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The Use of Public Land and Water Resources -- Agrarianism

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THE USE OF PUBLIC LAND AND WATER RESOURCES—AGARIANISM*

Roy E. Huffman**

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I. INTRODUCTION

The problems of ownership, tenure, use, and management of public lands are primarily western issues. For most of the 19th century and extending into the 20th century, disposal of the public domain was central to much well-intentioned government policy and legislation. The major national goal was to get this seemingly endless expanse of land into private ownership and to use the public domain in encouraging the settlement and development of the West including land grants to the railroads and for other purposes. The western public lands are the acres remaining after more than a century of federal grants and sales.¹

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This paper is largely historical, philosophical, and institutional. It is not concerned with the specifics of law. I am not qualified to do that. It is not concerned with the specifics of economic analysis. I am not qualified to do that anymore, either. The paper reflects my belief that decision-making with regard to public land and water resources, in both the disciplines of law, and economics, will be heavily influenced by a framework of historical, philosophical, and institutional considerations. (Statement by Mr. Huffman to the converage).

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1. M. CLAWSON, THE WESTERN RANGE LIVESTOCK INDUSTRY 94-96 (1950) [hereinafter cited as CLAWSON]; E. LOUISE PEFFER, THE CLOSING OF THE PUBLIC DOMAIN 169-180 (1951) [hereinafter cited as PEFFER]; M. SAUNDERSON, WESTERN LAND AND WATER USE 78 (1950) [hereinafter cited as SAUNDERSON].

The organic act creating the Public Land Law Review Commission defined public lands as follows:

As used in this Act, the term "public lands" includes (a) the public domain of the

II. EVOLUTION OF LAND AND WATER INSTITUTIONS

The great buffalo ranges of the West provided a natural setting for development of the range livestock industry.² As the land use pattern developed, the use relationship between land and water was forcefully illustrated. Control of water was often the basis for conflict among ranchers and between livestock growers and crop farmers.³ Land-hungry settlers from the eastern United States and from Europe were quick to take advantage of the Homestead Acts,⁴ the Desert Land Act,⁵ and other "free land" legislation.⁶

Not everyone played the game according to the rules. Some secured lands from the public domain by devious means and there were examples of ruthless exploitation.⁷ In the midst of all this, the results of exploitation of natural resources in the eastern United States became obvious to both government and private groups. The focus was the cut-over forest lands of the Great Lakes states.⁸ The resulting concept of reserving forest lands in public ownership gave rise to the national forests and other reserved lands.⁹ Fortunately, early in this period, the reservation process included the beautiful, the spectacular, and the unusual, beginning with Yellowstone National Park.¹⁰

The institutional characteristics of public ownership and the stated

United States, (b) reservations, other than Indian reservations, created from the public domain, (c) lands permanently or temporarily withdrawn, reserved, or withheld from private appropriation and disposal under the public land laws, including the mining laws, (d) outstanding interests of the United States in lands patented, conveyed in fee or otherwise, under the public land laws, (e) national forests, (f) wildlife refuges and ranges, and (g) the surface or subsurface resources of all such lands, including the disposition or restriction on disposition of the mineral resources in lands defined by appropriate statute, treaty, or judicial determination as being under the control of the United States in the Outer Continental Shelf.

Act of Sept. 19, 1964, 78 Stat. 982 (current version at 43 U.S.C. §§ 1391-1400 (1980)).

2. R. FLETCHER, *FREE GRASS TO FENCES* 148-49 (1960) [hereinafter cited as *FLETCHER*].

3. E. DALE, *THE RANGE CATTLE INDUSTRY: RANCHING ON THE GREAT PLAINS FROM 1865 TO 1925* at 84-85 (1960); B. HIBBARD, *A HISTORY OF THE PUBLIC LAND POLICIES* 209-10 (1968) [hereinafter cited as *HIBBARD*].

4. Major homesteading acts included: Homestead Act, Act of May 20, 1862, Ch. 75, 12 Stat. 392, 43 U.S.C. § 161 *et seq.* (repealed in 1976); Enlarged Homestead Act, Act of Feb. 19, 1909, Ch. 160, 35 Stat. 639, 43 U.S.C. § 218 *et seq.* (repealed 1976); Stockraising Homestead Act, Act of Dec. 29, 1916, Ch. 9, 39 Stat. 862, 43 U.S.C. § 291 *et seq.* (repealed in 1976).

