

Rangeland Professionals and Policy: Prospects for Effective Influence

Dedication

We dedicate this paper to the memory of Jim Ellis, whose research on pastoral ecosystems significantly advanced our understanding of human-environmental relationships in rangelands, exemplified interdisciplinary teamwork and synthesis, and contributed to a global paradigm shift in policy approaches to pastoral development.

By María E. Fernández-Giménez¹ and Urs Kreuter²

Editor's Note: The full proceedings for the symposium that this article refers to are available on the enclosed CD that is being mailed with this August issue of *Rangelands*. Please note, that the symposium papers on this CD have not been peer reviewed by the Society for Range Management.

According to the Society for Range Management mission statement, the rangeland profession is dedicated to promoting stewardship and scholarship of rangeland resources; the efficient and sustainable management of rangelands for a variety of values and products; public appreciation of the social and economic benefits of rangelands; and the professional development of its members. The profession is dominated by people trained in the applied life and physical sciences, but whether rangelands professionals work "on the ground," "behind a desk," or "in the ivory tower," they have to negotiate an ever more complex policy landscape.

In the developed world, changes in public values have obstructed management through litigation, and have fostered new and creative institutional arrangements such as the land care and collaborative stewardship movements. Growing attention to biodiversity preservation, and the increasing vulnerability of pastoralists and subsistence farmers to climatic fluctuations as well as economic and socio-political upheaval have created opportunities for both disaster and constructive social change. In addition, while social values for rangeland resources have been evolving, new non-equilibrium theories of rangeland dynamics have been advanced with important implications for rangeland policy and management.

These changes in social values and ecological theory, coupled with the ongoing discussion of SRM's role in Washington DC, led us to ask five key questions:

- 1) How do science and politics affect rangeland policy development?
- 2) What is and what should be the role of rangeland professionals and their societies in developing and implementing rangeland policies?
- 3) How can rangeland professionals meaningfully influence rangeland policies at the local, national and global levels?
- 4) What, if any, is the appropriate place for expatriate influ-

ence in the domestic rangeland policy of developing nations?

- 5) What are the roles and effectiveness of decentralized vs. centralized institutions in formulating and implementing policies that promote sustainable rangeland management?

To address these questions, the International Affairs Committee of the Society for Range Management sponsored a symposium during the Society's 55th meeting that was held in Kansas City, Missouri during February 2002. This symposium was the second in a two-part series, the first part of which was entitled "Rangeland Professionals and Society: Future Directions" and was held in Kona, Hawaii in 2001. Papers presented during the 2001 symposium are published in Volumes 23.5-6 and 24.1 of *Rangelands*. The six papers presented during this symposium are published in their entirety in the symposium proceedings, and represent diverse perspectives from academia, government, professional societies, and international donor organizations in the United States, South America, Africa and Asia.

Following, we present synopses of the papers presented, and we discuss the major findings and views reported, concentrating on the roles of rangeland professionals, range science, and politics in policy-making. We highlight four major themes that emerged from the symposium:

- 1) Short-term social and economic concerns override technical factors in most rangeland policy-making;
- 2) Links between science, policy and management must be strengthened through adaptive management, participatory research and proactive communication by rangeland professionals;
- 3) Rangeland policies must account for the historical environmental, social and economic conditions of specific locations; and
- 4) Broad participation in policy-making should be promoted at all levels of governance.

We conclude that rangeland professionals must engage actively in policy development if the goal of enhancing the sustainable management of rangeland resources is to be achieved. We also identify areas in which professional capacity needs to

be expanded to achieve this objective. Finally, we suggest that this shift in professional scope calls for rethinking of range education curricula.

Rangeland Professionals and Policy Development in the United States

Larry D. Butler³ and Dennis Thompson⁴

Rangeland professionals come from many different backgrounds and work in the field of rangeland science and management in a variety of ways. Some study the ecology of rangelands and related resources and focus little effort on developing and implementing policy. However, other rangeland professionals as well as other people and organizations may use the knowledge these ecologists gain to develop and implement policies that impact rangelands. Because of this indirect effect, rangeland professionals inevitably are involved and should, in fact, take the lead in developing emerging policies.

The benefits to the USA's rangeland resources will be proportional to the efforts of rangeland professionals in influencing relevant policy. Policy development without the proper consideration of rangeland resources could result in missed opportunities or it could result in disastrous impacts on the resource.

