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### Private protection of natural environments

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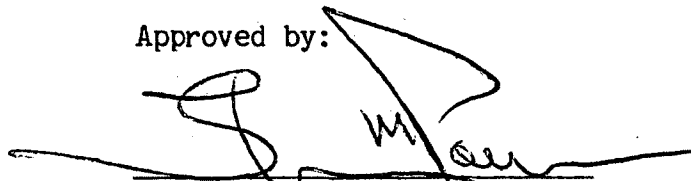
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THE PRIVATE PROTECTION OF  
NATURAL ENVIRONMENTS

By  
Dean Lueck  
B.A. Gonzaga University, 1980.

Presented in partial fulfillment of the  
requirements for the degree of  
Master of Science  
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## CHAPTER 1

### PROTECTING NATURAL ENVIRONMENTS: EXAMINING THE CONVENTIONAL WISDOM

In 1872, Congress established Yellowstone National Park as a "public or pleasuring ground for the benefit and enjoyment of the people."<sup>1</sup> This legislation signaled the beginning of a new era in federal land policy. Federal land policy prior to 1872 is best described as one of acquisition followed by disposal (see Tables 1-1 and 1-2).<sup>2</sup> By 1934, well over one billion acres of the public domain had been disposed of, including grants to states and railroads, script, purchase, preemption, and homesteading (see Tables 1-1, 1-2, and 1-3).

Even though Congress reserved Yellowstone in 1872, it was not until 1891 that reservation of land by the federal government became a major component of federal land policy. Specifically, the Forest Reserve Act, part of the General Revision Act of 1891, altered federal land policy by giving the president authority to withdraw forest land from the public domain in order to reserve an adequate supply of timber for future generations.<sup>3</sup> The lands withdrawn under the Forest Reserve Act form the vast majority of the National Forest System. National Parks, Wildlife Refuges, and National Monuments have also been created out of the public domain.<sup>4</sup> Eventually, the public domain was closed to private acquisition with the passage of the Taylor Grazing Act of 1934. The grazing districts established by this act eventually became part of the Bureau of Land Management. While it is true that some small parcels of federal land have been disposed of during the last fifty years, the dominant policy has been one of

Table 1-1

## Aquisition of Federal Lands, 1781-1867, in acres

Acquisition	Land	Water	Total
State cessions (1781-1802)	233,415,680	3,409,920	236,825,600
Louisiana Purchase (1803)	523,446,400	6,465,280	529,911,680
Red River Basin (1818)	29,066,880	535,040	29,601,920
Cession from Spain (1819)	43,342,720	2,801,920	46,144,640
Oregon Compromise (1846)	180,644,480	2,741,760	183,386,240
Mexican Cession (1848)	334,479,360	4,201,600	338,680,960
Purchase from Texas (1850)	78,842,880	83,840	78,926,720
Gadsen Purchase (1853)	18,961,920	26,880	18,988,800
Alaska Purchase (1867)	362,516,480	12,787,200	375,303,680
TOTAL	1,804,716,800	33,053,440	1,837,770,240

Source: U.S. Department of Interior, Public Land Statistics  
(Washington, D.C.:U.S. Government Printing Office, 1980), p. 3.

Table 1-2

## Important Federal Land Disposal Laws

Year	Price Per Acre	Size In Acres	Conditions
1785 (Ordinance of 1785)	\$1 minimum	640 minimum	Cash sale; amended in 1785 to provide for payment of one-third in cash, the remainder in three months.
1800	\$2 minimum	320 minimum	One-fourth of purchase price paid within 30 days, then annual installments of one-fourth for three years at 6 percent interest.
1820	\$1.25 minimum	80 minimum	End of credit system; cash payment only.
1830	\$1.25 minimum	160 maximum	Squatters on public domain allowed to purchase their tracts at the minimum price (preemption); temporary act, had to be renewed biennially.
1841 (Preemption Act)	\$1.25 minimum	40 minimum; 160 limit on preemption	Cash purchase only; established right of preemption, doing away with necessity of renewing legislation.
1862 (Homestead Act)	Zero	160 maximum	Payment of an entry fee and five years continuous residence; land could be preempted after six months residence for \$1.25 per acre cash.
1873 (Timber Culture Act)	Zero	160 maximum	Cultivation of trees on one-quarter of a 160-acre required.

Table 1-2

Continued

Year	Price Per Acre	Size in Acres	Conditions
1873 (Desert Land Act)	\$1.25	640; reduced	Required irrigation within three years.
1909 Homesteading Act)	Zero	320	Five year's residence with continuous cultivations.
1916	Zero	640	Designed for land useful only for grazing.
1934 (Taylor Grazing Act)	---	---	Established grazing districts on the remaining federal lands and closed the lands to private settlement.
1976 (Federal Land Policy and Management Act)			Reasserted the federal government's intent to retain ownership of federal lands.

Source: Lance E. Davis et al., American Economic Growth: An Economist's History of the United States (New York: Harper and Row, 1972), pp. 104-105.

Table 1-3

Land Owned by the United States as of Fiscal Year 1979, in acres

Agency and Bureau	Public Domain	Acquisition	Total
Dept. of Agriculture: Forest Service	166,002,139.6	27,534,259.6	187,536,399.2
Dept. of Energy: Energy R & D Administration	627,182.0	701,758.3	1,328,940.3
Dept. of Interior: Bureau of Land Management	395,155,545.5	2,367,290.0	397,522,835.5
Fish & Wildlife Service	38,686,169.8	4,468,836.0	43,155,005.8
National Park Service	61,547,222.6	6,729,944.6	68,277,167.2
Bureau of Reclamation	4,684,991.6	1,930,826.0	6,615,817.6
Tennessee Valley Authority	---	988,872.0	988,872.0
Dept. of Defense: Air Force	6,923,551.0	1,378,443.0	8,301,994.0
Army	6,616,134.0	4,054,084.0	10,670,218.0
Navy	1,976,127.9	1,249,255.4	3,225,383.3
Corps of Engineers	658,984.4	7,575,504.6	8,234,489.0
All Other Agencies	980,200.6	1,085,973.5	2,066,171.1
TOTAL	677,858,245.0	60,065,047.0	738,290,906.5

Source: U.S. Department of Interior, Public Land Statistics, pp. 10-12.

scientific management of federal land by federal bureaucracies. The government has also acquired a considerable amount of land for addition to the system of forests, grasslands, monuments, parks, and refuges.

Today the federal government owns over 700 million acres of land (approximately one-third of the total United States land area), and numerous federal agencies are involved in the management of natural resources (see Table 1-3). This shift in federal land policy (since the American Revolution) can be described as a shift from a policy of establishing private property rights to a policy of maintaining or establishing public rights to land. Though the reasons for this shift are varied and complex, one component is the view that the government (or state) is required for the protection of natural environments, such as parks and refuges. Today this view is the dominant (or conventional) view held by bureaucrats, environmentalists, and most American citizens. In fact, one noted environmental historian, Roderick Nash, has articulated the essence of this view by asserting the "fact that without formal (i.e. government) preservation the remaining American wilderness would vanish."<sup>5</sup>

Despite these attitudes (and resulting government policies), there is considerable evidence that questions the wisdom of this conventional view. In particular, there is evidence that the private sector does protect natural environments and that public management often degrades natural environments. The evidence below is presented to provide examples contrary to the traditional view of the role of the state in protecting natural environments.

### Privately Protected Natural Environments

The place to begin an examination of private sector protection of natural environments is perhaps Great Britain, where the modern private property-market economy originated. In English law there is precedent for private ownership of wildlife in reference to such "royal species" as the swan and the whale owned by the English king.<sup>6</sup> (The current extent of privately owned wildlife in England is not a subject of study examined in this paper.) Private rights to water also has precedent in English law. In Pollution, Property and Prices, Dales described the British system of property rights to water with respect to pollution control and stream quality. He found that property rights to fresh water fisheries were well-defined and enforced through the Common Law.<sup>7</sup> For decades, centuries in some cases, water use allocation has been through private (market) transactions. In the United States, however, private ownership of wildlife or instream water is still not considered a legal possibility.

While my research suggests that much of the natural environment protection in the private sector is relatively recent (within the last 25 years), there were private sector responses as early as the late 1800s. Tober reported that farmers in Pennsylvania began leasing their land to sportsmen's association for hunting as early as 1877.<sup>8</sup> Tober also described the establishment of private game preserves that began in Pennsylvania in 1871 and were designed after their European counterparts.<sup>9</sup> Initial membership fees for the first game preserve-shooting club were \$450 (approximately \$4,000 in 1983 dollars); today, memberships to similar waterfowl clubs in California's Sacramento Valley are as high as \$65,000.<sup>10</sup> Tober found that by 1894 "thirty-two



clubs controlled 824,112 acres" in the Adirondack Mountains of New York state.<sup>11</sup> Similar private preserves were being established elsewhere. In Tober's words, "Principal coastal preserves were found at the south shore of Long Island, the upper Chesapeake Bay, tidewater Virginia, the Currituck Sound, and the Suisan marshes of California; inland preserves were maintained along the Illinois, lower Mississippi, Sacramento, and San Juaquin rivers and at Michigan's St. Clair Flats."<sup>12</sup>

There are also cases of private sector wilderness preservation prior to the modern environmental movement. John D. Rockefeller purchased 30,000 acres in the Jackson Hole Valley of Wyoming and deeded them to the federal government, providing land for the bulk of Grand Teton National Park.<sup>13</sup> Rockefeller's family also provided core lands for the Great Smokie's National Park and Acadia National Park (see Appendix A). Percival P. Baxter, one-time governor of Maine, donated a 200,000-acre preserve containing Mt. Katahdin (Maine's tallest peak) to the state as a wilderness park now known as Baxter State Park.<sup>14</sup>

In addition to these early private sector efforts there has been a considerable amount of privately protected natural environments in recent times (see Appendices B and C). Private nonprofit conservation organizations have protected over 6 million acres through outright land ownership as well as through lease and easement contracts (see Appendix B). Profit-seeking institutions are protecting natural environments by providing such goods and services as stream reclamation, hunting and fishing access, wildlife habitat, outdoor recreation, and

recreation management (see Appendix C). In addition, many firms use easements or covenants to maintain or enhance environmental quality on or adjacent to their development projects. Below are two examples of privately protected natural environments. The first example is the Cross Ranch (North Dakota) and the second is the International Paper Company. The Cross Ranch example will illustrate how a nonprofit organization protects natural environments. The International Paper Company example will show how a profit-seeking firm is able to benefit from protecting such natural environments as wildlife habitat, recreational lands, and scenic-amenity areas.

#### Example: The Cross Ranch

The 10,000-acre Cross Ranch in North Dakota fronts the Missouri River along its west bank roughly 30 miles northwest of Bismarck. From a natural flood plain flanking the river, the land rises through terraces and eroded breaks into rolling upland prairies that are virtually treeless. The trees are to be found along the river and in woody draws among the breaks.<sup>15</sup>

This central North Dakota ranch was established during the 1880s by A.D. Gaines, a former professor of classical languages at the University of Minnesota and a land agent for the Northern Pacific Railroad.<sup>16</sup> In 1926, Gaines' son, Bert, took over the ranch. It was Bert Gaines who acquired Theodore Roosevelt's Maltese Cross brand and named the ranch Cross Ranch. Thirty years after Bert Gaines took over the ranch, he sold it to Robert Levis, an Alton, Illinois, businessman-farmer. In January 1982, The Nature Conservancy purchased the Cross Ranch for \$2.7 million for the purpose of preserving the ranch's unique heritage. The Nature Conservancy is a private nonprofit conser-

vation organization established to preserve natural areas. Since its inception in 1950, The Nature Conservancy has preserved over 2.8 million acres through purchase, easement, and assistance to government agencies.<sup>17</sup> The Cross Ranch is but one small example of the Conservancy's preservation efforts.