5. Desert Land Act, Act of Mar. 3, 1877, Ch. 107, 19 Stat. 377, 43 U.S.C. §§ 321-339 (repealed in 1976).

6. W. WEBB, *THE GREAT PLAINS* 227-44 (1942) [hereinafter cited as *WEBB*]; *FLETCHER*, *supra* note 2, at 146-47.

7. R. ROBBINS, *OUR LANDED HERITAGE* 243-49 (1942) [hereinafter cited as *ROBBINS*].

8. *Id.* at 301-02.

9. Creative Act, Act of March 3, 1891, § 24, Ch. 561, 26 Stat. 1103, 16 U.S.C. § 471 (repealed in 1976).

10. ROBBINS, *supra* note 7, at 243-49.

goals were a composite of several factors including: (1) the physical resources involved, (2) the time-line of westward settlement, and (3) the socio-economic aspirations of the people involved. A different configuration of these factors would have produced different federal policies and programs with regard to public ownership, use, and management. To illustrate the point, I wrote a graduate paper at the University of Wisconsin in 1951 speculating on the differences that would have resulted had the United States been settled from west to east rather than east to west.¹¹ First, I postulated that the forest resources of the Pacific Coast and the Rocky Mountains would have been exploited more severely than timber lands of the Great Lakes states. Second, the arid and semi-arid character of much of the western region and the crucial role of water would have produced different public and private institutions. Third, a President Roosevelt and a Governor Pinchot from the West and a President Van Hise of the University of Oregon, rather than the University of Wisconsin, might have led the conservation movement which brought the beginnings of a permanent system of public lands in the United States. Fourth, the less generous, more restrictive endowment of certain natural resources in the western states might have engendered an earlier and more general acceptance of a conservation ethic in the use of natural resources. Fifth, the great forests of the Great Lakes states might have been reserved as national forests.

What is the point of this discussion of a scenario of non-existent history? First, it illustrates the bases for institutions that become something to revere, defend, use, exploit, or attack, as the case may be. Second, the cast of characters—designated sinners and self-anointed saints—might have been reversed as to geographical location. This latter point is interesting to contemplate in relation to present-day concerns about public lands. But the real world is what it is and for reasons recorded in history.

Public land and water policies and legislation, as they evolved, were concerned with more than forest resources. They were concerned with the grazing resources of the Great Plains and the intermountain areas.¹² There was also great concern about watershed values in recognition of the fact that public land reservations would provide the source-lands for many of the great river systems.¹³ Watersheds, flowing

11. As an example, the appropriation doctrine allocating scarce water by giving first rights to first appropriators may have been extended from its use in the West to eastern portions of the country.

R. HUFFMAN, A NOTE ON THE PUBLIC LAND PROBLEM (1951) (unpublished graduate paper available from the author).

12. ROBBINS, *supra* note 7, at 358-61, 386-87; PEPPER, *supra* note 1, at 181-213.

13. Federal lands are the source of 61% of the natural runoff within the eleven contigu-

waters, and ground waters are the parts of the hydrologic cycle influenced by man's activities and management.¹⁴ Current efforts would extend that influence to precipitation through cloud-seeding technology including efforts to increase snowpack and summer water flow.¹⁵

III. USE RIGHTS IN LAND AND WATER RESOURCES

Property rights in land and water are seldom unrestricted despite an articulated view that it should be otherwise. The philosophy that landowners should be able to use their land as they please is still dominant among many landowners in the West. Perhaps this should not be surprising when one recognizes that many of the participants in the free-land and homesteading era came from non-landownership backgrounds. Landless peoples from Europe, when they became landowners, were especially insistent on the rights that went with the ownership of land.¹⁶

The elementary illustration of property rights as a "bundle of rights" applies equally well to land and water resources and public and private ownership. If the property owner has all the sticks in the bundle of rights, he is considered to hold an estate in fee simple.¹⁷ But, in different situations, other individuals and entities may hold sticks from the bundle. Use leases, mineral reservations, right-of-ways, and zoning limitations reduce the completeness of the bundle of rights. In the case of water rights in Montana, the state retains proprietary rights to water

ous western states. Eighty-eight percent of this runoff from public lands originates within national forests and 85% within national parks. PUBLIC LAND LAW REVIEW COMMISSION, ONE THIRD OF THE NATION'S LAND 141 (1970). One of the purposes of reserving national forests was to preserve the conditions upon which water flow depended.