Rangeland policies are formulated and implemented in the USA at various levels and in a number of ways. Congress sets policy by statute and guides policy with budget allocations, line item funding, budget earmarks, and budget language. The Executive Branch of the U.S. government also develops and establishes policy. Rangeland professionals are expected to be part of the policy development process by the administration, Congress, agency leadership, the public and other organizations. Rangeland professionals influence local, state, and national policies by providing direct input when called upon or by volunteering input at appropriate times.

When a government program is being developed, rangeland professionals are often asked for a "Rule of Thumb" or formula that "Fits All" throughout the nation. This can be frustrating to rangeland professionals as they know making rangeland health assessments, production potential forecasts, wildlife potentials, or other ecological assessments must be site specific. Rangeland professionals can be frustrated by decisions that they deem not to be technically sound. However, rangeland professionals should not be daunted by this reality and should not falter when the next opportunity for technical input occurs. They should continue to develop their knowledge base and ecologically sound technologies and be prepared to reply and be proactive on appropriate issues. The Society for Range Management can assist rangeland professionals in their efforts to provide technically sound advice by bringing rangeland issues to the table and by assisting in policy development based on sound and appropriate science.

Rangelands and Rangeland Policy in Argentina

Israel Feldman⁵

Almost 2,500,000 km² (85%) of Argentina is covered by rangelands, shrublands and woodlands. These include expansive prairies in the Pampa Region, woodland-dominated savannas in eastern Argentina, woodland/grassland mosaics in

the northeast central Chaco, steppe and desert grasslands in Patagonia, and high elevation desert grasslands in the Andes.

Today, Argentina has about 50 million head of cattle that are owned by about 250,000 landowners, and 70% of which are raised on rangelands. Argentina also has about 2.2 million sheep and 4 million goats owned by about 140,000 producers. They are raised mainly on large ranches in Patagonia and Corrientes Provinces.

Rangeland management is dominated by a "just use it" philosophy, derived from the perception that Argentina's endless grasslands will last forever. Researchers and academics have tried to promote management systems based on vegetation-type delineation. However, this approach has not been widely adopted partly because rangeland research and extension in Argentina is not widespread and has a short history, and because native grasses are undervalued relative to exotic cultivated pasture species used for fattening cattle. Public awareness about the importance of native rangelands is limited because of the more subtle physiognomy of rangeland vegetation types compared to forests, and the fact that changes in rangeland vegetation cover or composition are less noticeable or significant to laypersons than changes in forest composition.

Due to extensive soil erosion during the late 20th century resulting from inappropriate cropping systems, various federal, provincial, university, and private organizations are increasingly conducting research and extension activities on grassland management. Regulations promoting crop systems that prevent soil erosion have been established, but general rules controlling the use of rangelands are difficult to establish or implement because of the diversity of rangelands and their site-specific management needs.

To help overcome the poor dissemination of information about rangelands, the Instituto Nacional de Tecnología Agropecuaria (INTA) has organized biannual meetings for range managers since the early 1980s. In March 1999, the Asociación Argentina para el Manejo de Pastizales Naturales (AAPMPN)—Argentinian Range Management Society -- was founded to promote research and extension work on rangelands and their management; to disseminate information about the importance of rangelands; to create range management courses; and, in collaboration with government officials, legislators and NGO's, to draft multiple and sustainable range management policies. AAPMPN held its first congress in August 2001, and has organized courses for cowboys, ranch owners and range management professionals. AAPMPN is also establishing contacts with federal and provincial officials and Congressional representatives to call their attention to the importance of laws related to sustainable rangeland management.

Rangeland Policy Perspectives from Bolivia, Ethiopia, and Kenya

D. Layne Coppock⁶, Abdillahi Aboud⁷, Humberto Alzerréca⁸, and Solomon Desta⁹

Rangelands comprise 25 to 75% of the land area of Bolivia, Ethiopia, and Kenya, yet they are home to <16% of the national population in each case. Rangeland economies remain dominated by traditional forms of crop production and livestock husbandry. Although beset by poverty and other social

ills, Bolivia is nonetheless ahead of Kenya and Ethiopia in terms of rural living standards and progress in democratic governance. Ethiopia prohibits private ownership of land, while this is allowed in Bolivia and Kenya.