The last individual owner, Robert Levis, sought to preserve the ecological, archaeological, and historical values of the Cross Ranch and had offered the ranch for sale (below market price) to the state of North Dakota as a state park. In 1979, the state legislature approved funds to purchase the ranch from Mr. Levis. However, in September 1980, North Dakota voters defeated this legislation in a statewide referendum. After this vote, The Nature Conservancy became involved in an effort to purchase the ranch from Levis who still desired to preserve the ranch. Upon purchase of the ranch, Levis agreed to provide The Nature Conservancy with \$1 million for long-term management funds. In fourteen months, \$1.5 million was raised from corporations, foundations, and individuals.

The fact that The Nature Conservancy was unable to raise all of the \$2.7 million forced them to reconsider their original intentions of preserving 7,000 acres of the 10,000-acre ranch. Current plans to are to sell 4,600 acres and only preserve the remaining 5,400 acres as a natural area. During the summer of 1982, 1,300 acres of cultivated land were leased for farming, pending a more favorable market for land sale. In order to insure land use that was compatible with natural area management, The Nature Conservancy restricted the uses of the ranch land it sold to those compatible with the rest of the preserve

(see Appendix D). For example, The Nature Conservancy reserved all mineral rights to the land for sale and restricted land use to agricultural and grazing only. In addition, they reserved the right to approve any residential or commercial construction on the land as well as access and excavation rights for any archaeological research that would not "unreasonably interfere with the buyer's agricultural use of the property."

Currently, the Cross Ranch is being managed to preserve Missouri River bottomland, Indian archaeological sites, the frontier town of Hensler, North Dakota, and the prairie wildlife. The ranch is open to the public at no charge, and a live-on manager oversees the operation of the preserve. Hiking and fishing are allowed; archeological studies continue; grazing is used as a management tool and a revenue source; and fire and hunting are planned as potential management tools to enhance the environment. As such, the ranch is an example of how private nonprofit conservation organizations protect natural environments.

#### Example: International Paper Company<sup>18</sup>

The International Paper Company (IP) is a major industrial forest corporation and the largest private landowner in the United States. IP owns approximately 7 million acres of forestland: 5 million in the Southeast, 1 1/2 million in the Northeast, and 1/2 million in the Pacific Northwest. IP has annual sales of approximately \$5 billion and is considered a very successful enterprise. In addition, IP has

developed an extensive and profitable wildlife and recreation management program.

Since the 1950s, IP has earned revenue through the sale of hunting leases. Much of their land is leased to hunting clubs; in recent years, the total has been 1.65 million acres at an average price of \$.83 per acre annually.<sup>19</sup> The bulk of the research and planning work for IP's wildlife programs is conducted at the company's 16,000-acre Southlands Experiment Forest located near Bainbridge, Georgia. The forest was established in 1957 to investigate the potential of profitable wildlife management. Today, IP employs five specialists with M.S. degrees in wildlife biology who oversee wildlife and recreation on all of IP's land except those holdings in the Pacific Northwest. Research at Southland is primarily concerned with the development of forest management practices that enhance wildlife populations as well as profitability.

Because game animals are typically more valuable than nongame species, most of the research and management is directed at such species as turkey, pheasant, quail, waterfowl, and whitetailed deer. However, IP research foresters have conducted valuable research on such nongame fauna as bluebirds and gopher tortoises. One current and major study involves radio-tracking wild turkeys in Alabama. IP's wildlife research has become increasingly accepted in the scientific community and has produced benefits beyond those that can be captured by the company. In fact, IP currently commits more acreage to managed wildlife production than any single state game agency in the United States.

Leasing land to hunting clubs is but one of several wildlife management schemes IP uses. Some land is leased to state agencies for wildlife management; some is open for day hunting permits by species (individual permits on non-club land has averaged \$.62 per acre annually); and some of the land with little hunting demand is simply open to public hunting at no charge. IP also allows fishing on much of its land and leases fishing rights in areas where it has control of an entire lake; to date, however, revenue from fishing leases has been insignificant. In conjunction with its wildlife program, IP also is involved with such outdoor recreation projects as nature trails and canoe areas; currently, IP charges nothing for the use of these facilities and views them primarily as good public relations policy.

Another aspect of IP's management policy that is important for this paper is its cooperation with nonprofit conservation organizations to preserve natural areas. IP has worked with The Nature Conservancy and numerous local conservation organizations to preserve areas of unique ecological and geological value. IP has aided these groups by both selling and donating land. Because such actions are considered charitable gifts, there are often significant tax advantages in moving land into a protective use type. International Paper Company, by utilizing a variety of management tools and contractual arrangements, is an example of how profit-seeking firms can prosper from the protection of natural areas.

#### Public Failures In Protecting Natural Environments

While the evidence that shows the private sector to be successfully protecting natural environments has been growing, so has the evidence that

shows that the public sector has degraded natural environments. As previously mentioned, reservation and bureaucratic management of the public domain originated largely as a response to the nature of free enterprise, which was often perceived as rapacious and short-sighted, especially with regard to forest resources. Bernard Fernow, for example, a professional forester in the Division of Forestry (the precursor of the Forest Service) and author of Economics of Forestry, wrote:

We will see, that the forest resource is one which, under the active competition of private enterprise, is apt to deteriorate, and its deterioration to affect other conditions of material existence unfavorably; that the maintenance of continued supplies as well as of favorable conditions is possible only under the supervision of permanent institutions with whom present profit is not the motive. It calls pre-eminently for the exercise of the providential functions of the state to counter-act the destructive tendencies of private exploitation.<sup>20</sup>

Fernow was associated with what has been termed the "progressive conservation movement," along with such men as Theodore Roosevelt and Gifford Pinchot.<sup>21</sup> Conservationists in the progressive tradition criticized the private management of natural resources and were instrumental in establish policies that reserved land for public management.<sup>22</sup> Scholars of American history have typically subscribed to the view that the progressive conservation movement was the beginning of a long overdue change in federal natural resource policy.<sup>23</sup> Roy M. Robbins, a noted public land historian, summarized the conventional historical view:

No nation in the world had so wasted its natural resources or opened up its natural treasure to unbridled exploitation as had the United States of America. But a halt had been called. The grizzled, hardheaded pioneer of the American West and the ever-grasping corporation stood face to face with the challenge of a new American order which demanded an end to the reckless and wasteful methods of the era of laissez-faire. The task which remained was not only to recover lost ground, and to preserve the fragments that were left, but also to educate the public on the intelligent use of the remaining resources. This was a herculean task. Already the best of forest lands had been acquired, by fair means and foul, and the nation's rights in these resources reduced to a minute percent. In fact, many authorities thought that it was already too late. But governmental authorities insisted that there was still much good land left, and that immediate steps should be taken for its protection.<sup>24</sup>

Recent developments in the economics literature, however, suggest that many of the assertions made by progressive conservationists and their contemporaries are, in fact, not well-founded. For example, Libecap and Johnson found, contrary to the views of conservationists, that "costly Federal land policy encouraged fraud and theft" in American forests.<sup>25</sup> They noted that conservationists based many of their arguments for establishing a forest reserve system on timber fraud and theft, especially in the Pacific Northwest. Because government policy ignored the economies of scale involved in logging operations by legally restricting private land claims to 160 acres, timber men allocated a substantial amount of valuable resources to skirting the law ("fraud") in order to establish property rights to tracts of timber that were large enough to be economically viable. Libecap and Johnson document the activities of so-called "entry men" who were agents employed by timber companies to legally establish rights to land and then turn them over to their employer for a fee. Since the costs of "fraud" were real and significant, "the value of the land had



to be more than double the figure had there been no restrictions."<sup>26</sup> These costs, in essence, postponed the establishment of property rights and prolonged the period of common property, and this "delay contributed to the very timber theft that was used by conservationists to justify the creation of National Forests."<sup>27</sup> Libecap and Johnson further pointed out that "ironically, fraudulent activity which hastened the transfer of land from the public domain to the private sector reduced the frequency of timber theft." In addition, Libecap and Johnson found that "timber companies were not rapidly cutting their holdings" and that Gifford Pinchot (the first U.S. Forest Service chief) actually criticized timber owners for not producing.

In a later article, Johnson and Libecap examined market efficiency with respect to the harvest of timber in the Great Lakes region (Michigan, Minnesota, and Wisconsin) during the last half of the 19th century.<sup>28</sup> In examining the allegation made by early conservationists that markets were unable to account for increasing resource scarcity and that profit-seeking timbermen would ultimately exhaust their resource, Johnson and Libecap found that "the [timber] market not only operated in a manner consistent with the efficient market hypothesis, but that future demand and supply conditions for lumber were estimated accurately." Their examination of lumber and stumpage prices indicates that the market adjusted smoothly to changing resource values and inventories and that no major price shocks existed that would indicate a sudden realization that timber was a finite resource. Timbermen, in fact, harvested with prices (a measure of relative scarcity) in mind.

Johnson and Libecap further found that timber theft in the Great Lakes region was negligible and that property rights were established prior to major harvest operations. They also found that speculators held virgin old-growth timber off the market for as long as 20 years in expectation of stumpage price increases. They also refuted the allegation that rapid timber harvest led to mass flooding in the Great Lakes region; evidence supporting this claim was not found. While conservationists were alarmed that early timber harvest was exceeding the timber growth rate, Johnson and Libecap pointed out that "wealth maximization does not, in general, imply that growth should equal cut except at some steady state solution." In fact, downward inventory adjustment is quite rational with large stocks such as those faced by timbermen during the 19th century. In short, the Johnson and Libecap study indicated that when property rights are secure, markets "develop early and effectively to allocate resources over space and time."

In another study, Berck analyzed the assertion that private timber owners have overharvested their forests with regard to the socially optimal level.<sup>29</sup> In his examination of timber harvest rates in the Douglas fir industry, Berck found "that private entrepreneurs holding rational expectations with respect to future prices have historically been discounting the future at a real rate of 5 percent-- a much lower rate than that available for other private investments-- and, therefore, that these owners have not cut their forests prematurely." Berck's findings contradict the allegations of timber famine that have been common since the days of Gifford Pinchot. It is also worth noting that the timber market (which has been largely free of

price controls) where prices have risen much faster than the corresponding prices of crude oil has not brought the nation to its knees with a "timber crisis" (see Table 1-4).

With regard to range management, Libecap's Locking Up the Range, an analysis of federal range land controls, pointed to the insecure nature of property rights to the range as the cause of many range management problems, such as overstocking and underinvestment.<sup>30</sup> Libecap also noted that restrictive federal range policy increased the costs of establishing property rights and hence prolonging the overgrazing problem associated with the common property ownership. While overgrazing problems on the range can be largely attributed to common ownership during the end of the 19th century and beginning of the 20th century, the problem of underinvestment in fencing, water storage, and so forth can be largely attributed to the tenuous nature of property rights subjected to the fluctuating politics of bureaucratic management. Libecap's study suggested that market allocation has not been the cause of range conservation problems, but rather the insecurity of property rights to the range has often prevented markets from moving resources to their highest valued uses.