The national forests were created "to improve and protect the forests within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States . . ." Organic Act, Act of June 4, 1897, Ch. 2, 30 Stat. 34 (current version at 16 U.S.C. § 473 (1980)). National parks, on the other hand, were created to preserve scenery, natural and historic objects, and wildlife. National Park Service Act, Act of Aug. 25, 1916, Ch. 408, 39 Stat. 535 (current version at 16 U.S.C. § 1 (1978)).

14. R. HUFFMAN, IRRIGATION DEVELOPMENT AND PUBLIC WATER POLICY 34-37 (1953) [hereinafter cited as HUFFMAN]; SAUNDERSON *supra* note 1, at 57-60, 63-66, 112.

15. Thirty-three weather modification activities to increase precipitation were undertaken in the United States in 1979. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, SUMMARY OF WEATHER MODIFICATION ACTIVITIES REPORTED IN 1979, 4 (1980).

16. R. RENNE, LAND ECONOMICS 337 (2d rev. ed. 1958).

17. R. EELY AND G. WEHRWEIN, LAND ECONOMICS 76-78 (1940).

The words "fee simple" mean an absolute title or estate in lands wholly unqualified by any reversion, reservation, condition or limitation It is the most extensive interest which one may possess in real property [T]he words "fee simple" denote the largest estate in real property recognized by the law, and it is an estate unlimited as to duration, disposition, and descendibility. THOMPSON, REAL PROPERTY § 1856 (1979).

and the individual or corporate holder of a water right has only a use right with specified limitations.¹⁸

The bundle of rights in public lands is fragmented among a varying pattern of multiple uses. The public owner (government) may distribute sticks from the bundle of rights in the form of grazing rights, logging rights, hunting and fishing privileges, rights for mineral exploration and development, rights-of-way, and site locations for ski runs and other purposes. For many of the uses represented by these rights, the interrelationship of land and water is crucial. And the relationship of all these use rights to watershed values is an important consideration in the distribution of the bundle of rights.¹⁹

Controversy over the control and use of public lands will continue as long as there are public lands, and the controversy will be especially intense in the West. Changing social values and the growth of competing uses have caused variations in the problems related to public lands. Most notable is the growth in recreation and preservational uses and the social values which insure that these interests will have a dominant position in the bundle of rights.²⁰ The growing emphasis on public land reservations for wilderness significantly affects how the bundle of property rights is distributed. Wilderness could become the big stick in the bundle of property rights, although its position is most often expressed as a prohibition against use of the other sticks in the bundle.

The non-monetary nature of many of the social values associated with public lands complicates the decision-making process, *i.e.*, the allocation of sticks from the bundle of rights. Decision-making is further complicated because social values have different meanings to different individuals and groups.²¹ I am reminded of an evening in Washington, D.C. when the Wilderness Act of 1964 was before the Congress and emotions were running high. A conversation with an elderly lady revealed that her concept of wilderness was Rock Creek Park in the District of Columbia. There are more than humorous implications to this true story. It becomes serious in relation to public land and water resources because policies and programs are determined on a macroscale. They are often determined by individuals and groups with no direct concern for the resources in question, and, often, with no direct knowledge of the situation.²² Problems and controversies surface when the

18. MONT. CONST. art. 9, § 3. See also A. STONE, *SELECTED ASPECTS OF MONTANA WATER LAW* 15 (1978).

19. M. CLAWSON AND B. HELD, *THE FEDERAL LANDS: THEIR USE AND MANAGEMENT* 335-36 (1957). Water itself may be one of the valuable products of the federal lands.

20. *Id.* at 341.

21. HUFFMAN, *supra* note 14, at 175-89.

22. *Id.* at 190-216.

impacts reach the microscale level involving the users of public resources.

