THE CONVERGING PHILOSOPHIES OF MANAGEMENT OF PUBLIC AND PRIVATE GRAZING LANDS IN NORTH AMERICA: THE WESTERN UNITED STATES AND CANADA

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ABSTRACT

Conflict in natural resources management and use has become the order of the day. Laws have been passed which reflect changing societal attitudes. "Scientific" observation is frequently more perception than science, resulting in a generalized distrust of science. Lawsuits and court-directed decisions are prevalent. Some hopeful signs are also present: Conflict resolution protocols have worked well in some instances, but do so only to the degree that men and women of good faith pursue them. A tumultuous decade lies ahead.

KEYWORDS

Land use, policy, coordinated resource management, ecology

SOCIAL ISSUES

Publicly Owned Lands. The extensive uses of grasslands for livestock grazing and amenity uses such as recreation are evolving at an exceptional rate in Canada and the United States. The long history of the uses of public and private lands for commodity production, principally livestock, are being increasingly challenged by public interests across a broad spectrum of environmental issues. The trends towards increasing restriction of commodity uses are most developed in the public land areas of the western United States, however, similar trends are developing in Canada. A variety of legislation to control land use has been passed in the last 20 years. As institutions within government have matured, they have begun programs that now place substantial decision making authority for agricultural uses of grasslands within agencies that have no history of agricultural management. The dominant laws in the United States that currently direct land use on all publicly owned lands and increasing amounts of private land are the Endangered Species Act of 1966 and the Clean Water Act of 1972.

The Endangered Species Act is administered by the U.S. Fish and Wildlife Service for plant and animal species that are wholly resident in the country. Aquatic animal species that spend a portion of their life cycle in the ocean are administered by the National Marine Fisheries Service. The laws and subsequent regulations that govern land uses on public lands where endangered species are present are superseded by regulations to protect the listed species.

An example of the land use philosophy that is currently driving decisions for management of public lands that contain endangered species is the Record of Decision for Amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl: Standards and Guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl (1994). This covers an area in western Washington, Oregon, and California of 24,455,300 acres. The Standards and Guidelines for management are subdivided into two parts: (1) ecological principles for management of late-successional forests, and (2) the Aquatic Conservation Strategy. The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems. The objectives are defined in terms of "maintain and restore" watershed and landscape features to ensure protection of aquatic systems, connectivity between watersheds, water quality, sedimentation of water, flow volume and timing of streams and rivers, diversity of vegetation in terms of native species and others. In all cases the protection of aquatic systems is an absolute requirement. The practical consequences are land management plans that functionally eliminate use of the resource to assure no negative impact on aquatic areas. The view for management of public lands with sensitive species has markedly changed from sustained yield to no impact.

Further east into the public rangelands of eastern Oregon, eastern Washington, and Idaho the impact of fisheries protection programs is becoming more evident. The Decision Notice/Decision Record for managing anadromous fish producing watersheds (1995) has restricted the multiple uses to a secondary status following protection of fish habitats. The Standards and Guidelines control timber management, road building and maintenance, livestock grazing, recreation management, minerals management, fire and fuel management, land use, riparian management, watershed restoration, and fisheries and wildlife restoration. Each activity must meet specific criteria that are designed to protect anadromous fish habitats. As in the spotted owl areas the view of federal land management has moved from sustainable multiple use to no potentially negative impacts on wild species that have subpopulations listed as endangered species.

The Clean Water Act requires water quality to meet specific standards and criteria as defined by the Environmental Protection Agency. As the specific criteria are identified, We expect they will be fully incorporated into land use plans for public lands across the western states. In areas where public land management is controlled by the Endangered Species Act regulations there will probably be little additional change to meet requirements of the Clean Water Act. In all areas not currently protected by land use plans to meet endangered species needs, there will be major considerations to change land uses to meet new criteria under the Clean Water Act.

What all of this means in terms of public land management is that management systems are not being designed to meet the principles of grassland ecology, in our view, grassland principles are secondary in terms of current federal land use planning, especially in the U.S. Forest Service. The land management personnel are generally not educated in grassland ecology and this is reflected in their decisions. The result of all of these pressures is likely to be a continued decline of commodity uses of public rangelands. In Oregon, Washington, Idaho, and other states within the Columbia River Basin the U.S. Forest Service predicts a decline in use of public lands for grazing by 18-19% over the next 20 years if current trends continue. As livestock grazing declines, we would expect a corollary decline in interest in grassland ecology within the public land managing agencies.

Private Lands. Private lands are influenced by the same legislation but generally the restrictions on land uses come from state governments. The state governments are more sensitive to production issues and try to accommodate the necessary impacts inherent in

land use for commodity production. The Endangered Species Act has had a major influence on land use in restricted areas. Like public lands, the result of listing of a species leads to external federal decisions focused on protection of the listed species. Land use and value is a minor consideration when the federal government decides to protect an endangered species. No direct compensation is given to landowners.