Since John Wesley Powell's exploration of the American Southwest in 1869, there has been concern over the development and conservation of water resources in the arid Western states. Powell strongly urged the government to actively involve itself in the "reclamation" of the West.<sup>31</sup> Along with other progressives, Powell felt that the private sector could not muster the capital required for necessary water development and that water monopolies would dominate the region; only

Table 1-4

## Comparison of Timber and Petroleum Prices, 1945-1980

Year	(Stumpage In \$/1000 Board Ft.) Douglas Fir	(Avg. Value at Well Per Barrel) Crude Petroleum
1945	\$ 5.00	\$ 1.22
1946	6.60	1.41
1947	9.90	1.93
1948	19.90	2.60
1949	11.10	2.54
1950	16.40	2.51
1951	25.40	2.53
1952	25.80	2.53
1953	20.20	2.68
1954	16.20	2.77
1955	28.90	2.77
1956	37.70	2.79
1957	26.20	3.09
1958	21.80	3.01
1959	36.80	2.90
1960	32.00	2.88
1961	27.60	2.89
1962	24.80	2.90
1963	27.90	2.89
1964	38.10	2.88
1965	42.60	2.86
1966	50.00	2.88
1967	41.70	2.92
1968	61.20	2.94
1969	82.20	3.09
1970	41.90	3.18
1971	49.00	3.39
1972	71.70	3.39
1973	138.10	3.89
1974	202.40	6.74
1975	169.50	7.67
1976	176.20	8.14
1977	225.90	8.57
1978	250.30	8.96
1979	394.40	12.64
1980	432.20	21.19

Source: U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, bicentennial ed., part 1 (Washington, D.C.: Government Printing Office, 1975), pp. 547, 593; idem, Statistical Abstract of the U.S., 1981, 102d ed. (Washington, D.C.: Government Printing Office, 1981), pp. 706, 723.

through federally funded projects could adequate and equitable water resource development take place. The passage of the Newland's Reclamation Act in 1902 established the Bureau of Reclamation (originally named the Reclamation Service) and firmly involved the federal government in the water development business. Research by Anderson, however, suggests that the market system was falsely accused of being unable to handle the allocation of water for irrigation and municipal uses.<sup>32</sup>

Anderson documented the evolution of the prior appropriation doctrine, which established transferable rights to consumptive water use, and the scope of private water development. Anderson found private water development for irrigation and municipal uses to exist in significant amounts prior to the advent of widespread government involvement in water projects.<sup>33</sup> By 1890, there were already 3.6 million acres of Western land with privately developed water resources. Anderson's research suggests that the progressive's concern for adequate water development in the West via markets was largely unwarranted and that the concern of Powell et al. with water monopoly "has little empirical basis."<sup>34</sup>

The evidence presented above contradicts the traditional view that the private sector was wasteful and inefficient in its allocation of natural resources. In addition to this evidence, there has been considerable research indicating that public management of natural resources has often been inefficient and degrading to natural environments. One of the ways this inefficiency manifests itself is in the establishment of physical output maximization rules for resource

management.<sup>35</sup> In contrast to an economic decision rule, which attempts to maximize net discounted present value (NDPV), physical maximization rules seek to maximize such things as board feet of timber or animal unit months of forage production. As such, these physical maximization rules ignore costs, interest rates, and net revenue. Because these factors are not calculated into the decision making process, site specific investment is often suboptimal. For example, on national forest lands, low quality timber growing sites are often harvested at a net economic loss, while superior sites often receive less investment than is optimal.

Numerous studies have documented the inefficient management of public resources. Clawson has estimated that the U.S. Forest Service was operating at an annual loss in 1974 of approximately \$2 billion, even when input values for non-market goods (recreation, wildlife, etc.) were valued generously.<sup>36</sup> More important for this paper is the fact that such inefficiency has often led to the degradation of natural environments.<sup>37</sup> Much of the research in this area has focused on the Forest Service. Hyde, for example, found that 3.2 million acres of public forest land in the Pacific Northwest were allocated to timber production despite the fact that these lands were unprofitable for timber production.<sup>38</sup> Hyde showed that the region's recreational-wilderness land base could be tripled if efficient forest management was practiced.

Hyde conducted a similar analysis of the San Juan National Forest in Colorado, where wilderness and recreational use is very high.<sup>39</sup> Despite the high value of the forest as an amenity resource, the

Forest Service was expanding an already marginal timber program into 419,000 acres of roadless areas where roading costs alone exceeded the stumpage value of the timber. More recently, Sample found that total timber management costs for the San Juan National Forest in fiscal year 1981 were \$3,479,595 while timber receipts were only \$461,158.40. Translated into dollars per thousand board feet (mbf), costs were \$79.63 and receipts were \$10.55; costs did not include reduced recreation-wilderness values due to lumbering activities. The work of Barlow et al. supports the analyses by Clawson, Hyde, and Sample.<sup>41</sup> In the Tongass National Forest (Alaska), Barlow found that in recent years the Forest Service lost over \$10 million annually, largely because of the agency's original miscalculation of the standing timber inventory.<sup>42</sup> Despite this, Tongass forest planners have called for increased harvest during the next decade. Barlow estimated that annual costs for these planned harvests will be approximately \$80 per mbf while receipts will average \$25 per mbf annually.

All of these studies suggest that National Forest managers have degraded natural environments by expanding timber harvest programs into areas that are more highly valued for recreational-wilderness use. Hyde, for example, summarized his San Juan study by stating that

wilderness values would be better preserved on this land if it were privately owned, because no profit-oriented owner would bother to cut down the trees. This is a somewhat paradoxical conclusion, since profit-seeking is frequently thought of as leading to environmental degradation, which must in turn be mitigated by government regulation.<sup>43</sup>

Similar conclusions have been drawn by researchers who have studied other publicly managed natural resources. Lanner found that the

Forest Service and the Bureau of Land Management (BLM) have "chained" vast acreages of pinyon-juniper woodland at an economic loss.<sup>44</sup>

Chaining, a range management tool in which crawler tractors drag log chains over the ground to remove small trees in order to encourage forage production, is not only environmentally degrading but it fails to pass a standard benefit-cost test. Lanner reported that nearly 3 million acres were chained from 1950 to 1964; from 1960 to 1972 the BLM chained over 250,000 acres in Utah alone.

Other studies have shown that public agencies often subsidize development of natural environments through loans, grants, and insurance programs, as well as through publicly funded development projects. A few examples are found below. On the Navajo Indian Reservation, tribal officials and federal agents (with the Bureau of Indian Affairs) have institutionalized common property grazing practices that have led to overgrazing on the range.<sup>45</sup> Nearly twenty different federal agencies are involved in subsidizing the development and redevelopment of the nation's system of coastal barrier islands.<sup>46</sup> For over three generations, the Bureau of Reclamation and the Army Corps of Engineers have been building dams, channelizing streams, and draining wetlands; in the process, natural environments have been degraded by programs that often lack net economic justification.<sup>47</sup> Federal energy policy, by controlling prices and subsidizing costly projects, has artificially induced increases in energy demand, degraded natural environments, and hindered the development of alternative energy sources.<sup>48</sup> Wildlife populations, such as the grizzly bear, have also suffered from public management objectives.<sup>49</sup>



### Objectives and Organization

The evidence presented in the last two sections contradicts the conventional view that public ownership or management of natural resources is required for the protection of natural environments. Specifically, there is considerable evidence that the private sector often protects natural environments and that the public sector often degrades these areas. The purpose of this professional paper is to examine the economic logic behind this fact. Why do private institutions protect natural environments in certain cases and why do public institutions degrade them in certain cases? In the next three chapters, I will apply existing economic theory to these questions. From the start it is assumed that the evidence presented above is amenable to such analysis and is not simply a gathering of chaotic and coincidental events.

Before beginning the analysis, it is useful to clarify some of the terminology that will be used in this paper. "Natural environments" is taken to mean any natural resource valued for its amenity, recreational, wildlife, or wildland values. This would include scenic areas, wildlife habitat, open space, and wilderness backcountry. The term "natural areas" will be used synonymously with natural environments. A distinction between "public" and "private" should also be made. "Private" and "private sector" refer to any nongovernmental institution, that is any institution that receives revenue voluntarily and has no monopoly on coercive police power. "Public" or "public sector" is the converse; such institutions receive revenue through

such involuntary means as taxation and are backed by coercive police power. "State" will be used synonymously with "government."

This professional paper will be organized in the following manner: Chapter 2 will examine the economic rationale for both public and private protection of natural environments. The case for public protection will rest on traditional market failure analysis, while the case for private protection will be based on the paradigm of the "New Resource Economics." Chapter 3 will be an economic analysis of privately protected natural environments and will emphasize the property rights paradigm within neoclassical economics. The final chapter will be an examination of the mechanisms of private protection and an application of the property rights theory (described in Chapter 3) to the evidence shown above. Chapter 4 will also include a section on alternative institutional arrangements that might further enhance the ability of the private sector to protect natural environments.

A few remarks concerning an economic perspective of natural resources is in order. First, economics as a social science is concerned with value, not money, profit, or physical output. Likewise, a developing, changing economy means that resources are continually being moved to higher valued uses whether these new uses are steel beams, computers, or wildlife preserves. In fact, it is the entrepreneur, by finding higher valued uses for resources, who provides economic development and essentially provides society with a "free lunch." Economic development or growth does not simply mean more cars or more subdivisions. The most efficient economic system is one that

produces the most value for society's individuals from the available resources. It must be realized that value is of a subjective nature. Some people value the Rocky Mountains for their beauty and wilderness, some for their timber or minerals. (Actually, most people value them for all of these goods, although they do so to varying degrees.) An economist is in no position to distinguish which of these values are morally superior to the others. His analysis can only show that the values exist (in the form of demands) and that different institutions will allocate resources in ways that can change the total value derived from those resources.

In this professional paper, a key question implicit in much of the text will be: How does one create institutions that allow the public sector to protect natural environments with legitimate public good characteristics without undermining the ability of the private sector to do the same and without creating an environment conducive to resource-wasting political bargaining? This question is essentially what three economic historians have called the "basic dilemma of political economy."<sup>50</sup> The analysis put forth in this paper is an attempt to solve one aspect of this "dilemma."

NOTES

1. Joseph M. Petulla, American Environmental History: The Exploitation and Conservation of Natural Resources (San Francisco, California: Boyd and Fraser, 1977), pp. 230.
2. Federal lands, or the "public domain," originally consisted of excess "western" lands that had been ceded to the federal government by the thirteen original states.
3. George Cameron Coggins and Charles F. Wilkinson, Federal Public Land and Resources Law (Mineola, New York: The Foundation Press, 1981), pp. 119-122. Although the Forest Reserve Act was a response to fears of a "timber famine," scientists such as George Perkins Marsh had voiced concerns about watershed protection through forest preservation.
4. Ibid, pp. 219 and 616; and Environmental Law Institute, The Evolution of National Wildlife Law (Washington, D.C.: U.S. Government Printing Office, 1977), pp. 26, 126-127.
5. Roderick Nash ed., The American Environment (Menlo Park, California: Addison-Wesley, 1976), p. 5.
6. James A. Tober, Who Owns the Wildlife? The Political Economy of Conservation in Nineteenth-Century America (Westport, Connecticut: Greenwood Press, 1981), p. 120.
7. J.H. Dales, Pollution, Property, and Prices (Toronto, Canada: University of Toronto Press, 1968), pp. 65-73.
8. Tober, Who Owns the Wildlife?, p. 124.
9. Ibid, pp. 126-127.
10. Ibid, p. 127, and Ann Japenga, "Duck Hunting Is Cold, Expensive—and Worth It," Bozeman Daily Chronicle (February 8, 1983), p. 7.
11. Tober, Who Owns the Wildlife? p. 127.
12. Ibid, p. 128.
13. Nancy Newhall, A Contribution to the Heritage of Every American: The Conservation Activities of John D. Rockefeller, Jr. (New York, New York: Knopf, 1957).
14. Lloyd C. Irland, Wilderness Economics and Policy (Lexington, Massachusetts: D.C. Heath, 1979), pp. 172-174.
15. "Cross Ranch: Preserving a Piece of Early America," Orange Disc (Spring 1982), p. 8.