Overall, the single greatest threat to the sustainability of rangeland societies appears to be the privatization of key rangeland resources formerly under shared access or public trust. Privatization takes many legal and illegal forms—and the beneficiaries may be elites from inside or outside of pastoral systems—but the net result is similar, namely resource fragmentation, further marginalization of vulnerable, powerless people, and heightened instability and crisis for pastoral production systems.

Rangeland policy is set differently in each country. Bolivia offers the most opportunity for public dialogue, while Ethiopia is the most top-down, and a “land-grabbing culture” currently pervades Kenya. Short-term gain and political expediency govern policy-making in all three countries, and technical input from range professionals is minimal. Policy trends favor control and reduction of resource-use options on rangelands. This is the antithesis of what opportunistic rangeland peoples need to survive.

Rangeland advocates have a long way to go to enhance their impact on policy matters. Pastoralist societies are economically weak, and hence voiceless, in politics. In our experience, however, it is the relative inexperience and apathy of rangeland advocates, not disinterest by policy makers, that promotes disengagement. We believe rangeland professionals need to be more active in providing information to policy makers. We need to stress unique attributes of rangelands, such as the importance of risk management and the high reliance on key resources, since these differ from attributes of higher potential zones and may be less familiar to decision makers. While rangeland advocates are often at a disadvantage when arguing for rangeland investment based on economic returns, other values such as investment to promote humanitarian concerns and enhance regional stability and security might be more effective.

Rangeland Policy in South Africa

David Grossman¹⁰

Rangelands cover about 80% of South Africa. Bantu people (African) with livestock started settling South Africa in about 200 AD, while Europeans arrived in 1652. The resultant general replacement of indigenous herbivores with cattle, sheep and goats, is widely regarded to have resulted in changes in veld composition, accelerated soil erosion, and bush encroachment.

Concern about the degradation of rangelands has been a major factor driving policy formulation. Over the years, political leaders have reacted differently to this problem, according to prevailing macro-political considerations. Several government commissions were appointed to investigate drought and veld degradation by Jan C Smuts, who was Prime Minister of South Africa in the mid 1940s and had a passionate interest in veld (rangeland). Since Smuts accepted advice from local rangeland professionals, rangeland professionals were clearly co-drivers with politicians during this era.

After the 1948 referendum among the white electorate, 40

years of formal Apartheid rule under an Afrikaner Nationalist Government ensued, and the predominantly Afrikaner rural landowners became the most influential political grouping. Policy interventions included broad scale subsidies in the white commercial agricultural areas, but not in the “Black” homeland areas, which covered about 14% of the land but accommodated nearly 80% of the rural population. These homeland areas were economically or environmentally unsustainable, but despite warnings from professionals, the prevailing political ideology overrode this reality.

With the advent of a democratically elected non-racial Government in 1994, government priorities shifted to redressing racial inequities. A fully participatory policy formulation process was adopted, on a scale not previously experienced. In recognition of identified problems in rangelands, the government introduced the Working for Water and LandCare programs, which were aimed at reversing degradation. The former program was implemented after scientists quantified the nature and extent of invasive alien plants and because of the politically attractive fact that the program would create thousands of jobs. This is an example of a harmonious interaction between science and politics!

Another key factor determining the roles of science in policy formulation is credibility. “Doomsday” scenarios that fail to materialize lessen credibility. John Acock’s predictions in the 1950’s about the expansion of Karoo vegetation have not fully materialized and predictions by prominent professionals during the 1960’s about desertification have been completely erroneous. In addition, paradigms shifts, including debate on non-equilibrium systems, confuse politicians who seek simple epigrammatic answers to important questions. The time scale of scientific enquiry and the intervals between “quantum leaps” in knowledge, seldom match the short time horizon of political planning.

South Africa has provided evidence that rangeland professionals can influence policy formulation, especially when their credibility and level of trust is high and when their recommendations resonate with the needs of the politician and provide demonstrable short-term benefits to society.

