



## **Education and experience to empower the next generation of rangeland professionals**

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### **Abstract**

The challenges facing rangelands and the human communities that rely on them are increasingly intense and variable. Management of the modern threats of damaging fire regimes, invasive plants, variable climates, and desertification of rangelands across the globe requires a skilled and knowledgeable workforce. Historically, most rangeland management professionals came from agricultural backgrounds, obtained a rangeland degree through educational programs that provided extensive hands-on field experiences, got real-world experience through internships or summer jobs, and/or received extensive training and mentoring through their employers.

Many emerging rangeland professionals today, however, come from urban backgrounds, often with little or no direct exposure to rangelands. Time constraints on established rangeland professionals, due to increased workload and limited personnel, result in less opportunity for emerging professionals to learn from experienced rangeland management trainers and mentors. A proposed emphasis on recruiting, embracing diversity, engaging modern educational practices, and fostering intentional mentoring is needed to empower emerging rangeland professionals to develop a full complement of important knowledge, skills, and leadership traits to successfully manage rangeland resources. The Society for Range Management is committed to supporting and promoting the full continuum of educating, training, and mentoring future rangeland management professionals. Programs include those targeting high school and college students as well as a new program for early career rangeland professionals called the Academy for Rangeland Career Success. While these efforts are largely focused on the United States, ideas and engagement are needed worldwide. Effective programs will be presented and opportunities to share ideas and successful approaches from across the globe will be highlighted to support the theme of valuing rangelands and pastoral systems for their societal contributions.

### **Introduction**

Slightly more than a century ago, the discipline of rangeland science emerged with the primary goal of addressing the significant challenges associated with livestock production on grasslands, shrublands, and woodlands (Sayre et al. 2012). This development gave rise to the profession of rangeland management, which brought together scientists, government land administrators, and livestock producers in a collaborative effort. From the early stages of the profession, it was recognized that sustaining rangeland productivity and values

depended on recruiting and educating skilled personnel to handle the complex challenges of rangeland management (Sampson 1954). To support this emerging profession, courses and academic programs were established at Colleges and Universities to train professionals able to manage grazing, fire, and invasive species, and thereby ensure the sustainability of rangelands worldwide (Abbott et al. 2012; Taylor et al. 2020).

Global challenges such as climate change, food security, water sustainability, energy production, biodiversity loss, and desertification are increasingly critical to society and pose significant threats to rangelands. Addressing these issues requires a robust and well-trained rangeland workforce, yet the persistent shortage of skilled professionals jeopardizes the health and sustainability of these ecosystems. The demand for rangeland professionals who possess both strong academic knowledge and practical experience has never been greater, underscoring the urgent need to cultivate and expand this essential workforce. To address this workforce shortage, we argue that those dedicated to sustaining rangeland health and productivity must: (i) identify and recruit a diverse group of rangeland professionals, (ii) transform rangeland training and education, (iii) mentor and support early career professionals, and (iv) foster networks of life-long learners.

### **Identify and Recruit Rangeland Professionals**

Building a strong, well-educated rangeland workforce starts with recruiting individuals to pursue advanced degrees essential for a career in rangeland management. One of the primary reasons prospective students do not choose degrees in rangeland ecology and management (REM) is simply a lack of awareness that such programs exist (Abbott et al. 2012). When exploring degree options through university websites, which often feature hundreds of majors, degrees, and certificates, students are unlikely to come across REM programs unless they are already familiar with the profession. Students may be more likely to encounter REM degree options if they are bundled with broadly recognized fields such as wildlife management, forestry, or environmental science. On-campus recruitment efforts, such as visits by rangeland faculty or students to introductory courses in biology, botany, or chemistry, or presentations to freshman interest groups, have proven effective in raising awareness. Additionally, exposure to the profession through youth range camps, interactions with rangeland professionals, or guidance from parents, teachers, or high school counsellors also play an important role in influencing students to choose an REM major. Anecdotal evidence from reviews of several REM programs accredited by the Society for Range Management (SRM), suggest that university Range Club tabling and peer-group ambassador programs are an effective way to recruit students to REM programs. These outreach efforts are critical for attracting the next generation of rangeland professionals.

