not lose the transcendent quality that is sought in science generally, i.e., the knowledge that the scholar produces should further the social learning and public work of a particular group, but it should also transcend the particular interests and concerns of that group so as to have a broader range of application. For example, the scholar's work may be informative to other groups working on similar projects.

Our working model of public scholarship thus places the weed scientist in the thick of interlinked processes of engaged scholarship, social learning, mutual triggering of enthusiasm, and concerted innovation. Our model views these processes as essential to effective public work in agricultural and food systems. Finally, our model identifies an additional

necessary condition for public scholarship: organizing work. We define organizing as the work of weaving members of fundamental social institutions—e.g., education, faith communities, commerce, family, state—into effective public-work groups. Organizing is needed both within these fundamental institutions and among them (Michels and Massignale 2002). The scholar's role in such organizing can range from passive to active, but at a minimum the scholar must recognize the importance of organizing and understand and accept its dynamics. Given its critical importance, all participants in public work must be willing to lend support, direct or indirect, to organizing. Therefore, public scholars may well wish to develop some organizing abilities.

### **Some Cases of Public Scholarship by Weed Scientists**

To bring these notions of public scholarship to life, we will present sketches of two public-work projects that have engaged weed scientists. The outcomes of these projects underscore the possibilities for public scholarship in weed science while also highlighting a range of issues and challenges.

#### **Coupling Social Learning and Scholarship to Implement IWM**

This project began in 1997 at the University of Minnesota, St. Paul, MN (Jordan et al. 2000). We have experimented with social learning settings, which we call learning groups, in search of practical means to enable a set of interacting professionals—farmers, crop consultants, extension educators, project organizers, members of nonprofit organizations, and extension- and research-oriented LGU faculty members—to create interrelated innovations needed to make progress in an important public-work project, i.e., implementing IWM. In essence, we are working to identify the roles and contributions of all parties in the interface between farmers, extension workers, and scientists and to enhance working relationships in this interface.

#### *Organization and Activities of Groups*

During summer 1998, two experimental collaborative learning groups were organized and met monthly during fall–winter of 1998–1999 and 1999–2000 and on a few other occasions (e.g., summer field tours). One group addressed soybean [*Glycine max* (L.) Merr.] production, the other group addressed vegetable production, and each had 18 members: 3 research scientists, 2 extension educators, and 13 farmers or farm advisors (see Jordan et al. 2000 regarding details of group functioning). After initial planning, the groups turned to discussions of weed problems facing the farmers and their current approaches to weed management. In these meetings, weed science researchers presented relevant research findings, followed by extensive discussion and dialogue among the group members. Dialogue generally took the form of probing for insights from the day's theme into how the farm as a whole presented both opportunities for and challenges to IWM. For example, in one meeting a weed researcher described the sources of risk in weed management. This presentation spurred a long discussion about the sources of risk and the ways of assessing and reducing risk by fine-tuning farm operations.

At the final meeting before the farming season began, each farmer described plans for an on-farm project involving observations or experiments related to some aspect of weed management. Experiences with these projects were related when meetings resumed in autumn.

Evaluations (details in Jordan et al. 2000) indicated that all participants viewed the groups as valuable settings for information exchange and creative innovation, fueled by exchanges between people holding different knowledge and experience about weed management. Presently, we are experimenting with an expanded network: seven new groups are underway. In this phase of the project, we are testing the idea that successful learning groups can be facilitated by extension educators who are attentive to social learning, familiar with some basic concepts of ecological weed management, and supported by weed scientists. Moreover, we are using interactive television and other distance-learning technologies to convene a learning group for extension and research participants to provide a forum for social learning among these participants about our shared efforts to facilitate IWM using learning groups.

#### *Experiences of Weed Science Project Participants*

For each of us (R.B., J.G., and N.J.), the project has furthered changes in our work that were already underway and has triggered additional developments that were unforeseen at the outset. Our individual directions of change can be seen as interdependent. Thus, our experiences are consistent with the model presented above of social learning as a driver of concerted innovation among interacting professionals.