16. Sources used for the history of the Cross Ranch are "Cross Ranch: Preserving a Piece of Early America," pp. 8-11; "Preserving Cross Ranch," Horizons 2 (Summer 1981): 16-22; a November 17, 1982, letter from Robert M. Horne, Director of the North Dakota Field Office of The Nature Conservancy; and a December 22, 1982, conversation with Mr. Horne.

17. See "More Than a Wish," The Nature Conservancy News (July/August 1981).

18. Sources of data for International Paper Company include: William C. Dennis, "Private Lands and Public Amenities," unpublished paper, 1982; Richard Starnes, "Editorial," Outdoor Life (January 1982), pp. 11-12; James L. Buckner and J. Larry Landers, "A Forester's Guide to Wildlife Management in Southern Industrial Pine Forests," Technical Bulletin No. 10, January 1980, Southland Experiment Forest International Paper Company, Bainbridge, Georgia; December 2, 1982, telephone conversation with Sam Rainer of International Paper Company; and April 13, 1983, telephone conversation with Jim Buckner, research forester for International Paper Company.

19. Dennis, "Private Lands and Public Amenities."

20. B.E. Fernow, Economics of Forestry (New York, New York: Thomas Y. Crowell, 1902), p. 20.

21. For a description of progressive conservation, see Arthur A. Ekirch, Jr., Man and Nature in America (New York, New York: Columbia University Press, 1963); Samuel P. Hays, Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920 (Cambridge, Massachusetts: Harvard University Press, 1959); Nash, The American Environment; and Petulla, American Environmental History.

22. Ibid.

23. One exception is Grant McConnell, "The Conservation Movement: Past and Present," The Western Political Quarterly 7 (September 1954): 463-478.

24. Roy M. Robbins, Our Landed Heritage: The Public Domain, 1776-1936 (Princeton, New Jersey: Princeton University Press, 1942), pp. 335-336.

25. Gary D. Libecap and Ronald N. Johnson, "Property Rights, Nineteenth-Century Federal Timber Policy and the Conservation Movement," Journal of Economic History 39 (March 1979): 129-142.

26. For example, under the Timber and Stone Act, the California Redwood Company spent a total of \$1,120 for a 160-acre plot, \$400 of which was payment to the government and \$670 of which was evasion costs. See Ibid, p. 136.

27. For a discussion of common property, see Chapter 2.
28. Ronald N. Johnson and Gary D. Libecap, "Efficient Markets and Great Lakes Timber," Explorations in Economic History 17 (October 1980): 372-385.
29. Peter Berck, "The Economics of Timber: A Renewable Resource in the Long Run," The Bell Journal of Economics 10 (Autumn 1979): 447-463.
30. Gary D. Libecap, Locking Up the Range: Federal Land Controls and Grazing (Cambridge, Massachusetts: Ballinger Publishing Company, 1981).
31. John Wesley Powell, "The Reclamation Idea," in Nash, The American Environment, pp. 28-33.
32. Terry L. Anderson, "Institutional Underpinnings of the Water Crisis," The Cato Journal 2 (Winter 1982): 759-792.
33. In fact, the acreage developed through private irrigation projects exceeded that of government projects well into the 1940s. According to Anderson, by 1950, 10,169,000 acres had been developed privately in the seventeen Western states.
34. Anderson noted that (1) water company competition for water customers existed, (2) a bilateral monopoly consisting of one group of sellers and one group of buyers often existed, and (3) monopoly required water storage capable only through large construction projects was generally not economically feasible for private developers.
35. The clearest example of such a rule is found within the U.S. Forest Service, which manages timber according to the rule of sustained yield forestry. This rule requires that timber be harvested at the culmination of mean annual increment (CMAI), the point at which tree biomass is maximized. See Barney Dowdle, "An Institutional Dinosaur with an Ace: Or, How to Piddle Away Public Timber Wealth and Foul the Environment in the Process," in John Baden and Richard Stroup, eds., Bureaucracy vs. Environment (Ann Arbor, Michigan: University of Michigan Press, 1981), pp. 170-185.
36. Marion Clawson, "The National Forests," Science 191 (February 20, 1976): 762-767.
37. See generally Baden and Stroup, Bureaucracy vs. Environment, for a survey of inefficient resource management that has led to the degradation of natural environments.
38. William F. Hyde, Timber Supply, Land Allocation and Economic Efficiency (Baltimore, Maryland: Johns Hopkins University Press, 1980).

39. Idem, "National Forest Logs Red Ink for Treasury," The Wharton Magazine (Fall 1981), pp. 66-71.
40. V. Alaric Sample, Jr., "Review of the San Juan Forest Plan," Forest Planning 3 (December 1982-January 1983): 22-26.
41. Thomas J. Barlow et al., Giving Away the National Forests (Washington, D.C.: Natural Resources Defense Council, 1980).
42. See also Joe Cone, "Scandals in the Tongass Forest," Sierra (July/August 1982), pp. 53-60.
43. Hyde, "National Forest Logs Red Ink for Treasury." p. 67.
44. Ronald M. Lanner, "The Eradication of Pinyon-Juniper Woodland," Western Wildlands 3 (Spring 1977): 12-17, and idem, "Chained to the Bottom," in Baden and Stroup, Bureaucracy vs. Environment, pp. 154-169.
45. Gary D. Libecap and Ronald N. Johnson, "The Navaho and Too Many Sheep Overgrazing on the Reservation," in Baden and Stroup, Bureaucracy vs. Environment, pp. 87-109.
46. William J. Siffen, "Bureaucracy, Entrepreneurship, and Natural Resources: Witless Policy and the Barrier Islands," Cato Journal 1 (Spring 1981): 293-311.
47. Steve H. Hanke, "The Political Economy of Water Resources Development," Transactions of the 38th North American Wildlife Conference (Washington, D.C.: Wildlife Management Institute, 1970), pp. 377-389; and Bernard Shanks, "Dams and Disasters: The Social Problems of Water Development Policies," in Baden and Stroup, Bureaucracy vs. Environment, pp. 108-123.
48. Ernst R. Habicht, Jr., "U.S. Natural Gas Policy: An Autopsy," in Baden and Stroup, Bureaucracy vs. Environment, pp. 64-76; and Richard L. Stroup, "The Policy-Induced Demand for Coal Gasification," in *ibid.*, pp. 77-86.
49. Frank C. Craighead, Jr., Track of the Grizzly (San Francisco, California: Sierra Club Books, 1979). See Chapter 10, "Bureaucracy and Bear: The Grizzly Controversy," pp. 191-230. See also Robert K. Davis, Steve Hanke, and Frank Mitchell, "Conventional and Unconventional Approaches to Wildlife Exploitation," Transactions of the 38th North American Wildlife Conference (Washington, D.C.: Wildlife Management Institute), pp. 75-89; and William C. Dennis, "The Public and Private Interest in Wilderness Protection," Cato Journal 1 (Fall 1981): 373-390.
50. Douglass C. North, Terry L. Anderson, and Peter J. Hill, Growth and Welfare in the American Past: A New Economic History, 3rd ed. (Englewood Cliffs, New Jersey: Prentice-Hall, 1983), pp. 154-173.

CHAPTER 2  
ECONOMICS AND THE LOGIC BEHIND PUBLIC AND  
PRIVATE INSTITUTIONS

Both public and private institutions have been used to protect natural environments. The evidence presented in Chapter 1 suggests that private institutions have performed better than expected and that public institutions have performed worse than expected. In this chapter, I will examine why this has been the case; concurrently, I will examine the economic rationale for establishing both public and private institutions to protect natural areas.

Market Failure: The Case for Public Institutions

Within the context of economic theory, most of the goods and services associated with protection of natural environments (wildlife habitat, scenic vistas, and wilderness) have been analyzed via the theory of market failure. More specifically, market failure regarding natural environments typically focuses on the problems of externality, public goods, and common property. The problem of monopoly, although an acknowledged market failure problem, is of little importance in the natural resource matters addressed in this professional paper. The following section will examine the three components of market failure with respect to the protection of natural areas. When markets fail to efficiently allocate resources, economists have suggested that public institutions be established to allocate those resources in an efficient manner.



### Externality

Externalities (or spillovers) have been the overwhelming argument for government intervention in a market economy. Externalities occur, and they may be "positive" or "negative" when all of the impacts of economic activity are not born by the decision maker.<sup>1</sup> When either type of externality occurs, production will deviate from the social optimum. Externalities exist precisely because private costs and benefits are not equated with social costs and benefits.

"Negative" externalities arise when the marginal social costs (MSC) of some activity exceeds the marginal private cost (MPC) (see Figure 2-1). In such a case, private output ( $Q_p$ ) is greater than prescribed by economic efficiency criterion ( $Q^*$ ). The greater the difference between social and private costs, the greater the misallocation. Air pollution is often cited as a classic example of a negative externality. Because the cost of using the environment as a waste dump is less for the polluter than for rest of society, the air is overused as a disposal medium.