With the addition of public hearings to the process, decision-making often extends over long periods of time. Frequently, issues of control and use of public land and water resources are appealed to the courts, resulting in an even longer decision-making process. These and other changes affect the management decisions of the users of public land and water resources. This decision-making process is a far cry from the relatively simple landlord-tenant relations that agricultural users of public lands were accustomed to for many years within the framework of legislative provisions and administrative rules.²³ The present situation insures that control and use of public land and water resources will continue to be a controversial matter.

IV. INTEGRATED USE OF LAND AND WATER RESOURCES

The benefits of integrated use of land and water resources in the range livestock industry are not a matter of theoretical speculation. An integrated pattern of land and water use in the production of range livestock has evolved since the earliest days of settlement on the grasslands of the Great Plains. The history of the West is replete with stories of conflicts over water among livestock operators. Control of available water supplies meant control of vast areas of grazing land. As the homesteaders moved onto the Plains and the free grass of the public domain came to an end, it was not uncommon for ranchers to arrange for "surrogate homesteaders" to file on strategic tracts of land. This tactic often left many tracts of land without a water supply and created some less than desirable homesteads. The rancher could purchase the surrogate homesteads and still have the free grass of the public domain.²⁴ But, homesteading came so swiftly that the advantage was short-lived.

The people of the eastern United States thought in terms of small farms and viewed legislation providing for homesteads of 320 and 640 acres as the basis for a landed aristocracy. They did not understand the vagaries and limitations of a semi-arid climate.²⁵ John Wesley Powell, first director of the U.S. Geological Survey, did understand the situa-

23. Users or potential users of public land and water resources may not have liked the decisions that were made in the past but only in relatively recent times have large numbers of administrative decisions been challenged in lengthy court proceedings. Such litigation was facilitated by language in *Sierra Club v. Morton*, 405 U.S. 727, 735 (1972) that indicated environmental injury could be the basis for standing if a private association were to show that its members were injuriously affected.

24. E. OSGOOD, *THE DAY OF THE CATTLEMEN* 114-18 (1929); PEFFER, *supra* note 1, at 22-26.

25. PEFFER, *supra* note 1, at 12-14.

tion. Best known as the explorer of the Colorado River, Powell was involved in surveys of the western lands. In his *Report on the Lands of the Arid Region of the United States* in 1879, he recommended homestead units of 2,560 acres and modification of the rectangular system of survey so that each homestead had access to water resources for livestock and irrigation.²⁶ Eastern legislators were sure that homesteads of 2,560 acres would create a landed aristocracy and the recommendation received scant attention. Powell was the first to recognize the fundamental relationship between land and water in the West. His report on the arid lands gathered dust until the great drought of the 1930s when it suddenly became popular reading among individuals seeking an answer to the land and water use problems of that time. The result was the Great Plains Water Conservation and Utilization Act of 1939.²⁷ This program attempted to combine remnants of the public domain and sub-marginal crop lands into grazing districts which would be integrated with newly irrigated lands along the streams. Base units on the irrigated lands plus grazing rights in the districts would copy the pattern of operating units most successful in surviving the impacts of the drought. This was one government land program that was based on the experience of private operators and designed to expand the successful pattern of integrated land and water use. World War II and the rains came before much of this government program was realized, but it pointed the way for many land and water users, both public and private, as the Great Plains region rebuilt and recovered from the drought.²⁸

Two great climate-spawned disasters in the Great Plains had much to do with the present organization and management of livestock ranches in the region. The vicious winter of 1886-87 showed that domestic cattle, unlike the buffalo, could not survive if left to shift for themselves. Great cattle ranchers were wiped out. The story was told in an understandable fashion by Montana artist Charles M. Russell in his famous painting "Waiting for a Chinook" or "The Last of the Five Thousand".²⁹ The operators who continued livestock production on a

26. J. POWELL, REPORT ON THE LANDS OF THE ARID REGIONS OF THE UNITED STATES 11-57 (1879); W. SMYTHE, THE CONQUEST OF ARID AMERICA 357 (rev. ed. 1905); HIBBARD, *supra* note 3, at 496-501; HUFFMAN, *supra* note 14, at 122-24; PEFFER, *supra* note 1, at 24-25; WEBB, *supra* note 6, at 419-22.

27. Act of Aug. 11, 1939, Ch. 717, 53 Stat. 1418 (current version at 16 U.S.C. §§ 590y-590z-10). See also HUFFMAN, *supra* note 14, at 139-41.