The extreme effects of the Endangered Species Act is of secondary importance as an influence on private land use. Management changes on private land to protect water quality is mandated under the Clean Water Act. Throughout the grasslands of the United States new management strategies are being designed and implemented to protect water quality with emphasis on protection of riparian zones and fisheries. The implementation of the Clean Water Act by the Environmental Protection Agency and its associated state agencies is just beginning in earnest. More stringent requirements for water quality are being demanded as lawsuits to force compliance to the Clean Water Act have been successful. In Oregon in 1996 there were over 800 streams listed by the Department of Environmental Quality as water quality limited. In fact, few grassland streams can meet the criteria demanded in regulation without exceptions. The consequence is tremendous conflict and social problems as people worry about being forced to try to accomplish the impossible.

The social problems generated by implementation of the environmental protection laws stem from a variety of sources. An obvious source of conflict is the opposite paradigms of protection versus sustained use. Beyond this has been the misuse of incomplete science to support the decisions of agency officials. While the products from the land, whether they are water quality components or species of animals, are the result of ecosystem processes and structure; the science used to make decisions has never included a comprehensive ecosystem analysis. Perhaps that isn't yet possible. Nevertheless, ecological decisions with enormous social impact are made. Public officials claim they depend on science to make the decision. While that is partly true, the reality is only a small component of the relevant ecosystem processes are evaluated, measured, modeled or considered.

The result is regulation and policy that is unreasonable and unfeasible. The criteria are widely touted as scientific. The consequence is that science has largely lost the respect of land users, environmentalists, and most anyone interested in grassland use or protection. The loss of confidence by the public in our current degraded science that has been manipulated to meet political ends is now a major problem facing grassland scientists. Unless we correct this, our futures are bleak.

SCIENTIFIC ISSUES

The scientific information that is needed to eventually resolve the social issues previously discussed will be highly integrative. Currently the approach used in most investigations relating to environmental impact inquiries is correlative rather than experimental. There is implied cause and effect relationships based on all levels of correlation. Because of the complexity of the issues involved even extremely involved multivariate studies consider the range of possible cause and effect relationships. The fundamental assumptions of statistical designs are widely disregarded and dismissed under the assumption the experimental procedures are robust and the assumptions are unimportant. The consequence is a huge array of conflicting correlative studies that yield widely different, reasonable interpretations.

These correlative studies do have real value in looking towards possible cause and effect relationships. They can assist in formulation of hypothesis that can be tested with experimental procedures. We do not need to stop research at the hypothesis testing stage and jump to conclusions based on these correlative studies. In the rush to provide a scientific solution to social and political concerns we have frequently ignored the care and caution we received in training as scientists.

We can conduct scientific investigations that will contribute to constructive solutions to societal concerns. However, if we are to develop principles that can be widely used, we will need to expand the large body of correlative research and hypotheses development science to examine basic cause and effect relationships. The world of grassland ecology is not so complex that a reductionist approach to science is unworkable.

Currently the hypothesis that a wide array of small effects of land use accumulate so that the cumulative effect is severe is a logical and largely untested hypothesis across the range of its application. The hypothesis can be tested to define thresholds of response for a variety of impacts and ecosystem components to define when an effect can accumulate, when one environmental stress overwhelms the impact of another, when effects do accumulate, how to measure impacts of small scale stresses on landscape level responses. This is an extremely interesting area of science that can be of great value in the long term understanding of grassland ecological processes. However, we are doing very little to conduct research within the order of landscape scale outputs beyond correlative research. Until we integrate reductionist process studies, we will not understand the cumulative effects of any action on landscape level outputs.

We need to continue to invest time and energy into development of conceptual theories of plant succession and plant community ecology. The acceptance of non-equilibrium theory of ecological states and transitions among states in the United States of America which follows the general perspective of ecologists worldwide is encouraging. We need a solid theoretical basis that can be used as a benchmark predictor for expected results of plant/soil units in response to natural and induced stimuli. Without a unifying theory, our research loses direction and becomes a series of unrelated case histories. At the same time we need to question, test, refine, and be prepared to reject our global succession theory so we can become increasingly precise in our ability to predict outcomes in terms of plant community structure and function.

The use and frequently misuse of Clementian ecology in the United States of America is a good example of the problems that develop from acceptance of a global theory without a continued questioning of its long term utility and proper application. The oversimplification of Clement's theory to an assumed static, climatic climax led to widescale confusion among ecologists and land managers. As grassland managers realized that national interpretations of ecological status of the land were incorrect, the Society for Range Management developed a committee of rangeland ecologists to refine condition classification of rangeland ecosystems. This resulted in the incorporation of the principles of non-equilibrium ecology into rangeland condition classification (Society for Range Management 1995). At the same time, the National Research Council in the United States appointed an interdisciplinary committee to evaluate the same issue and they developed these ideas in terms of Rangeland Health (1994). The work of both groups to evaluate and develop a conceptual framework for classifying ecological status of rangelands has had a

major influence on how land managers view land potential and expected outcomes. The new national handbook of the Natural Resources Conservation Service integrates the newly synthesized ideas of rangeland health into monitoring approaches and techniques. Hopefully, we will continue to question and refine the concepts of rangeland health so that we move towards more predictive ecological models with less controversy.