In 2020, a survey conducted for the Range Science Education Council (RSEC) explored rangeland degree choices at U.S. colleges and universities. Male and female students were nearly equally represented among the 228 respondents and about 75% of respondents were range majors. The survey revealed that 43% of range majors across the western U.S. initially enrolled as REM majors, while 57% switched to the REM major later. Among those who changed majors, 66% did so before taking a range course, while 37% switched after taking one. The top three reasons for changing to an REM major were perceived career opportunities (72%), the uniqueness of the major (40%), and the potential work locations (46%). The survey also showed that about 60% of REM majors entered as freshmen, while 40% were transfer students. These students came from various backgrounds: very rural areas (26%), towns with populations between 2,500 and 25,000 (38%), cities with populations over 25,000 (30%), and other locations (6%).

When asked how colleges and universities could increase enrollment in range-related majors, 87 respondents provided suggestions. The majority (78%) emphasized the importance of outreach to communities, schools, and other students, while fewer respondents mentioned the need for curricular or programmatic changes (29%) and highlighting employment opportunities (25%). Universities need to sharpen and expand their recruiting efforts as the demand for rangeland graduates continues to be high. In the U.S., 124 students per year graduated with an undergraduate degree in REM between 2011 and 2022 (Educational Digest, Tables 318.30) and the average demand for Conservation Scientists (of which range management is a part) is projected at 140 per year between 2023 and 2033 (U.S. Bureau of Labor Statistics Occupational Outlook Handbook).

Programs aimed at deepening and diversifying the rangeland workforce should also consider avenues to attract and support non-traditional students seeking REM degrees. Developing 2-year technical programs and building relationships with faculty in community colleges could increase the number of students seeking rangeland degrees and provide options that are more affordable to a wider array of students (Bullard 2024).

### **Transform Rangeland Education**

Rangeland education is predominantly delivered through traditional, on-campus classes led by university faculty. Over recent decades, the reduction in faculty with specialized expertise in rangeland science, coupled with a growing emphasis on research over teaching, has significantly diminished the coverage of rangeland topics in many academic programs. This decline comes at a time when the demand for graduates in REM is increasing. Furthermore, many prospective students are geographically constrained, limiting their ability to access the traditional coursework essential for career advancement. To address these challenges, it is imperative to modernize rangeland curricula and adopt innovative instructional methods that broaden access, support student participation, and enhance professional development opportunities.

Advances in communication technologies over the past 25 years have created significant opportunities to serve place-bound students, enhance teaching resources for educators, and facilitate collaboration across universities and continents. Currently, several asynchronous web-based courses provide rangeland education to students. However, effective rangeland management requires strong skills in social interaction and the ability to engage stakeholders with local knowledge and solutions (Sampson 1954; Roche et al. 2021; Taylor et al. 2024). To address this need, distance-accessible courses could incorporate structured discussions involving topic experts or practitioners with deep local knowledge. Students might be tasked with investigating livestock operations, ecological challenges, wildlife habitat programs, or rangeland improvements in their communities, sharing findings with their peers. Laboratory activities could be designed to have students collect specimens or data, analyse results, and present their findings collaboratively. Professors could also collaborate to create innovative assignments and documentary-quality class presentations, moving beyond reliance on outdated or inconsistently prepared notes and presentations.

To better prepare the next generation of rangeland managers, it is essential to explore innovative approaches to course delivery. For instance, distance-accessible postgraduate programs have been designed to offer flexible educational pathways, enabling students to progress from graduate certificates to master's degrees (Ferguson 2021). Another promising approach is the use of workshop-style courses, such as those offered at the University of Nevada-Reno, which combine online learning with intensive field workshops to provide hands-on, practical knowledge. Additionally, workshops and courses could be developed to serve both degree-seeking students and professionals pursuing continuing education, fostering an inclusive learning environment that meets diverse educational and needs for career advancement.