R.B. focuses on extension and research addressing a broad range of managed ecosystems, from horticultural crops and forage production to wetlands and other ecosystems managed for natural qualities. He finds that the overall demand for technical advice on vegetation management in this range of ecosystem types is growing rapidly. He perceives a widespread expectation that the University will provide, at no cost to the user, reliable and straightforward solutions to vegetation management problems. He finds these demands and expectations very difficult to meet, given the resources of his position. Moreover, when he tries to play the role of providing clear-cut solutions to problems, he fears that his extension clientele does not develop—or even see a need for—a capacity to think differently about problems and, therefore, to pull more resources in to contribute to improving problem situations. Instead, he sees that playing the role of a solution provider tends to promote a passive, uncreative stance among clientele. He concludes that handing information to them is often undesirable and counterproductive because such information is not frequently understood or used.

In contrast, he found that working with a learning group led to “giving farmers tools so that they can approach problems in different ways and are able to deal with the next problems on their own.” He felt that he had increased his ability to avoid being trapped in the expert role. Looking to his future work, he foresees himself applying techniques and approaches he had refined in the learning group to the other sectors of his very diverse clientele—including vegetable farmers, land managers, tree farmers, the state Department of Transportation, the Nature Conservancy, horse

breeders, and immigrant market gardeners. He feels that re-directing his efforts in this way has considerable potential to render his job more doable in terms of time demands.

J.G. is also focused on extension and research work. In his early career, he had placed considerable emphasis on herbicide technologies, in both extension programming and research. But for some years, he has been promoting learning about the complex and challenging arena of IWM systems. With his clientele, he emphasizes topics 2 to 5 yr out and tries to push them a little more onto bigger weed management things. After some hard work, he feels he has learned to integrate weed management and weed ecology to create programming that “. . . has some depth to it . . . you can come back two or three or four times and still learn something new.” He wishes to help his audience develop new levels of awareness of weed ecology, e.g., of the tempo and pattern of seeding emergence and growth. His intention is that his clientele will then use their new understandings to create their own site-specific knowledge. For example, his audience might begin to plan and manage their labor schedules with an eye to the exponential growth patterns of weeds. He has found that this technique of opening eyes to some fundamental aspects of weed ecology has been very powerful and useful. These previous experiences were an important motivation for his participation in the learning-group project. The project afforded him a safe setting to hone skills and test his ideas and suspicions about what audiences might need. He has also found that there were surprises for him in the workings of the group. For example, he was struck by how the farmers’ summer on-farm inquiries provided learning experiences that made the farmers relaxed and chatty, and seemed to expand their view of the range and scope of their weed management options.

He reflects on the learning groups not as providing some sort of final solution but rather as a place where he can discover new possibilities for programming that creates awareness about the interplay of weed management and weed biology and enables farmers to use this awareness to devise farm-specific IWM programs.

The third participating weed scientist (N.J.) has a research-focused appointment that emphasizes IWM. His participation in the learning group project has deepened his conviction that IWM involves many human and social issues of knowing, learning, and decision making and helped him begin to develop a research program aiming to address these issues in theory and practice. In the process, he has come to appreciate how such research must depart from the dominant norm of weed science scholarship—i.e., testing well-defined hypotheses by incisive and well-controlled studies. Rather, studying the learning groups as instruments for the development of IWM appears to call for an inductive and narrative mode of scholarship. In this mode, the scholar is not the principle author of new knowledge but rather takes the lead in integrating across a broad range of knowledge forms to draw forth a deeper understanding of a complex situation.

In summary, we have each found our participation in the social learning of groups to be strong spurs to innovation in our scholarship. Each of us has deepened our commitment to participating in social learning as an essential means of efficiently and effectively working toward our shared goal of implementing IWM. We each see that we have a strong

interest in participating in settings where diverse professionals can innovate in and between their professional practices. This shared perception represents a considerable convergence and focusing of our mutual professional interests, and we believe it is an example of concerted innovation as a result of a social learning experience.