Other legislation stimulated by drought conditions included The Taylor Grazing Act, Act of June 28, 1934, Ch. 865, 48 Stat. 1296 (current version at 43 U.S.C. § 315 *et seq.* (1980)) which had as its purpose the creation of grazing districts to "promote the highest use of public lands . . ."

28. *Id.* at 141-48.

29. FLETCHER, *supra* note 2, at 87-93.

permanent basis began to harvest native grass, produce forage for winter feeding, and use fenced pastures as a means of reserving more sheltered areas for winter grazing.³⁰

The second climatic disaster was the Great Drought of the 1930s. This blow from Nature provided little or no grass for the grazing season and a shortage of livestock feed for the winter season over a period of several years. As noted earlier, this situation resulted in a renewed recognition of the use relationship between land and water resources.³¹

The integrated use of grazing land and irrigated lands is not limited to their control and use within the same ranch unit. While that is the most stable and manageable arrangement, other forms of integration may be possible where circumstances do not permit the development of self-contained ranch units. The availability of livestock feeds from separate farms in irrigated areas can provide an important integration with livestock ranches having inadequate feed-base resources. But integrated land and water use is a two-way street. Grazing lands can provide a supply of feeder cattle for irrigated farms having a cattle feeding enterprise, and irrigated lands may provide emergency grazing when grass is short on range land.³²

Supplies of stockwater are obviously a requirement for use of grazing lands. Streams, wells and reservoirs are an important factor in the use and management of lands in the range livestock industry. In the Great Drought of the 1930s, a lack of water, as well as feed and grass, were involved in the liquidation of cattle herds. Rehabilitation of the range lands of the Great Plains included subsidizing wells and reservoirs that became a part of integrated resource use.³³ Properly distributed throughout the range lands, wells and reservoirs make possible the management of cattle on the range to achieve maximum beef production and, at the same time, maintain a conservation approach to land utilization.

30. C. KRAENZEL, *THE GREAT PLAINS IN TRANSITION* 125-30 (1955) [hereinafter cited as KRAENZEL].

31. HUFFMAN, *supra* note 14, at 128-30.

32. HUFFMAN AND PASCHAL, *Integrating the Use of Irrigated And Grazing Land in the Northern Great Plains*, *LAND AND PUBLIC UTILITY ECON.* 17 (1942); SAUNDERSON, *supra* note 1, at 68.

33. HUFFMAN, *supra* note 14, at 137-39.

One act encouraging such utilization, the Water Facilities Act, had as to its purpose: to formulate and keep current a program of projects for the construction and maintenance in the said areas of ponds, reservoirs, wells, check-dams, pumping installation, and other facilities for water storage or utilization, together with appurtenances to such facilities. The facilities to be included within such programs shall be located where they will promote the proper utilization of lands, and no such facilities shall be located where they will encourage the cultivation of lands which are submarginal and which should be devoted to other uses in the public interest.

Act of Aug. 28, 1937 Ch. 870, 50 Stat. 869 (current version at 7 U.S.C. § 1921 (1979)).

The overall benefits of integrated use of land and water resources are to be found, then, in the stabilizing of operating units and communities. Winter feed supplies, feed reserves for drought years, water development, and managed grazing can mitigate the impacts of droughts and other climatic extremes. The range livestock operators of the Great Plains have developed a system of production that can survive in the long run. A major factor in maintaining the system is the use of public land and water resources in combination with the private holdings of many operators.³⁴

V. COMPETITION FOR WATER AS A SCARCE RESOURCE

Water is the crucial factor in the economic and social balance of a semi-arid region, a fact that is not well understood outside the region.³⁵ Government development of irrigation projects in the West was generally opposed by individuals, groups, and legislators east of the hundredth meridian. The most common argument was that irrigated agriculture provided subsidized competition with the production of food and fibre in established farming areas. This was a strong argument when agricultural products were in surplus. Ignored was the fact that much of the production from irrigated lands in the West was not in surplus and involved different crops than those that dominated east of the hundredth meridian.³⁶

There was little discussion or consideration of the importance of the integrated use of land and water in providing stability to much of the farming and ranching of the West as well as to the socio-economic structure of the region. The argument regarding public development of irrigation projects is probably a thing of the past. There may be potential irrigation projects which, because of size, would be possible only through the public effort of state or federal government. But they may never become a reality because of the high costs of construction and development, because of the competition for other water uses, and/or for ecological-environmental reasons.