### **Support Early Career Professionals**

Offering early-career rangeland employees support and professional development is crucial after recruiting and training individuals for careers in rangeland ecology and management. In 2010, the U.S. Bureau of Land Management published a “white paper” highlighting concerns about the agency’s shortcomings in providing adequate training, mentoring, and onboarding for early-career rangeland management specialists. The paper identified widespread issues with retaining early-career employees and ensuring they could effectively serve both the rangeland resource and its stakeholders across various offices and regions. It warned that without meaningful development strategies for new employees, these challenges would worsen. Fifteen years later, those predictions have materialized. At the 2023 International SRM Meeting more than 20 employers, including agency representatives and private non-government organizations, confirmed that these issues remain pervasive.

Several factors contribute to the challenges facing rangeland professionals today, including shifts in their backgrounds, changes in academic preparation, and limited training and onboarding by employers. Historically, many rangeland professionals came from agricultural backgrounds, completed rangeland degree

programs with extensive hands-on field experiences, gained real-world exposure through internships or summer jobs, and received comprehensive training and mentoring from employers. In contrast, many emerging professionals now come from urban backgrounds with little to no direct exposure to rangeland management. Hands-on field experiences are increasingly limited, even in high quality REM programs, and fewer professionals gain practical experience through internships or summer jobs. Additionally, time constraints on established professionals, caused by heavier workloads and staffing shortages, reduce opportunities for mentorship. To ensure effective rangeland management and retention of employees in the field, it is vital for emerging professionals to develop essential knowledge, skills, and leadership traits.

The Society for Range Management created the Academy for Rangeland Career Success (ARCS) to address the professional development needs of early-career rangeland management professionals. ARCS aims to enhance participants' knowledge, skills, and leadership in four key areas: Professionalism, Working with People, Understanding Cultures, and Subject Competency. Over the course of a year, participants engage with experts through a combination of remote and in-person mentoring and training. The curriculum focuses on addressing skill gaps, strengthening existing competencies, and leveraging individual strengths for mentoring others. While ARCS has shown promising results in its first year, agencies and employers must also invest in programs to ensure the retention and success of early-career professionals.

### **Foster Networks of Life-Long Learners**

An essential strategy for supporting the future of rangeland management is fostering networks of lifelong learners. Building strong connections among land managers, ranchers, scientists, extension educators, and conservationists is critical to addressing the challenges facing rangelands today. Diversifying the rangeland workforce is also key to attracting new professionals and equipping them with the tools needed to succeed. This diversification should encompass various stages of career development, creating an inclusive environment for continuous learning and innovation (Taylor et al. 2020).

To achieve this, the Society for Range Management has established programs and initiatives that emphasize professional development throughout career stages. SRM's network spans from high school youth programs to collegiate students participating in the Student Conclave, and from early-career graduates in the Young Professionals Conclave (YPC) and the Academy for Rangeland Career Success, to mid-career and seasoned professionals. These networks not only help individuals transition through different career phases but also foster a culture where professional development is recognized as a critical component of career growth. However, there is evidence that we need to reach more rangeland professionals to help them develop the mindset that professional development is key for their continued career progression.

Members of the YPC and ARCS program benefit from targeted mentoring and networking opportunities, helping them build connections with other rangeland professionals within the SRM As they transition to regular membership, their continued professional growth depends largely on self-motivation to engage with peers and actively contribute to the profession. At every stage, SRM focuses on fostering a passion for rangelands and enhancing members' technical skills by introducing emerging tools like drones and artificial intelligence (AI).

Professional development opportunities are not limited to SRM annual meetings and section gatherings, which provide forums for research dissemination, extension updates, and producer engagement. The importance of lifelong learning in rangeland management extends globally, as evidenced by the Australian Rangeland Society (ARS), which has played a central role in professional development both within Australia and internationally (Taylor, et al. 2020). Such efforts highlight the value of continuous skill enhancement and the critical role these opportunities play in developing leaders within the rangeland profession.

By fostering a robust network of lifelong learners and emphasizing professional development, SRM, ARS and other rangeland organizations ensure that rangeland professionals remain equipped to address evolving challenges and lead the way in sustainable land management.

### Conclusions/Implications

It is urgent to provide educational opportunities for students of REM and support for career professionals to succeed and excel in the management of rangelands as rangelands face unprecedented challenges to their ecological resilience and the human communities they sustain. The future of rangelands lies in the hands of the next generation. Our commitment to fostering and supporting these students and early-career professionals will either pave the way for or hinder the sustainable management of rangelands across the globe.

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