### *Reflections on Our Experiences*

Challenges related to discrepancies between the processes of public scholarship and the professional roles, norms, and values of participants in the work arose. First, the method of this work was certainly unfamiliar to all of the weed scientists at the outset. We were doing a mode of scholarship for which we had no formal training. We were addressing questions that were not very visible in the research agenda of weed science for the purpose of creating knowledge whose ultimate evaluation and publication was likely to involve unfamiliar outlets, the relevance and legitimacy of which were not recognized in our discipline. Second, the social dimensions of public scholarship make very large time demands, which have certainly been challenging to meet. Participating in a developing public-work group entails many time-consuming stages (Engel 1997). The time and other resources needed for these stages are not much recognized in academic culture.

But among our colleagues and in the peer-evaluation process, we have not yet encountered serious tensions around these issues. We suspect that the grant support obtained in the work, the production of publications, the place of this work as part of a broader portfolio of scholarship done by each of the faculty participants, and our focus on the practical challenge of IWM implementation have all contributed to the favorable response that our work has received in the peer-evaluation process.

### **A Vegetation Management Working Group**

Dr. Tony Svejcar is a weed scientist who focuses on range management. He had just arrived at the Eastern Oregon Agricultural Research Center, a research center operated jointly by USDA-ARS and the Oregon State University, in 1991. As he became familiar with the local and regional situation, he foresaw conflicts regarding land use and management. Regionally, environmental activist groups had often used litigation to oppose natural resource industries such as logging. He felt that such litigation would soon be used to oppose agriculture, especially livestock production on public lands. He suspected that vegetation management on regional public lands would soon be a highly contested issue. These matters were much on his mind as he set out, in his role as the Center’s research leader, to determine the priorities and purposes for its work.

Soon, he was approached with an interesting opportunity. A local woman, an environmental educator with a reputation as a moderate environmentalist, had begun to organize a discussion group to address sustainable development in the region. She invited representatives from local businesses, including but not limited to logging and ranching, from his research center, from local government, state, and federal agencies, and from a host of environmental organizations. Dr. Svejcar joined this group and was soon elected its chair. Initially, the group focused on broad discussions of sustain-

able development and was able to reach an agreement on the general principles of sustainable development in their regions. These conversations initially held the interest of the group, but he quickly sensed that it was necessary for the group to converge on a specific issue within a few meetings lest frustration or boredom erode the groups' membership and will.

To help the group work toward a focal issue, a set of presentations were made on the relevant work of various group members, e.g., his Center's research on range ecology or the efforts of the county government. At this point, the focus was still general on various efforts to address the region's perceived lack of prosperity and economic development. After a few meetings the group agreed to address a particular issue: land management of a local area, Steens Mountain. This area was used and valued by a variety of groups—both recreational and ranching interests. The general atmosphere was one of conflict. The group agreed to move forward by discussing and negotiating a landscape description—an agreed-upon vision of how the area would look, in social and environmental terms, that was truly shared between environmentalists and members of natural resource-based industries.

Dr. Svejcar found that the group was able to agree about the social component of this vision but struggled to create a corresponding environmental vision. He was surprised at how few people had a vision for how the land should look. As the project continued, he was able to support the group by translating the social vision into an image of the vegetation composition of the Steens Mountain area. To do so, he drew upon the paleoecology research on presettlement lands, the response to fire and other disturbances, and the recent work of his Center on rangeland ecology. Although he was initially uncomfortable telling his fellow group members what the land should look like, he came to understand that the group wished to hear his views on this. He also suggests that an additional significant spur to social learning came from his Center's research on a highly invasive juniper (*Juniperus* spp.) species. Many ranchers felt that ecological restoration of the Steens Mountain required reducing the abundance of the juniper. His Center's work showed that juniper invasion could sharply reduce both rangeland ecological health and forage production. Demonstrating this link to both ecological restoration and forage production changed the views of many environmentalists and some ranchers who had previously been unconcerned by the increase in juniper abundance. Dr. Svejcar believes that his Center's work helped the group converge on a shared judgment—definitely not present at the outset—that reducing juniper abundance was in the interest of all parties. Thereafter, the group asked the Bureau of Land Management to carry out the group's shared agenda for vegetation management.