This is not to say that new irrigation developments will not be initiated. The last decade has seen great improvement in the technology of irrigation, *i.e.*, power units, pumps, distribution pipes and sprinklers.

34. WARD AND KELSO, *Irrigation Farmers Reach Out into the Dry Land*, MONT. AGRIC. EXPER. STA. BULL. 565 (1949).

The use of public lands may be an integral part of ranching operations close to public lands. In fact, private holdings may have little value without access to public range lands. P. FOSS, *POLITICS AND GRASS* 197-204 (1960) [hereinafter cited as FOSS]. Twelve percent of total forage consumption in the West is on public lands. ONE THIRD OF THE NATION'S LAND, *supra* note 13, at 105.

35. KRAENZEL, *supra* note 30, at 260-63.

36. HUFFMAN, *supra* note 14, at 288-90.

This technology makes possible the development of irrigated lands where, previously, projects were physically impossible or economically infeasible. Ranchers are privately developing new irrigated lands using this new technology.³⁷ In the process, they are demonstrating again that water is often the critical factor determining the optimum use of semi-arid lands.

Agriculture faces growing competition from major energy projects for land and water use. Also, there is competition from non-market values ranging from specific recreational uses to purely aesthetic values. Public and private lands and water resources are subject to this increased competition.³⁸ This competitive situation is accompanied by significant changes in social values. The effect on decision-making regarding the use of public land and water resources is of great importance to agricultural users. The use of these publicly-owned resources has been built into the organizational structure of private operating units and the values of these use permits have been capitalized into many ranch units in the range livestock areas of the Great Plains region.³⁹

Competition for the use of public lands may result in restricted use or in non-use for particular purposes. More intensive management of public lands may result in reduced grazing allotments to insure long-term carrying capacity. Or decision-makers may decide that non-market values are the crucial values in achieving the maximum in benefits for the region,⁴⁰ again possibly resulting in a reduction in livestock grazing. Grazing use may be terminated for a period of time while land is being stripmined and reclaimed. Whatever the changes in the bundle of rights, there will be definite effects on the livestock production units that include public lands.

Security of tenure in the use of public land resources is an important factor in the continuing conflict between public land agencies as landlords and ranchers as tenants.⁴¹ Greater security of tenure and more freedom in management must be on the minds of individual ranchers as they participate in the Sagebrush Rebellion. In theory at least, the transfer of public lands from federal to state ownership would mean a landlord closer to home and with a better understanding of user

37. Privately developed irrigation projects account for about 83% of the acres irrigated in the United States. Federal water projects irrigated approximately 10.2 million acres in 1979 and private projects approximately 50 million acres. WATER AND POWER RESOURCES SERVICE, UNITED STATES DEPARTMENT OF THE INTERIOR, ANNUAL ACREAGE AND CUMULATIVE CROP VALUE (1980); 1980 IRRIGATION SURVEY, IRRIGATION JOURNAL 72H (1980).

38. HUFFMAN, *Cattle, Coal and Water Rights*, 5 WESTERN WILDLANDS 3 (1979).

39. FOSS, *supra* note 34, at 64-72; CLAWSON, *supra* note 1, at 114-17.

40. CLAWSON, *supra* note 1, at 385-86.

41. HUFFMAN, *Public Land Policies Related to Ranching, Economic Problems in Ranching*. GREAT PLAINS COUNCIL PUB. 22, MONT. AGRIC. EXPER. STA. 95 (1964).

problems. Also, it is assumed that much of the public lands would be moved into private ownership. It is more likely, however, that some of the lands would be retained in state ownership because of obvious public values or because private ownership would not be economically sound. Much of the land still in public ownership was passed over by private landseekers during the selection process.⁴² The need for security of tenure for agricultural users of public lands would be as essential with a state landlord as with a federal landlord.

Individuals and groups concerned with recreational uses of public lands have a different view of the Sagebrush Rebellion. Such expressions as "a public lands heist," "they're fixing to steal your land," and "a land grab in disguise" appear in the titles of articles in three speciality magazines.⁴³ They suggest that state ownership of public lands will make them available to fewer rather than more users.