Effective Rangeland Policies for Implementing Global Conventions in Africa

Gufu Oba¹¹

Carbon trading will create an opportunity for implementing carbon sinks in degraded rangelands in Africa during the second commitment period of the Kyoto Protocol (starting in 2012). The role of rangeland professionals in developing effective rangeland policies for monitoring carbon sinks in pastoral land use systems, in developing guidelines for carbon contracts, and in testing research methodologies for certification of project implementation is discussed in this paper. The role of rangeland research in establishing carbon sink baselines and carbon monitoring systems in grazing lands, and the role of rangeland professionals in future negotiations are also highlighted. The prospects for carbon trading contracts between the host African countries and utility companies in developed countries are also discussed, and examples of carbon accumulation monitoring are provided to show how carbon

sinks might benefit from funding mechanisms and the opportunities for future carbon trade.

The Kyoto Protocol provisions exclude the use of rangelands for carbon sequestration, even though rangeland soils may contain substantial amounts of global carbon. Therefore, rangeland professionals working in Africa will need to understand the importance of rangeland carbon sinks for renegotiations after the first commitment period (i.e. 2020). In particular, expertise in carbon contracts and carbon trading will be needed to explore ways that collaborative ventures between local land users and utility companies can be improved in the future. Consequently, in order to accomplish the tasks of establishing verifiable methodologies for measuring carbon sinks and developing carbon contracts, rangeland professionals need to become familiar with the complicated rules of the Kyoto Protocol, especially the standards for establishing carbon sink verification.

In addition, rangeland professionals should emphasize the use of carbon sinks in the world's rangelands by developing criteria for evaluating carbon sink projects. Although the socio-economic issues related to carbon sinks in rangelands still require clarification, rangeland professionals should be pro-actively involved in future negotiations of the conventions by establishing baselines for "business as usual" scenarios, developing criteria for certifying and monitoring carbon sinks, and developing guidelines for carbon contracts in a timely manner. This is important because guidelines for carbon contracts necessary for implementing global carbon conventions should be based on certified carbon sink baselines and properly researched monitoring systems.

Taking Stock: Policy, Practice, and Professionalism in Rangeland Development

Robin Mearns¹²

International development institutions have long engaged in supporting rangeland management in developing countries, but the context and rationale for such support has changed considerably as development mandates have broadened. This changing development context has been mirrored by theoretical developments in the range profession, but the relationship between rangeland science and development policy and practice is far from direct. This paper takes stock of some lessons learned from attempts to engage in rangeland tenure and policy in Asia and Africa, focusing on the World Bank's recent experience in China and Mongolia.

Development agendas in recent years have sharpened the focus on poverty reduction and on circumstances in which environmental goals may take precedence over production considerations. In addition, there are signs of progress within major development financing institutions towards a learning-process approach to development. Within the range management profession, changes in thinking at the international level have resulted in more open acknowledgement that ecological dynamics can have distinct management implications for adaptive management, common-pool resource tenure and access, and livestock mobility. These trends appear to strengthen the case for supporting environmentally sustainable and so-

cially inclusive rangeland management interventions in developing countries. There is also a growing appreciation that the practical opportunities afforded by these encouraging developments are often limited by socio-political and historical factors at the country level, and development practitioners are realizing that 'second-best' options may need to be adopted where these offer greater promise of practical progress at the local level.

Several themes emerge from a review of the World Bank's experience in the field of pasture land tenure and policy in Africa and Asia, which take the relevant policy agenda well beyond the terrain usually thought to be the concern of rangeland science and professionals. These include: 1) The need to frame 'natural resource management' issues in a manner which addresses the primary concerns of pastoralists themselves while still addressing sustainability concerns; 2) A shift in emphasis from the spatial and social boundaries in pasture land management towards the empowerment of groups, including the flexibility to negotiate boundaries according to varying ecological or socio-economic conditions; and 3) Recognition that community-based approaches to rangeland management involve actors at multiple layers.

The challenge for rangeland professionals lies in charting a course through this complex policy terrain that is theoretically and empirically informed yet practically feasible at the local level. Rangeland professionals can play a valuable role in the development process by: 1) Assisting with the technical design of adaptive co-management approaches, monitoring of outcomes, and disseminating information on good practices; 2) Conducting empirical research to evaluate the practical impact of policies in widely varying ecological and livelihood contexts; 3) Integrating lessons from international experience into national research programs on livestock and pastoral development; and 4) Offering advice to development practitioners to help identify the conditions under which alternative policy and management options can help to achieve acceptable results in terms of risk management, equity, and sustainability.