"Positive" externalities, the analog to negative externalities, arise when the marginal social benefit (MSB) of some activity exceeds the marginal private benefit (MPB) (see Figure 2-2). In this case, private output is less ( $Q_p$ ) than under efficient resource allocation ( $Q^*$ ). Again, the greater the difference between social and private benefits, the greater the misallocation. Scenic vistas provide an example of a positive externality. A private owner may find it difficult to capture the value of a scenic view and, hence, may produce less of these views than would be socially optimal. For the natural environments examined in this paper, the concept of positive externalities

Figure 2-1  
Negative Externality

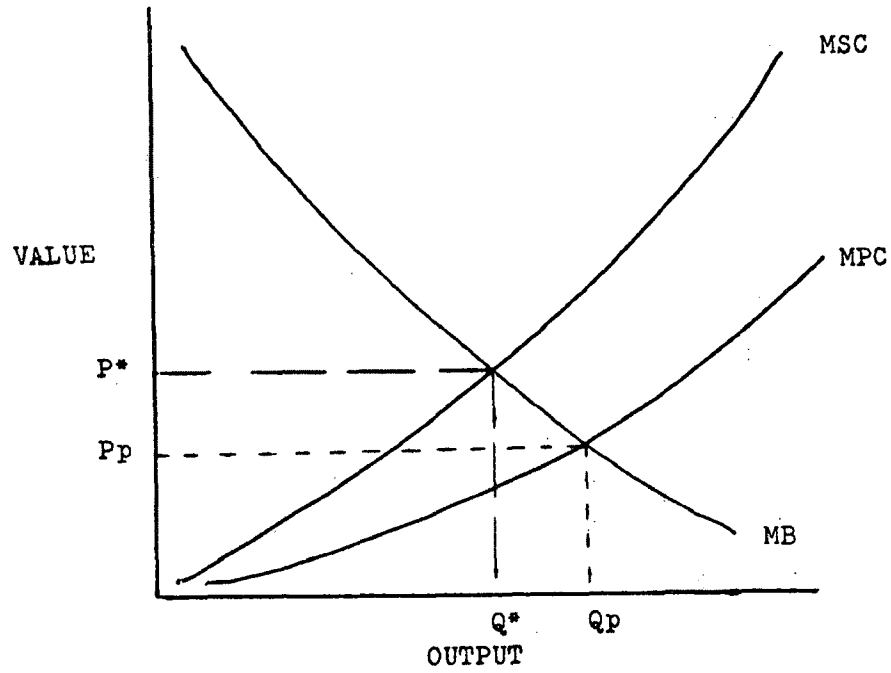
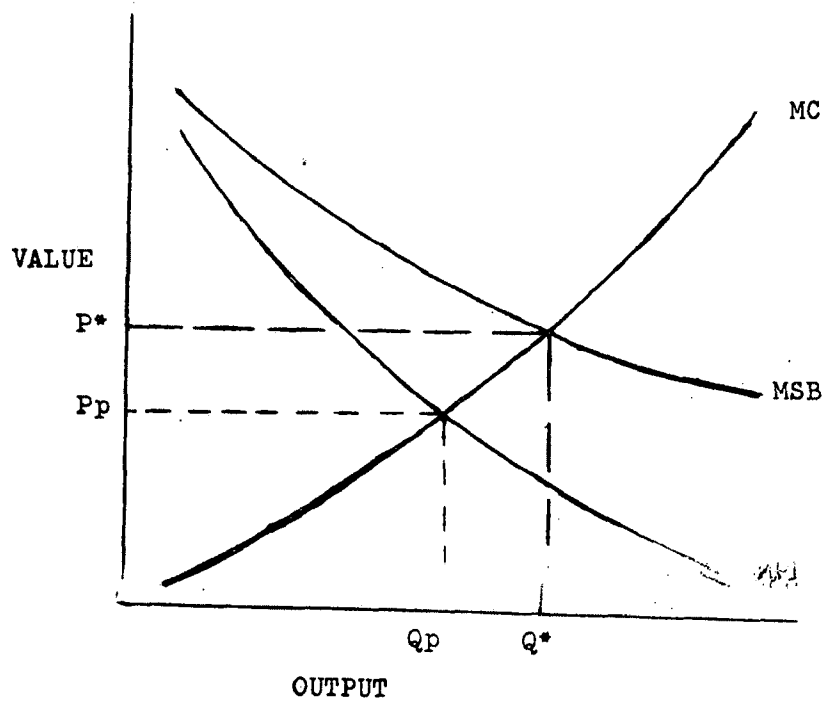


Figure 2-2  
Positive Externality



is a particularly useful scheme. Many other goods—parks, wildlife habitat, and so forth—have often been considered positive externalities.

### Public Goods

Public goods are more extreme cases of the positive externality problem and have provided a strong argument for government allocation of natural environments. Samuelson first described "public goods" in economic terms in 1954.<sup>2</sup> His original definition described public goods as distinguished (from private goods) by nonexcludability and jointness in consumption. Public goods can also be distinguished from private goods by their vertically summed demand curves (private good demand is summed horizontally), which illustrates jointness of consumption.<sup>3</sup> To be more specific, a public good is one for which users cannot be excluded and the marginal cost of use approaches zero. Because of these characteristics, there exists no incentive for any individual or firm to produce such a good. National defense is perhaps the classic example of a public good, but many natural areas are considered to have public good characteristics—national parks, wilderness areas, and wildlife refuges, for example. By definition, a pure public good must be provided by government in order for efficient allocation, or any allocation for that matter. Public goods can also be described as the extreme case of positive externality—the divergence between private and social benefits is maximized; in effect there are no private benefits to be realized from the production of a pure public good.

Natural resource economists have applied the public good model to many of the natural environments examined in this paper. Krutilla, for example, argued that a good might also be considered public because of indivisibility, irreversibility, and various nonmarket demands.<sup>4</sup> The concept of indivisibility suggests that certain goods must remain intact for them to maintain their value; that is, the Grand Canyon would not have the same value if only half of it were preserved. Because of indivisibility, it is difficult for a private owner to own such a "large" resource. The irreversibility argument suggests that the nature of some resources is such that any development would destroy the resource for all time. Once Old Faithful has been developed for geothermal energy, its ecological and aesthetic value would likely be destroyed. Regarding nonmarket demands, economists have argued that many people value natural areas such as wilderness simply because they exist (existence demand), because they would like to have the option of visiting a wilderness (option demand), and because they would like to pass on wilderness to their children (bequest demand).<sup>5</sup> It is difficult for a private owner to capture these values with a market price for entry.

Because of the public good characteristics mentioned above, private individuals will often behave as "free riders" and avoid revealing their true willingness to pay for such goods. Accordingly, private individuals and firms have no incentive to produce these goods. Since these goods are wealth-creating, in the sense that they provide utility for individuals, government production of these goods is justified by economic theory. The protection of natural environ-

ments, such as scenic areas and wildlife habitat, is considered to be a public good by most contemporary natural resource economists.<sup>6</sup> As such, the public good-positive externality model is useful for analyzing the role of institutions in protecting natural environments.

### Common Property

The third economic concept relevant to the protection of natural areas is the problem of common property. Common property (or a common pool resource) is simply a resource for which there exists no exclusive property rights to use or allocation. With respect to this paper, such natural environments as ocean fisheries, wildlife habitat (especially for migratory species), and watersheds are examples of common property. Common property provides the institutional setting for resource overexploitation as individuals seek to maximize their own welfare by utilizing the resource. Essentially it is the nature of these resources that often hinders the establishment of property rights. In addition, many publicly owned resources have attributes that may be considered to be common property; backcountry recreation in many of our wilderness areas is a good example.

Perhaps the most elegant treatment of the misallocations that result from common property institutions was "The Tragedy of the Commons" by ecologist Garrett Hardin in 1968.<sup>7</sup> Hardin pointed out that in a system where no one has exclusive rights to use a resource the resource itself will be ultimately destroyed as individuals seek to maximize their own gain. Formal economic analysis of common property, however, has been advanced by the work of Gordon and Cheung.<sup>8</sup>

Gordon was one of the first to note that common property resources yield no economic rent; that is, no returns exceeding opportunity costs. Cheung later elaborated the mechanism by which these rents from "nonexclusive" (common property) resources are dissipated and how private contracting may arise to curb the dissipation of these rents.

As has been pointed out by those who have contributed to the economics literature regarding common property, wealth maximizing individuals tend to overuse resources held in common. This predictable result has been documented for many different resources.<sup>9</sup> Because common property leads to losses in social welfare, the institution itself has serious shortcomings. Government regulation of common property and the establishment of private property rights are two ways of modifying the institution such that private and social costs align more closely.<sup>10</sup>

Understanding the institution of common property is important for an analysis of the institutions that are used to protect natural environments. Wildlife (and wildlife habitat) represent the aspect of natural area protection most closely fitting the common property model, although neither is common property in the pure sense. Since 1842, court decisions in the United States have ruled that wild animals are public property belonging to people of individual states as well as the nation.<sup>11</sup>

When examining natural environments from a common property viewpoint, the appropriate questions are: (1) when did—if they did—private property rights to the resource arise and in what form, and (2) when did—if it did—government establish rights to the resource

and how does it govern use and allocation of the resource. In many cases, wildlife and rangeland, for example, the government established rights to use and allocation of a common property resource in order to prevent overuse. In this paper, the appropriate use of the common property model is the analysis of the establishment of rights (both public and private) to the resource and how those rights influence resource allocation. Little attention will be paid to existing common property institutions (such as groundwater basins) as they have little relevance for this paper. The common property problem regarding natural environments is not one of continued "tragedies," but one of establishing rights systems that lead to efficient resource allocation. Economic analysis of common property shows that when the nature of a resource prohibits the establishment of private rights, governmental action is warranted in order to curb the overexploitation of the resource.

#### The "New Resource Economics":

#### The Case For Private Institutions

The traditional market failure analysis shown above indicates that private institutions will have difficulty protecting the optimal amount of natural environments because of public good-positive externality and common property problems. Recently, however, there has developed a new paradigm for natural resources economics that is critical of traditional neoclassical market failure analysis and offers an explanation for some of the government inefficiencies described in Chapter 1. The paradigm has been labeled the "New

Resource Economics" by those scholars most closely involved with its developing literature.<sup>12</sup>

### The New Resource Economics

The new resource economics has been termed "old ideas and new applications" and is a blend of neoclassical, property rights, public choice, and Austrian economics specifically applied to the problems of natural resource management and allocation.<sup>13</sup> Neoclassical economics is the paradigm most often taught in American universities today. Anderson has identified the central elements of the neoclassical paradigm as marginal analysis, information and uncertainty, and interest (capital) theory.<sup>14</sup> Accordingly, the neoclassical micro-economic model illustrates the efficiency of a perfectly competitive market. Because of its recognition that decisions are made on the margin in an uncertain world where information is scarce, the neoclassical model provides important insights into natural resource allocation. However, because the neoclassical model emphasizes market equilibrium and underestimates the importance of institutions, the model often has difficulty in explaining real world decisions.

Property rights theory, a subset of neoclassical economics, developed rapidly during the 1960s beginning with the publication of classic articles by Coase and Demsetz.<sup>15</sup> Since that time, a paradigm has developed that utilizes methodological individualism (as does traditional neoclassical economics) and assumes that the individual attempts to maximize his net welfare (not simply "profit") within the existing institutional setting. Property rights economics forces the



analyst to examine the structure of property rights to resources in order to determine the incentives faced by decision makers. Property rights economists also acknowledge the importance of transaction costs; because these costs are nearly always positive, they must be considered when analyzing resource allocation. By linking ownership rights, incentives, and economic behavior, the property rights paradigm expands the scope of economics beyond the competitive market equilibrium emphasized by neoclassical theorists.

Public choice theory, also a subset of neoclassical economics, is closely tied to the property rights paradigm. Public choice economists realize the importance of institutions and incentives in shaping economic behavior, but they focus their analysis on decisions made outside the market by voters, politicians, and bureaucrats. Public choice theory has spawned a vast body of literature that outlines the economic logic of government resource allocation.<sup>16</sup> The theory of public choice allows the economist to critically examine alternatives to market allocation.

Austrian economics is, first of all, not a subset of neoclassical theory. The Austrian perspective developed concurrently with neoclassical theory during the late 1800s and is decidedly a different perspective, though often underestimated and overlooked by contemporary economists. Austrian economists stress the subjectivity of individually held values and emphasize the market as a process that is able to transmit knowledge concerning diverse and changing values through the price system.<sup>17</sup> To the Austrians, the market is best considered as an information system. Austrians also stress entrepreneurship, the ten-

dency of individuals motivated by profit to move resources to higher valued uses. The Austrian perspective also points to the inherent difficulty of centralized economic planning because of the impossibility of obtaining correct information (without prices) and the lack of socially efficient incentives. Like public choice theory, the Austrian paradigm causes one to be critical of the government's ability to efficiently allocate natural resources.