Competition from energy developers for the use of public lands is in large measure competition for the water resources that are integral to both public and private lands.⁴⁴ It appears now that the amount of surface area to be disturbed by stripmining may be relatively small compared to acreages suggested in early projections.⁴⁵ Both public and private water resources will be affected, however, because they are part and parcel of the same hydrologic cycle, the same watersheds, and the same groundwater resources.

Much of the opposition to stripmining of coal in the Northern Plains has been because of concerns for flora and fauna in the disturbed areas. All the questions are not answered yet, but there is growing evidence that acceptable land reclamation is possible with regard to surface cover for livestock grazing, wildlife habitat, and watershed protection. It is impossible to justify restoration of lands for grazing at a cost of several thousand dollars per acre. But land reclamation satisfies ecological-environmental concerns and benefits a constituency beyond the on-site agricultural users. Reclamation costs are a part of the costs of producing energy and can be calculated as cents-per-ton of coal mined.⁴⁶

42. PEFFER, *supra* note 1, at 169-80.

43. CALLISON, *Sagebrush Rebellion is Just another Name for a Public Lands Heist*, NATIONAL PARKS AND CONSERVATION MAGAZINE (March, 1980); TRUBLOOD, *They're Fixin' to Steal Your Land*, FIELD AND STREAM (March, 1980); TARNES, *The Sagebrush Rebellion: A Land Grab in Disguise*, OUTDOOR LIFE (March, 1980).

44. CATTLE, COAL AND WATER RIGHTS, *supra* note 38, at 4.

45. As an example, in Montana, industry figures obtained by the State of Montana indicate that in the three-year period of 1979-80, approximately 3,800 acres were consumed by mining and associated disturbances such as powerline corridors, haulroads, and stockpile locations. (Letter on March 3, 1981 from the Department of State Lands, on file with the Public Land Law Review, University of Montana School of Law, Missoula, Montana).

46. For example, if a coal seam of 30 feet in thickness produced 80,000 tons of coal per

The movement of surface water into and over the watershed in the coal mining-land reclamation sequence is easy to understand. The effects of coal mining and land reclamation on groundwater resources are not so obvious. Removal of the coal and its replacement with overburden materials may well have local effects on the movement of groundwater. Springs, wells and the flow of streams may be affected.⁴⁷ The areas to be stripmined for coal, however, will disturb such a small part of the major groundwater aquifer, *i.e.*, the Madison Group, that effects on the larger groundwater resources are likely to be minimal.

The effects of taking water from the surface water system for use in energy generating plants and other coal utilization facilities in the Northern Plains are relatively easy to observe. The removal of large quantities of water from the region to supply the requirements of coal-slurry pipelines, however, would have major impacts on both surface and groundwater resources. What large withdrawals of water from the Northern Plains region may mean to the recharge of groundwater resources is an unanswered question. Experience in other regions is not encouraging in that regard.

Economic analysis may show that the cost of transporting coal can be reduced by the use of pipelines. Alternative transportation is available by railroads, however, and whether the choice should be made on the basis of relative cost is questionable. At issue is the logic of moving water from a semi-arid region to regions where the water supply is adequate and where too much water is often a problem.⁴⁸

VI. CONCLUSION

The ethics of removing part of the natural resource base from a region where the land-water balance is already a precarious one, needs more than cursory consideration. Following the Great Drought of the 1930s, the agricultural users of land and water resources developed the ethic of stewardship and it is still growing in acceptance. Industrial and other non-agricultural users of land and water should become a part of that ethic. Government, both federal and state, should play a leading role in stewardship, including the recognition that land and water resources are integrated not only in how man uses them but in the natural order of things.⁴⁹

surface acre and land reclamation costs were \$10,000 per acre, the costs of reclamation would be 12-1/2 cents per ton of coal mined. Other figures can be substituted to calculate costs for a specific site situation.

47. HUFFMAN, CATTLE, COAL AND WATER RIGHTS, *supra* note 38, at 4-5.

48. *Id.* at 5.

49. HUFFMAN, *Water Resources Development; a Problem of Man and His Environment, Water and Western Destiny*; WEST. INTERST. WATER CONF. PROC. 6 (1969).