Synthesis and Conclusion

María E. Fernández-Giménez¹ and Urs Kreuter²

In most countries, rangeland professionals currently appear to play a minimal role in the development of policies that affect rangelands.

Several symposium speakers pointed out that much of the developing world lacks policies directed towards the conservation and management of rangeland resources or the well-being of rural populations that depend on them. People whose livelihoods depend on the land are often politically marginalized, and key resources that sustain their production systems are frequently captured by elites and others, and converted to other uses, such as cropland (Coppock et al.). Moreover, natural resource management per se is seldom a priority identified by pastoralists, whose concerns favor more immediate needs such as water development and veterinary services (Mearns). This paucity of attention to the condition of rangelands can, in part, be ascribed to the subtle physiognomy of rangeland vegetation types and the fact that the slow changes in rangeland vegetation often go unnoticed by the untrained eye (Feldman).

An added problem is that historically, rangeland professionals influenced the direction of development on arid rangelands, with distinctly mixed results (Mearns). The failure of many range improvement and pastoral development projects in the mid 20th century (Mearns) and false predictions about the imminent demise of vast areas of rangelands (Grossman) led to a pronounced decline in donor investments in these areas, despite the increasing vulnerability of pastoral populations and rangeland landscapes. However, the assumptions underlying the conventional wisdom of pastoral development have been increasingly challenged, which may lead to renewed interest and investment in pastoral development, with greater emphasis on the integration of sustainable livelihoods and landscapes, increased sensitivity to the nuances of pastoral land tenure, and a commitment to a more participatory development approach that emphasizes local capacity-building over technological solutions.

With few exceptions, mainly in the developed world, science seldom drives rangeland policy.

South Africa provides an unprecedented example of national-scale participatory planning process after the first democratically elected non-racial Government came to power in 1994 (Grossman). In this instance, rangeland professionals and their scientific knowledge were formally included in the planning process, following which the Land and Agriculture Policy Center, staffed by both South Africans and expatriates, was established to assist in policy formation. In contrast to South Africa, there is often a dramatic disconnect between the knowledge generated in academic or research institutions and its application by producers, land managers or policy-makers. Several of the authors point out that, in order to increase acceptance of their findings and thus their influence in policy formulation, scientists must learn to communicate their results clearly and simply to political decision-makers, who are more interested in identifying the scientifically defensible course of action that satisfies the largest number of constituents than in understanding the complexities and caveats embedded in esoteric scientific publications. Yet oversimplification holds its own perils. Generalized technological interventions and land tenure policies were responsible for many of the range improvement and development debacles of the 20th century.

Another issue that emerged is the relevance of recent advances in rangeland ecology, notably "non-equilibrium" theories of rangeland vegetation dynamics and plant-animal interactions, for the development of range policy. This debate seems academic to some in the face of the acute issues of poverty, access to markets and social services, and insecurity faced by pastoralists in many developing countries (Feldman, Coppock et al.). By contrast, the integration of state and transition models into ecological site descriptions in the USA indicates that the Natural Resource Conservation Service is institutionalizing the new paradigm, even though the site-specific and historic data needed to accomplish this and uncertainty about what constitutes a "state," a "transition," or a "threshold," will make this a challenging process to complete (Butler and Thompson). The place where non-equilibrium ecological theory appears to hold most sway is among multinational donor organizations such as the World Bank, where it supports development approaches that appreciate the importance

of flexibility, mobility, diversity, and opportunism to pastoral livelihoods and rangeland sustainability (Mearns).

One area in which rangeland professionals have a new opportunity for influencing policy is in the carbon sequestration arena (Oba). By paying attention to local conditions, range professionals can contribute significantly to the implementation of the Kyoto Protocol by using past data gathered in developing countries to help establish empirical baselines and monitoring protocols for carbon sequestration investments and carbon trading.

Macropolitical structures provide the framework for ways in which local people, rangeland professionals, and politicians can contribute to policy formation.

The symposium provided a fascinating cross-section of local, national and international political processes that affect rangelands and their management. Local politics often come into play, particularly in poorer nations, through the capture of the most productive land and other assets by local elites, and their emphasis on investments with short-term returns to perpetuate existing power structures (Coppock et al.). Another theme that emerged from the symposium was the importance of macropolitics, macropolitical transformations, and the interactions between politics at local, national and global scales. Macropolitical structures and climate provide the overall framework for the ways in which local people, rangeland professionals, and politicians can contribute to formation of policy.