By utilizing the insights of these four perspectives, the new resource economics offers a more general theory of natural resource allocation than does any single perspective. The new resource economics allows one to examine the institutions through which resources are distributed and make policy prescriptions based on that analysis. The paradigm of the new resource economics stresses the fact that there is no such thing as a perfect and costless economic system and that sound policy attempts to establish the "least imperfect" system.

With regard to the protection of natural environments, the new resource economics offers an explanation of the evidence presented in Chapter 1, evidence that showed that private institutions are protecting natural areas and evidence that public institutions are degrading natural areas. An analysis of "government failure" (the market failure analog) will be used to outline the economic logic behind the bureaucratic inefficiencies described in Chapter 1. In addition, a critical look at market failure analysis will be used to explain why private institutions are actually protecting natural environments when conventional theory suggests that they do not have that ability.

### Government Failure

The underlying logic behind government failure is the same as it is for market failure: decision makers are not held responsible for their actions. Because government decision makers (politicians and bureaucrats) do not hold property rights to the resources they allocate (i.e., they lack "residual claimancy"), they do not face strong incentives to use resources efficiently. In addition, bureaucrats and politicians make decisions largely outside the market and do not receive information in the form of prices. There are five specific phenomena that explain why government agents tend to ignore the marginal principle as a decision rule.<sup>18</sup> These phenomena are: (1) rational ignorance, (2) the special interest effect, (3) the bundle purchase effect, (4) the short-sightedness effect, and (5) little incentive for internal efficiency.

First, voters in a democratic society tend to be "rationally ignorant" of issues that do not immediately concern them. The simple fact that most Americans cannot even name their own Congressmen vividly illustrates this point.<sup>19</sup> On the other hand, the average citizen is acutely aware of public policy directly influencing his own well-being. Farmers in North Dakota know (or care) little about Montana wilderness policy but are keenly aware of the latest federal farm bill. Likewise, Montana backpackers tend to have little interest in farm policy but are quite knowledgeable about current policy concerning energy exploration in their favorite wilderness areas. For economists who recognize information as a scarce good, this rational ignorance should come as no surprise.

A second phenomena is the "special interest effect" and is exemplified by the parable of the North Dakota farmer and the Montana backpacker. When an individual's vested interests are at stake, he makes an effort to become informed and influence public policy. When issues become sufficiently narrow (as do such issues as farm policy and wilderness legislation) and when individual interests of a small group become sufficiently large (as in farm and wilderness issues), "then a narrowly focused but highly motivated special interest group is likely to wield enormous political clout."<sup>20</sup> When such a situation exists, as it often does in representative government, the general taxpayer contributes to the special interest kitty without being asked. From the perspective of the special interest, the treasury is a common property resource.<sup>21</sup>

Third, because individuals place only one vote in the political system for a representative who must speak for him on every issue, there is an inherent lack of precision in political decision making. Economists have labeled this the "bundle purchase effect." Even the well-informed voter has little hope of expressing all of his preferences in a political setting; in direct contrast is a market setting where a "voter" (buyer) can express his preference specifically on a multitude of "issues."

Fourth, since politicians and bureaucrats must provide satisfaction to current constituents, they suffer from a "short-sightedness effect." Politicians are concerned primarily with pleasing current voters, and bureaucrats are often concerned primarily with appeasing current special interest groups. Future generations are rarely given

genuine consideration in political-bureaucratic decisions. There is no a priori reason to expect that decisions made in the public sector will adequately consider the welfare of future generations. Beyond two, four, or six years, the discount rate of the politician is likely to approach infinity.

Finally, there is "little incentive for internal efficiency" in the public sector. Decision makers are not residual claimants; that is, they can rarely gain personally from making efficient choices. In short, they cannot capture any residual or profit that might result from wise decisions. Instead of maximizing utility by seeking profits, bureaucrats seek such things as "salary, perquisites of the office, public reputation, power, patronage, and (increased) output of the bureau."<sup>22</sup> Similarly, they lose little by choosing an inefficient alternative. Politicians and bureaucrats are usually removed from the information (prices) available in the marketplace. Government resource allocation can be expected to have significant problems in attaining the social optimum for the same reason as the market system; in effect, "authority and responsibility" are separated under imperfect property rights arrangements.

All of these points illustrate the imprecision of government resource allocation. Recognizing the imperfections that are inherent to government decision making helps explain how bureaucratic management has resulted in inefficient resource use and degraded natural environments (see Chapter 1). Politicians and special interest groups have incentive to support costly and inefficient public programs, the average voter has incentive to remain ignorant of these programs, and

the bureaucrat has no incentive to follow a marginal decision-making rule based on economic valuation. A program such as chaining appeases local ranching interests (who receive subsidized forage improvement) and their congressmen (who have favors to handout to their constituents) and remains obscure to most voters (who are "rationally ignorant"). More important, the bureaucrats who manage the program have no incentive to curtail it when the last acre chained begins to have costs that outweigh benefits. As Sowell has noted, "Given categorical mandates and the law of diminishing returns, it is virtually inevitable that governmental agencies would eventually end up doing things which seem irrational as isolated decisions."<sup>23</sup>

#### Property Rights and Market Failure

While the preceding government failure analysis offers an explanation for public degradation of natural areas, the traditional market failure analysis suggests that the private protection of natural areas (described in Chapter 1) should not occur. By utilizing the property rights paradigm within the new resource economics, one can critically examine the nature and extent of the public good—positive externality and common property problems. It should be remembered that these two aspects of market failure are important for analyzing the private protection of natural environments.

Natural environments are often considered to be a prime example of public goods—positive externalities. While the positive externality model is useful in illustrating problems of inefficiency, it does little to address the root cause of the inefficiency. By util-

izing the property rights paradigm, the divergence between private and social benefits can be seen as an absence of efficient property rights. A private owner who is unable to have exclusive and transferable rights to a scenic view is unlikely to provide such a view for social consumption.

Another analysis of externality has been put forth by Cheung who has argued that "externality" is a misleading term and that the real issue is transaction costs and uncontracted activities.<sup>24</sup> Where the costs of transacting a contract between parties are greater than the benefits to be gained from the trade, a misallocation will occur. In the case of scenic vistas, it may be prohibitively costly for the owner to collect a fee from the passersby. Externalities, according to Cheung, are more appropriately seen as uncontracted effects, whether those affects are air pollution or scenic vistas. In the same vein, it is difficult to facilitate mutually beneficial contracts when property rights are lacking.

The property rights-transaction costs analysis of externality points to different policy (both goals and tools) than does welfare economics in the Pigovian tradition, which has suggested that an appropriate goal is the elimination of externalities (internalization of all costs and benefits) via a governmentally imposed system of taxes (to reduce negative spillovers) and subsidies (to stimulate production of positive spillovers). Coase and Cheung are but two economists who have attacked this approach.<sup>25</sup> Essentially, they have argued that a more socially optimal policy would seek not to eliminate externality, but to minimize transaction costs that impede voluntary

trade. The analyses by Coase and Cheung recognized the fact that "externalities" result from all activities and that a policy that seeks to eliminate an externality may in fact impose costs that exceed the benefits of the intervention.<sup>26</sup>

An increasing number of economists have been criticizing the traditional application of the theory of public goods-positive externalities. Coase, for example, described the system of private lighthouses in Great Britain and suggested that the lighthouse is not as complete an example of a public good as Mill, Sidwick, Pigou, Samuelson, and other economists have argued.<sup>27</sup> Likewise, Cheung has described the elaborate system of contracting that has evolved between beekeepers and apple growers in the state of Washington. Cheung explained how private contracting has internalized the supposedly pervasive externalities associated with bee pollination services and apple blossom nectar services.<sup>28</sup> Others have argued that when exclusion becomes more feasible private pricing schemes will develop to provide public goods without coercive action; in fact, some have argued that very few goods meet the nonexcludability characteristic originally described by Samuelson.<sup>29</sup>

The property rights examination of public goods-positive externalities suggest that certain natural environments may have fewer public good characteristics than most natural resource economists assume. The degree of excludability is crucial to the private production of public goods, and the evidence presented in Chapter 1 suggests that excludability is feasible in many instances. The public good problems that appear to be the most important for the protection of



natural environments are "irreversibility" and various nonmarket demands (i.e., bequest, existence, and option demand). Irreversibility is most important for unique resources, such as biological species, and less important for such things as wildlife habitat. By the same token it should be recognized that resource development can often proceed without harming irreplaceable natural areas.<sup>30</sup> The "free rider" problems of the nonmarket demands mentioned above are frequently and at least partially overcome by voluntary donations to private conservation organizations who use their resources to protect natural environments.

When natural environments exist as common property, they are likely to be overexploited and, hence, degraded. Regarding natural environments, the problem of common property is not so much one of overexploitation, but one of establishing the correct set of property rights to use and allocation that will optimally allocate the resource. Government regulation has been a typical response to common property problems; the case of the Western rangeland is an example.<sup>31</sup> In many cases, government control of a resource has actually legitimized the institutional problems of common property and in the process caused natural environments to be degraded.<sup>32</sup> These government responses were implicitly based on the assumption that private institutions were incapable of efficient allocation; but as Demsetz and others have noted, private property rights to common property resources tend to evolve as the value of the resource becomes commensurate with the costs of defining and enforcing those rights.<sup>33</sup> While the evolution of property rights is a subject that will be explored in the following

chapter, it should be recognized that the mere existence of common property does not necessarily mean that private use will lead to overexploitation.

### Summary

From the perspective of the new resource economics, the problem of market failure is best explained by the absence of well-defined, enforced and transferable property rights to the specific resource in question. Where such property rights are lacking, private institutions have difficulty allocating resources efficiently. The protection of natural environments has generally been treated by economists as an area where government action must be used to correct market failure. However, there is substantial evidence that suggests that the problem of market failure in protecting natural areas is less pervasive than is often assumed. In addition, the government failure analysis provided by the new resource economics helps explain why public institutions have often caused the degradation of natural areas. In the next chapter, I will examine the economic forces that explain the private protection of natural environments. Such an examination is a requisite for determining how one might further encourage the protection of natural areas.

## NOTES

1. Armen Alchian and William Allen, University Economics, 2nd ed. (Belmont, California: Wadsworth, 1969), pp. 472-477; James D. Guartney and Richard Stroup, Economics: Private and Public Choice, 3rd ed. (New York, New York: Academic Press, 1983), pp. 610-614; and Jack Hirschleifer, Price Theory and Applications, 2nd ed. (Englewood Cliffs, New Jersey: Prentice-Hall, 1980), pp. 532-539.

2. Paul A. Samuelson, "The Pure Theory of Public Expenditure," The Review of Economics and Statistics 36 (November 1954): 387-389.

3. Idem, "Diagrammatic Exposition of a Pure Public Good," The Review of Economics and Statistics 37 (November 1955): 350-356. See also Joseph J. Seneca and Michael K. Taussig, Environmental Economics, 2nd ed. (Englewood Cliffs, New Jersey: Prentice-Hall, 1979), pp. 91-112.

4. John V. Krutilla, "Conservation Reconsidered," American Economic Review 57 (September 1967): 777-786. Krutilla's argument focused on a treatment of cases when natural environments exhibit qualities of a public good.

5. Ibid.

6. See, for example, Seneca and Taussig, Environmental Economics, pp. 91-112, 197-204.

7. Garrett Hardin, "The Tragedy of the Commons," Science 16 (December 13, 1968): 1243-1248.

8. Steven N.S. Cheung, "The Structure of a Contract and the Theory of a Non-Exclusive Resource," Journal of Law and Economics 13 (April 1970): 49-70; and H. Scott Gordon, "The Economic Theory of a Common Property Resource: The Fishery," Journal of Political Economy 62 (April 1954): 124-142.