### *Reflections*

Dr. Svejcar's experience has changed the way he defines and carries out his work as a weed scientist. He realized that weed scientists work with two audiences, scientists and the public, and came to think that we focus much too strongly on the former audience. Compared with his early career, he now gives much more priority to communicating his work in public and to having dialogues with public groups. Dr.

Svejcar feels that such work has been vital to his Center and to his effective direction of its weed and rangeland research program. During the past decade, the Center has become a highly recognized actor in the region. This recognition has come in part from making scrupulous efforts to follow up on commitments made to working groups and other public efforts. As a result, he now feels that there is strong regional support for the Center. For example, local officials are willing to make a strong case for a regional agricultural research center to visiting members of the Congress. He believes that the federal portion of the Center would likely have closed had it not been able to increase its regional support. The federal portion of the Center has doubled its scientific staff and tripled its budget; he judges that this is largely because of their participation in local and regional public work. Through this additional support, the Center as a whole has become considerably more productive scientifically. Therefore, coupling the Center's scholarship to regional efforts at public work and social learning has been very helpful in sustaining the Center's efforts to create public goods. In the process, his work with the public audience has changed the character of Dr. Svejcar's own scientific activity. His personal production of scientific publications has been reduced, although by no means halted, while he has been doing public work that has increased the overall productivity of his Center. He sees no easy way to mitigate this trade-off of personal productivity of publications for public work because of the need for personal involvement in the latter: "We have to put a face on it."

Within his institutional home (ARS), his public work has had a mixed reception. Senior administrators have generally been supportive, whereas many of his peers have been concerned with the trade-offs in his scientific work and have feared that his public work would prevent him from being promoted to higher professional levels. But he senses that the climate for public work is changing. The Government Results and Performance Act has created considerable incentives to more clearly define our customer base. These incentives have recently created noticeable interest among his peers; increasingly, they are asking: "how do you do this stuff?"

## **Conclusions**

First, we think it is clear that a public scholarship approach can increase the ability of weed scientists to develop sustainable management of weeds in managed ecosystems of all kinds. Moreover, we believe that weed scientists can receive institutional and public support for taking steps toward public scholarship. Support will likely be contingent on making a clear and persuasive case on two points: that public scholarship meets scholarly and academic norms and that it increases the relevance of weed science to local public needs and concerns.

Second, weed scientists should identify requisite knowledge and skills for public scholarship (Ison and Russell 2000). A tentative inventory includes methods for analyzing complexity (Checkland and Scholes 1999; Jiggins and Rölling 2000; Wilson and Morren 1990), knowledge of individual and social learning processes, and effective participation and management of group processes (e.g., dialogue, joint construction of systems models, constructive group

evaluation, and conflict mediation, Daniels and Walker 2001). Important personal qualities include listening ability, respectfulness for others, personal authenticity and authority, and reflective practice (Schön 1995)—an ongoing process of constructive self-evaluation as a means of coping with the dynamic complexity of public scholarship. The breadth and range of these needed skills will certainly require the development of new norms for professional evaluation and new curricular and educational structures, e.g., learning communities (Collay et al. 1998; Ison et al. 2000).

Third, we conclude that public scholarship is very strongly dependent on organizing that enables social learning by bringing together the various elements of effective public-work groups and maintaining relationships and interactions that are necessary for social learning. Therefore, such organizing requires conscientious and well-supported practice, evaluation, analysis, and refinement, and public scholars must lend a hand.

Finally, participation in public work via public scholarship offers a way for weed scientists to help renew the relevance of scientific and educational institutions—such as LGUs—to the practice of democracy itself (Lubchenco 1998; Peters et al. 1999)! Several recent surveys of the LGU faculty (Diment 1995; Boyte and Fogelman, personal communication) have revealed considerable professional “malaise.” Many complained that they felt unable to live up to the ideals that had originally attracted them to academic life. We think that the practice of public scholarship can increase the ability of many scientists to pursue these ideals and thus to feel more fulfilled in their working lives.

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