Where democracy and political stability prevail, and where there is a framework for decentralized decision-making, the opportunity for local and scientific input into policy formation is elevated. In some developing countries there is a trend towards interest group and advocacy politics, even at the local level (Coppock et al.). This development provides another avenue for involvement by rangeland professionals in the policy process as information resources for local groups. Yet, even where the political system theoretically allows for democratic process, rangeland users are often in the political minority and may be excluded from influencing policy. Moreover, even solicited scientific advice may be ignored or denounced if the science or its policy implications contradict the prevailing political ideology or politically competing considerations. In many countries the national-level policy framework that governs land tenure is too rigid to allow for the development of flexible and site-specific local tenure policies (Mearns). In the American political system, much policy making (and breaking) happens through the Congressional budget negotiations, which are influenced both by national political debates and local "pork barrel" politics (Butler and Thompson).

International politics intersect with local and national concerns when global conventions are implemented locally. For example, there is a potential for "carbon colonialism" if developed nations investing in carbon sequestration projects in developing countries reap the benefits of carbon mitigation credits and timber profits while leaving the host nation with modest land rents, unaccounted opportunity costs, land use conflicts, and displaced farmers (Oba). This creates an opportunity for the constructive involvement of rangeland professionals in renegotiating the Kyoto Protocol in its second phase, by helping local communities enter the global carbon market in a

way that provides positive incentives for sustainable resource management.

Perspectives presented in this paper provide an instructive sample from which emerge several common themes regarding the role of rangeland professionals in policy-making.

- **Because politics and perceived short-term economic and social needs generally prevail over science and resource management, technical factors are often overshadowed in policy-making for rangelands.**

Indeed, the lack of policies that explicitly address rangeland conservation and management is an indication of the relatively low priority of resource management for many rangeland users and their political representatives. Thus, to achieve their conservation and management goals, rangeland professionals must reframe policy agendas to integrate social and economic priorities with resource management concerns. Instead of despairing that rangelands are ignored, rangeland professionals must refocus their efforts to clearly articulate the interdependence of sustainable livelihoods, community well-being, and sound stewardship to policy-makers and rangeland inhabitants. They should also support policies and aid programs designed to address economic, social and resource management concerns in an integrated fashion. If this course is followed, major areas of policy emphasis are likely to include risk management, resource tenure and poverty alleviation, with an emphasis on improved credit and markets for pastoralists.

- **Rangeland professionals should strengthen the links between science, policy and management, through participatory research, adaptive management, and clear and proactive communication of their science to policy-makers and rangeland users alike.**

Range science becomes more relevant to resource users when it is based on participatory research and adaptive management that combine experimental design with alternative, locally meaningful management practices. Advancement towards these objectives will require the commitment of individual investigators and a change in the institutional culture of academic and government research entities.

- **Rangeland policies need to take into account the historical environmental, social, and economic conditions of specific locations.**

It is extremely important to understand local environmental and social history in designing effective rangeland policies. Traditional resource management institutions can be instructive for contemporary policy formulation even when they are no longer viable in their historic forms. Rangeland professionals should encourage national-level policies that are sufficiently flexible to allow for locally adapted implementation.

- **Broad participation in policy-making should be promoted at all levels of governance.**

It is difficult to overstate the importance of political stability for the implementation of sustainable rangeland management practices. Countries with more stable and genuinely democratic systems of government offer greater opportunities for popular engagement in policy-making, by rangeland users, professionals, and other stakeholders and interest groups.

Transparency and accountability in policy-making at all levels is necessary to ensure that formal democratic processes are not derailed by corruption or dominated by narrow interest groups. Traditionally marginalized voices, especially those of minority rangeland user groups, must be brought into the policy discourse. This is not a simple or riskfree task since it may result in significant shifts in the existing balance of power. However, examples, such as the Working for Water program in South Africa, the LandCare program of Australia, and the Grazing Lands Conservation Initiative in the USA, show that inclusive policy-making processes can be successfully implemented to alleviate or resolve resource conflicts, or to develop resource management plans with strong public support. While collaborative policy-making is neither a panacea nor the most appropriate or efficient approach for all issues, public involvement in policy-making, including the participation of rangeland professionals, should be encouraged whenever possible to provide people who are interested in or directly affect rangeland resources with a sense of proprietorship over the stewardship rangelands.