The issue of water will become increasingly important as an aspect of grassland values. The potential yield and quality of water is of extreme importance to society. Historically, water yield and quality has been a very small component of grassland research. The increased population in North America and the ever increasing need for larger quantities of water and water of higher quality for amenity uses will continue to accelerate. Grassland research programs will expand the hydrology and water quality components substantially in the next decade. There will be a national tendency for institutional research administrators to focus future water related research in engineering units that have historically dealt with water issues. It is of paramount importance that future studies of water yield and quality be focused within an ecological theory and that aspects of sustainable supplies of water in terms of yield and quality be fully evaluated. The integration of engineering and ecological expertise should provide the most economic long term solutions to water related issues. Ultimately, urban citizens and rural landowners will need to find mutually beneficial solutions to the developing competition for water and water quality.

In recent years there has been an increased awareness of the encroachment of weeds across the rangelands and grasslands of western North America. The current rapid expansion of these alien plant species has raised great concern among land managers but has not generated sufficient research to stop the rapid expansion of these new, highly adapted weeds. The current weed management strategies and control methods are inadequate. A recently developed protocol for weed control proposed by the Bureau of Land Management shows promise. They treat the weed problem much like a forest fire. When a small isolated patch of weeds is found, it is attacked with full force and eradicated. The expansive areas of weed infested lands are managed to try to contain the weeds within the area they have claimed. Reclamation of these expansive weed dominated areas needs new research. No existing technology exists to economically restore these lands to what are now called healthy rangelands.

Biotechnology has become an established agricultural business. In crop development progress has been made and transgenic plants are available for large scale testing. This is an exciting new area of biological science. Native grasses could be studied and perhaps even altered to help resolve the major weed problems facing North America. The complex genetic makeup of perennial native grasses will be much more difficult to manage than the simpler annual crop plants. The development of this technology should allow integration of perennial grasses into biotechnology, research programs. This approach to improving the competitive ability of native grasses and forbs may be essential to restore millions of acres where fundamental site characteristics have been altered so that competitive ability of the native species is inadequate to maintain their position in native ecological systems.

The expansion in technology in the computer industry and the expanded capacity for personal computers has opened a variety of options to develop expert systems and other large and complex models. At the same time, a variety of geographic information system programs have developed that will assist the developing science of landscape ecology. These tools have great power and potential. The newly acquired analytical ability within GIS may well revolutionize the way we monitor ecosystems from simple plant to landscape scales. The capability of GIS will yield estimates of cover, density and frequency that are not subject to individual judgement. The electronic evaluation of transect data can eliminate observer error. Currently, resolution is at the scale of a square millimeter for images gathered correctly. As long as proper care and ground truth is incorporated, we may see a new era of efficiency and accuracy of field sampling.

CONFLICT RESOLUTION

All of these changes in laws, policy, and attitude have resulted in a bewildering complexity of science and perception. Frequently, it pits interest groups against each other and advances a win/lose philosophy.

There are some stunning examples of a better way, however. Coordinated Resource Management (CRM) is perhaps the best established and longest running of these. In CRM, all affected parties are brought to the table; pertinent data (facts) are marshalled; and the format for a rational set of decisions is provided. CRM plans are in place throughout western Canada and the western United States.

Other regional and/or localized approaches show promise as well. The Society for Range Management's Pacific Northwest Section (British Columbia, Washington, and Oregon) have created a prototype for bringing natural resource, industry, and environmental factions together. Their approach has resulted in the highly successful Oregon Watershed Improvement Coalition (OWIC). Another success story revolves around the Oregon Department of Environmental Quality sponsoring the Oregon Cattlemen's Association to create a landowner based educational program called the Watershed Ecosystem Program (WESt). Finally, throughout western North America we are seeing an interest in creating localized watershed councils. These councils provide a mechanism for local input to natural resource issues and, while variable in their degree of influence, to date, show promise for the future.

Contact the Department of Rangeland Resources (OSU) or the Society for Range Management (SRM) if you would like further details.

CONCLUSION

The future and challenges of grassland science in terms of monitoring, plant species development, solution of vexing problems like weed invasion is indeed exciting. The new electronic age has provided objective instruments that allow superb accuracy at multiple scales. We will see great increases in precision of data collected in the near future. Science will get better and predictions more accurate.

Several conflict resolution techniques and protocols have emerged. These show promise of creating rational plans when people of good faith work together. Yet, the social problems for publicly owned and privately owned lands are sure to increase in the short term. Increased urban and decreased rural populations will continue to grow apart philosophically. Land use controls based on politics and power threaten to supersede scientific perspectives in decision making. Hypotheses may continue to masquerade as clear conclusions. We see a long period of social adjustment as the urban population with their distinct knowledge and passionate ideals move into the rural areas and work at home connected to the business electronically. It will surely be an interesting decade ahead as we see the development of a new and integrated social system governing uses of grasslands.

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