9. See generally Garrett Hardin and John Baden eds., Managing the Commons (San Francisco, California: W.H. Freeman 1977).

10. Common property institutions may avoid the "tragedy of the commons" in some small group settings where social pressure is extremely strong; families and certain communes are examples of efficient use of common property. See Kari Bullock and John Baden, "Communes and the Logic of the Commons," in Hardin and Baden, Managing the Commons, pp. 182-199.

11. The Evolution of National Wildlife Law. See pp. 8-12 for the legal-historical background regarding wildlife ownership rights. English law had long recognized the right to take wildlife that was owned by no one in nature. See pp. 12-20 for a description of the development of the state ownership doctrine. In Martin v. Waddell, 1842, a landowner "claimed to own both the riparian and submerged

lands" of the Raritan River (New Jersey) and was attempting to exclude all others from the oyster fishery with that claim. In this case, the Supreme Court held that the navigable water (and the fishery) were owned by the state as a public trust. Later in McCready v. Virginia, 1876, the Court openly declared that the state owned the fish in the navigable tidewaters. Finally, in Geer v. Connecticut, 1896, the Court fully articulated the general theory of state ownership of wildlife, stating that the state had the "right to control and regulate the common property in game." From that point on, state regulation of wildlife and its taking had its foundation in American law.

12. Much of the literature relating to the "New Resource Economics" is attributed to those individuals associated with the Center for Political Economy and Natural Resources at Montana State University, Bozeman, Montana. These individuals include Terry Anderson, John Baden, Ronald Johnson, and Richard Stroup.

13. Terry L. Anderson, "The New Resource Economics: Old Ideas and New Applications," American Journal of Agricultural Economics 64 (December 1982): 928-934.

14. Ibid, p. 928.

15. Ronald Coase, "The Problem of Social Cost," Journal of Law and Economics 3 (October 1960): 1-44; and Harold Demsetz, "Toward a Theory of Property Rights," American Economic Review 57 (May 1967): 347-359.

16. See James M. Buchanan and Gordon Tullock, The Calculus of Consent (Ann Arbor, Michigan: University of Michigan Press, 1962); William Niskanen Jr., Bureaucracy and Representative Government (Chicago, Illinois: Aldine-Atherton, 1971); and Mancur Olson, The Logic of Collective Action (New York, New York: Schocken Books, 1965).

17. See F.A. Hayek, "The Use of Knowledge in Society," American Economic Review 35 (September 1945): 519-530; and Israel M. Kirzner, Competition and Entrepreneurship (Chicago, Illinois: University of Chicago Press, 1971).

18. Richard Stroup and John Baden, "Property Rights and Natural Resource Management," Literature of Liberty (October/December 1979), pp. 5-44.

19. One poll taken in 1973 showed that 54 percent of the total population did not know or failed to identify their own congressmen correctly. See Louis Harris Poll, conducted for the U.S. Senate, Committee on Governmental Operations. Published as Confidence and Concern: Citizens View American Government (Part 2) (Washington, D.C.: U.S. Government Printing Office, 1973), pp. 215-216.

20. Stroup and Baden, "Property Rights and Natural Resource Management," p. 15.

21. Rodney D. Fort and John Baden, "The Federal Treasury as a Common Pool Resource and the Development of a Predatory Bureaucracy," in Baden and Stroup, Bureaucracy vs. Environment, pp. 9-21.

22. Niskanen, Bureaucracy and Representative Government, p. 38.

23. Thomas Sowell, Knowledge and Decisions (New York, New York: Basic Books, 1980), p. 141.

24. Cheung, "The Structure of a Contract and the Theory of a Non-Exclusive Resource." See also Carl J. Dahlman, "The Problem of Externality," Journal of Law and Economics 22 (April 1979): 141-162.

25. Steven N.S. Cheung, The Myth of Social Cost (London, England: The Institute for Economic Affairs, 1978); and Coase, "The Problem of Social Cost."

26. John Burton has described Pigovian externality analysis in the following manner:

The Pigovian social cost argument, carried to its logical conclusion, can be deployed as an argument for government intervention in anything and everything. For uncontracted or external effects are a pervasive phenomenon of social life. Walk down any street and you will be confronted with a vast number of external effects:

- the pleasing sight of a well-kept garden,
- the noise of children playing,
- exhaust fumes from passing cars,
- the smell of cooking,
- a pretty girl passing by,
- the roar of the traffic,
- canine deposits underfoot,
- the jostle of the crowd,
- advertisements of billboards (sometimes garish, sometimes informative and useful),
- and so on.

The simple Pigovian policy formula, carried to the logical extreme, implies that government should intervene, every second of our lives, to correct the myriad externalities that surround us all the time.

This implication does not accord too well with common sense. If governments intervened to correct every externality, the entirety of the national effort would be eaten up many times over by resource-consuming intervention--and there would be no market activities left for "correction!" The old grey mare of the economy would collapse under the weight. Common sense suggests there is something fundamentally wrong with the simple Pigovian policy formula.

See "Externalities, Property Rights, and Public Policy: Private Property Rights or the Spoliation of Nature," in Cheung, The Myth of Social Cost, pp. 69-91.

27. R.H. Coase, "The Lighthouse in Economics," Journal of Law and Economics 17 (October 1974): 357-376.

28. Steven N.S. Cheung, "The Fable of the Bees: An Economic Investigation," Journal of Law and Economics 16 (April 1973): 11-34.

29. Harold Demsetz, "The Private Production of Public Goods," Journal of Law and Economics 13 (October 1970): 293-306; and Dwight R. Lee, "Discrimination and Efficiency in the Pricing of Public Goods," Journal of Law and Economics 20 (October 1977): 403-420. See also Gwartney and Stroup, Economics, pp. 622-625, who have stated that many so-called public goods that are not characterized fully by non-excludability, and hence often produced by private owners, are more properly called "near-public goods." Example of goods characterized by concurrent consumption but not by non-excludability include television broadcasts, movies, parks, and football games.

30. For example, the National Audubon Society has allowed grazing, trapping, and natural gas development on its Paul J. Rainey Wildlife Preserve without diminishing wildlife and aesthetic values. See Donald G. Schueller, "Land of Snow Geese, Three-Cornered Grass--and Lonnie Lege," Audubon (July 1978), pp. 18-37; and John G. Mitchell, "The Trapping Question: Soft Skins and Sprung Steel," Audubon (July 1982), p. 81.

31. Libecap, Locking Up the Range.

32. Feral horses and burros, firewood in national forests, national parks, Western rangeland, and statutory wilderness areas are all examples where regulation has retained certain common property characteristics. Most of this occurs because the resource is priced at or near zero. In those cases, overexploitation of the resource continues.

33. Demsetz, "Toward a Theory of Property Rights." See also Terry L. Anderson and Peter J. Hill, "The Evolution of Property Rights: A Study of the America West," Journal of Law and Economics 12 (April 1975): 163-179.

## CHAPTER 3

### THE ECONOMICS OF PRIVATELY PROTECTED NATURAL ENVIRONMENTS

At this point, it should be clear that private institutions are capable (both in theory and in fact) of protecting natural environments. An inquiry into the economic logic behind this protection is the purpose of this chapter. I will begin by reviewing demand and supply components for the protection of natural areas. An examination of the structure and evolution of property rights to natural areas will follow. Prior to the chapter summary, I will briefly examine such considerations as de facto protection, as well as the economics of nonprofit firms and philanthropists.

#### Demand and Supply Determinants

In order to carefully examine the economic components of private protection, it is useful to begin by looking at the demand and supply determinants for the protection of natural environments. Such an examination will provide a framework for analyzing market allocation of these areas by private individuals and firms. I will make no attempt to specifically quantify such things as demand for waterfowl habitat or the supply of scenic vistas. I will, however, suggest that the demand for and supply of natural areas has changed during the course of America's history and that the general direction of that change can be observed and defined. In that vein, I will be taking a look at how the major demand and supply determinants have changed over the past 200 years.

## Demand

In economics, the law of demand states that "there will be a negative relationship between the price of a good and the amount of it buyers are willing to purchase."<sup>1</sup> Price theorists in general have pointed to the following seven characteristics as those that determine the quantity of a good or service demanded at a given price: (1) consumer income (wealth), (2) income distribution, (3) consumer preferences (tastes), (4) number of consumers (population), (5) price of related goods (both substitutes and compliments), (6) price expectations, and (7) the structure of property rights (i.e., the extent of exclusivity and transferability).<sup>2</sup> Changes in any of these components will necessitate, ceteris paribus, a "shift" in demand. The following paragraphs examine the trends in these components as they relate to the demand for natural environments.

Environmental goods, including natural areas, are often said to be highly income elastic. In the words of Seneca and Taussig, authors of a leading text on environmental economics, "we hypothesize that environmental quality is a highly income elastic or luxury good, which means that households with relatively high incomes desire to consume a higher fraction of their income in the form of expenditures on environmental quality than do households with relatively low incomes."<sup>3</sup> Intuitively, this hypothesis seems quite plausible, and the limited available data are supportive. For example, studies have shown that users of national parks and wilderness areas have incomes significantly above average.<sup>4</sup>

Assuming, then, that natural environments are luxury goods, changes in per capita income are likely to have a significant impact



on demand. North, Anderson, and Hill report that per capita income in the United States has grown at an annual rate of 1.6 percent in real terms since 1840.<sup>5</sup> This represents a doubling every 43 years; in other words, the average U.S. citizen in 1983 is approximately 3 1/2 times wealthier than his 1840 counterpart in terms of real income. This evidence points to a significant increase in demand for natural areas since the 19th century when conservation policy was developing. Regarding the distribution of income, North, Anderson, and Hill point out that income distribution has changed relatively little during America's history.<sup>6</sup> In addition, there is little, if any, evidence detailing the impact of differing wealth distribution on the demand for natural areas.

Population, or numbers of consumers, obviously influences aggregate demand. Since 1790 when the U.S. population was 3,929,214 to 1970 when population was 203,235,298, population increased by over 50 times (see Table 3-1). It logically follows that this extremely large increase in the number of potential consumers has caused an increase in demand. Although one could argue that preferences have changed such that individuals value natural environments relatively higher than they have in the past, I will not take the time to do so. Suffice it to say that demand for natural environments today is likely to be higher than any time in the recent past due to significant increases in population and per capita income, as well as possible changes in the preferences of society's individuals.<sup>7</sup>

Since little work, either theoretical or empirical, has been done to examine the impact of related good prices or price expectations on

Table 3-1

## U.S. Population and Population Density, 1790-1970

Year	Population	Density (population per square mile of area)
1970	203,235,298	57.5
1960	179,323,175	50.6
1950	150,697,361	50.7
1940	131,669,275	44.2
1930	122,775,046	41.2
1920	105,710,620	35.6
1910	91,972,266	31.0
1900	75,994,575	25.6
1890	62,947,714	21.2
1880	50,155,783	16.9
1870	39,818,449	13.4
1860	31,443,321	10.6
1850	23,191,876	7.9
1840	17,069,453	9.8
1830	12,866,020	7.4
1820	9,638,453	5.5
1810	7,239,881	4.3
1800	5,308,483	6.1
1790	3,929,214	4.5

Source: U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1970, Part I (Washington, D.C.: Government Printing Office, 1976), pp. 8.

the demand for natural areas, little will be said here. It is likely, however, that there exist few close substitutes for wildlife, scenic amenities, or ecological stability. That fact would also suggest that demand is quite price inelastic; the fewer available substitutes the more inelastic is demand. Consumption data on complementary goods like backpacks, rifles, cross-country skis, binoculars, cameras, and Gore-tex clothing could potentially provide valuable information on demand for natural areas, but sound data and application are lacking. One complementary good for which demand impact is discernable is transportation. Lower transportation costs over time have undoubtedly increased the demand for natural areas.