Rangeland professionals can no longer afford to view policy-making as outside their domain of expertise and appropriate involvement.

If we, as rangeland professionals, do not take the driver's seat, we and the resources that we advocate for, will be taken for a ride, with potentially devastating consequences for the principles of sound science and rangeland conservation. However, in order to claim our place behind the wheel we will need to rethink our role as professionals, and the scope of range science as a discipline.

Many of us were drawn to range science because of the inherently integrative and interdisciplinary nature of the field, and the opportunity to study the interactions among soils, plants, climate and herbivores. Now we must go a step further to fully integrate human social and economic systems in our understanding of rangeland ecosystems and their management. It is no longer sufficient to be technically proficient in the biophysical foundations of range science. Today's rangeland professional must be able to perform integrated socio-economic and ecological analyses of rangeland ecosystems, and identify the "killer assumptions" underlying proposed management actions. These needs are nowhere more apparent than in the international arena, because in the developing world, rangeland conservation and management objectives will only be achieved if they are closely linked to social and economic development priorities.

To be effective in the policy arena, rangeland professionals must also dramatically improve their communication skills, by proactively sharing their knowledge and concerns with policy-makers in simplified terms without overreliance on "doomsday" scenarios. This task will be made easier if the public is more directly included in the conduct of range science, through participatory research and adaptive management. Such collaborative learning has the added benefit of increasing the public's scientific literacy and providing laypersons with greater appreciation for the complexities and uncertainties associated with rangeland management.

Finally, these shifts in our professional and disciplinary scope have important implications for range education. The

knowledge, skills and abilities that our students will require to meet the challenges outlined above call for increasing emphasis in range curricula on social sciences, integrated ecosystem analysis, and communication skills, including mediation and negotiation. However, this broadening of our professional role does not imply that we should abandon our existing knowledge base, professional culture and networks. Rather, we must expand our knowledge base to address the interactions of social, economic and ecological systems, and enlarge our professional networks to include a growing client base with increasingly diverse land management objectives.

This compilation shows that rangeland professionals have much to contribute to the development of policies that support the conservation of rangeland resources and the well-being of communities that depend on them. Our effectiveness will depend on our ability to expand our professional capacity, and on our initiative and commitment as individuals, institutions and professional societies to engage at all levels of policy formulation and implementation.

Author information

1. Assistant Professor, School of Renewable Natural Resources, 325 BioSciences East, University of Arizona, Tucson, AZ 85721
2. Assistant Professor, Department of Rangeland Ecology and Management, Texas A&M University, College Station, TX 77843-2126
3. Director, Grazing Lands Technology Institute, Natural Resource Conservation Service, P.O. Box. 6567, Fort Worth, TX 76115
4. National Range and Grazinglands Ecologist, Natural Resources Conservation Service, South Ag. Building Rm. 6150, 14th and Independence Ave., SW, Washington DC 20205-0016
5. President, Asociación Argentina para el Manejo de Pastizales Naturales, Mendoza 1819 Dto. A, 2000 Rosario, Argentina
6. Associate Professor, Dept. of Rangeland Resources, Utah State University, Logan, UT 84322.
7. Dean, Faculty of Environmental Studies and Natural Resources, Egerton University, P.O. Box 536, Njoro, Kenya.
8. Private Consultant, Calle 4, Casa 300, Villa San Antonio Bajo, Casilla de Correo 13697, La Paz, Bolivia.
9. Post-Doctoral Associate, Dept. of Rangeland Resources, Utah State University, Nairobi, Kenya, and Addis Ababa, Ethiopia.
10. Private Consultant, P.O. Box 29038, Sandringham 2131, South Africa
11. Senior Researcher, International Center for Environment and Development Studies, Agricultural University of Norway, PO 5001, N-1432 Ås, Norway
12. Senior Natural Resource Management Specialist, Rural Development and Natural Resources Sector Unit, East Asia and Pacific Region, World Bank, 1818 H Street NW, Washington DC 20433