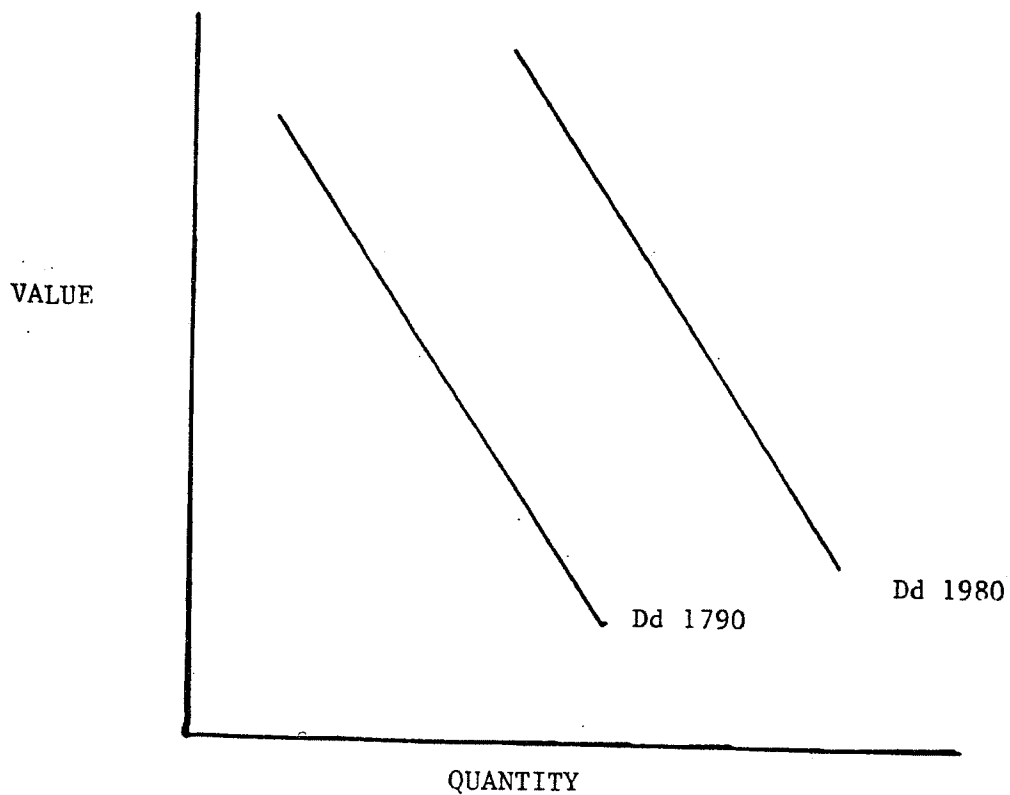
Price expectations typically influence demand in the following manner: if higher future prices are expected, demand will rise; if, however, lower future prices are expected, demand will fall. At best, it is unclear how price expectations have influenced demand for natural areas, especially considering the fact that many such areas are provided at a zero price by government. The role of property rights in affecting demand is of crucial importance and will be more closely analyzed later in this chapter. It is important, however, to note here that different property rights arrangements will yield different pricing schemes that accordingly influence demand.<sup>8</sup>

Despite the absence of significant data, it seems to be reasonable to state that the demand for natural environments has grown significantly during the course of American history. Changes in income, population, and preferences explain this demand shift best. A lack of close substitutes also suggests that demand is quite price

inelastic, especially for unique goods, such as the Grand Canyon. One might graphically display the changing demand over the last 200 years as in Figure 3-1. Trend data for outdoor recreation supports the contention that demand for natural areas has increased substantially over the past two centuries.<sup>9</sup>

Figure 3-1

The Characteristics of the Demand  
for Natural Environments, 1790-1980



## Supply

The other major concept in economics is the law of supply, which has been called "a principle which states that there will be a positive relationship between the price of a good and the amount of it offered for sale by sellers."<sup>10</sup> In general, supply is determined by the following six components: (1) stock of the resource, (2) state of technology, (3) input prices, (4) market access (entry), (5) information, and (6) uncertainty.<sup>11</sup> Any change in these components can facilitate a "shift" in the supply schedule, which has been described as "a change in the minimum price necessary to generate each different rate of output."<sup>12</sup> Regarding natural environments, "supply" is taken to mean the amount of goods and/or services that is available from natural areas. Quite obviously, the stock of natural areas is a crucial variable in this supply function. Technology, in turn, is an important variable in determining the stock of natural areas. The impacts of technological change on the stock of natural environments is ambiguous; technological advancement has pushed the stock in both directions. Krutilla has argued that technology impacts natural areas differently than other processed goods.<sup>13</sup> While technological advances can increase the stock of rugby balls (by reducing production costs and using resources more efficiently), it is difficult to increase the stock of Grand Canyons via technological advancement. Krutilla further stated that "the supply of natural phenomena is virtually inelastic."<sup>14</sup> Accordingly, it would seem that technological improvements would make it "economical" to develop resources from pristine

environs that were at one time of no value for production purposes, thus further reducing the stock of natural phenomena.

Krutilla's supply inelasticity argument can be refined. The inelasticity is closely linked to the "irreversibility" of the resource stock in question. For unique biological-geological resources as Old Faithful or the Grand Canyon, supply inelasticity is found; but for waterfowl habitat on the northern prairie, the supply is more elastic. Technology in wildland reclamation may ultimately be a determining factor in the stock of natural areas; thus, influencing the supply of goods and services provided from natural areas.<sup>15</sup> Timberline Reclamation, for example, is a company that reclaims streams in order to enhance the productivity of the natural fishery (see Appendix C). The technological advances made by Timberline Reclamation most certainly have increased the stock of natural areas. In essence, technology has an important, but ambiguous and often counterbalancing impact on the stock of natural environments. Generally, however, during the course of American history, technological advances have often reduced the stock of those areas.

Regarding the effect of input prices, market access, information, and uncertainty on the supply of natural area goods and services, little will be said here. Since the allocation of these goods and services is generally not a typical production process (in the sense of adding labor and capital to natural resources), input prices are largely irrelevant to the allocation question, except to the extent that the costs of defining and enforcing property rights might be

considered input prices. An examination of property rights will come later in this chapter.

Market access is a crucial point that will also be examined within the context of property rights arrangements. For example, the fact that wildlife have long been declared (by the courts) to be public property has often hindered the ability of the private sector to manage land for wildlife purposes. Information and uncertainty are also important supply determinants. The lack of accurate information is a problem in all economic systems and the degree of inaccuracy will influence output supply. With respect to goods and services from natural environments, where price information is so often lacking, it is quite plausible that supply is suboptimal. Uncertainty about future demand can also impact the supply; in fact much of the debate over environmental preservation issues is implicitly a debate over the future demand (value) of natural environments.

Because the forces of technology can shift supply in two directions (by impacting resource stocks as well as the cost of providing goods and services) and because it is difficult to pinpoint the specific impacts of the other supply determinants, it is difficult to make strong statements about the long-term trend regarding the supply of goods and services from natural areas. While it is recognized that there are fewer roadless areas in the U.S. today than in 1776 and that certain species have become extinct during that same period, it is difficult to determine the long-term supply trend for these goods and services. One might postulate that resource stock has declined for most of U.S. history and has increased in recent years, however, there

does not appear to be any significant research (either theoretical or empirical) to allow one to make a more substantive statement about the changing supply of goods and services provided by natural environments.

The preceding demand and supply analysis, while by no means conclusive, suggests that the price (value) of natural environments has risen during the course of American history. This suggestion is drawn from evidence pointing to a large increase in demand and a likely decrease in supply (although supply may be increasing in recent years) for these areas. One of the difficulties of analyzing demand and supply in greater detail is the difficulty of accurately categorizing a particular resource as a "natural environment." Nevertheless, the preceding section has illuminated at least some of the economic forces surrounding the protection of natural environments.

#### The Structure and Evolution of Property Rights

While an examination of the private protection of natural areas could utilize the concepts of externality, public goods, and common property, a more complete and in-depth analysis is one that examines the structure and evolution of property rights to these resources.<sup>16</sup> Positive externalities—public goods are cases where existing property rights do not allow optimal price exclusion, and common property is a case where property rights simply do not exist. In these cases, private institutions are easily shown to be inefficient. Natural environments are generally put into these broad, often ambiguous categories. In this section, I will outline the existing theory regarding the evolution of property rights and the form in which they



evolve. In addition, I will apply this theory to the allocation of natural areas in an attempt to gain a better understanding of private protection than is possible via the typical market failure analysis.

### The Evolution of Property Rights

The economic literature dealing with the formation of property rights from common property began with Demsetz's "Toward a Theory of Property Rights."<sup>17</sup> In his original thesis, Demsetz stated that "property rights develop to internalize externalities when the gains to internalization become larger than the cost of internalization."<sup>18</sup> Demsetz described the establishment of hunting territories by the Montagnais Indians (who lived on the Labrador Peninsula) as the value of the fur-bearing animals in the area increased.<sup>19</sup>

Anderson and Hill, however, were the first to explicitly define the variables important to the establishment of private property rights.<sup>20</sup> They used a simple model that compared the marginal benefits and costs of defining and enforcing property rights to explain the equilibrium level of definition and enforcement activity. Anderson and Hill's model also helped explain the changing structure of property rights over time. The marginal benefit of defining and enforcing rights is linked to resource scarcity, which is determined to a great degree by physical scarcity and changing preferences. As will be shown later, the benefits of defining and enforcing rights to wildlife and wildlife habitat have been increasing over time as wildlife has become more valuable.

The marginal cost of defining and enforcing rights is largely a function of "technology, resource endowments, and scale of operations," all of which change the quantity of resources or the opportunity cost of production.<sup>21</sup> As Anderson and Hill noted, the development of barbed wire fencing was a technological advance that dramatically lowered the cost of defining and enforcing rights to the grassland of the Great Plains. Anderson and Hill applied their model to the system of property right to land, livestock, and water in the American West and found it to be a powerful tool for explaining the evolution of rights to those resources out of a system of common property.

Umbeck further expanded the theory of evolving property rights and applied it to the California Gold Rush.<sup>22</sup> Following Cheung's rent-dissipation model, Umbeck postulated that "there are potential gains from (exclusion) . . . and establishing property rights" to a common property resource.<sup>23</sup> When these rights will be established will depend on the value of the resource and the cost of negotiating and enforcing the property rights. A fundamental addition to the theory of evolving property rights is his assertion that "as the value of a piece of property rises, the cost of enforcing the rights to that will also rise," but that the value of a piece of property will rise faster than the costs of negotiation and enforcement.<sup>24</sup> Accordingly, there will be an optimal point at which the establishment of rights makes economic sense.

Umbeck's argument that enforcement costs will rise with property value is certainly plausible in a static sense, but it ignores both

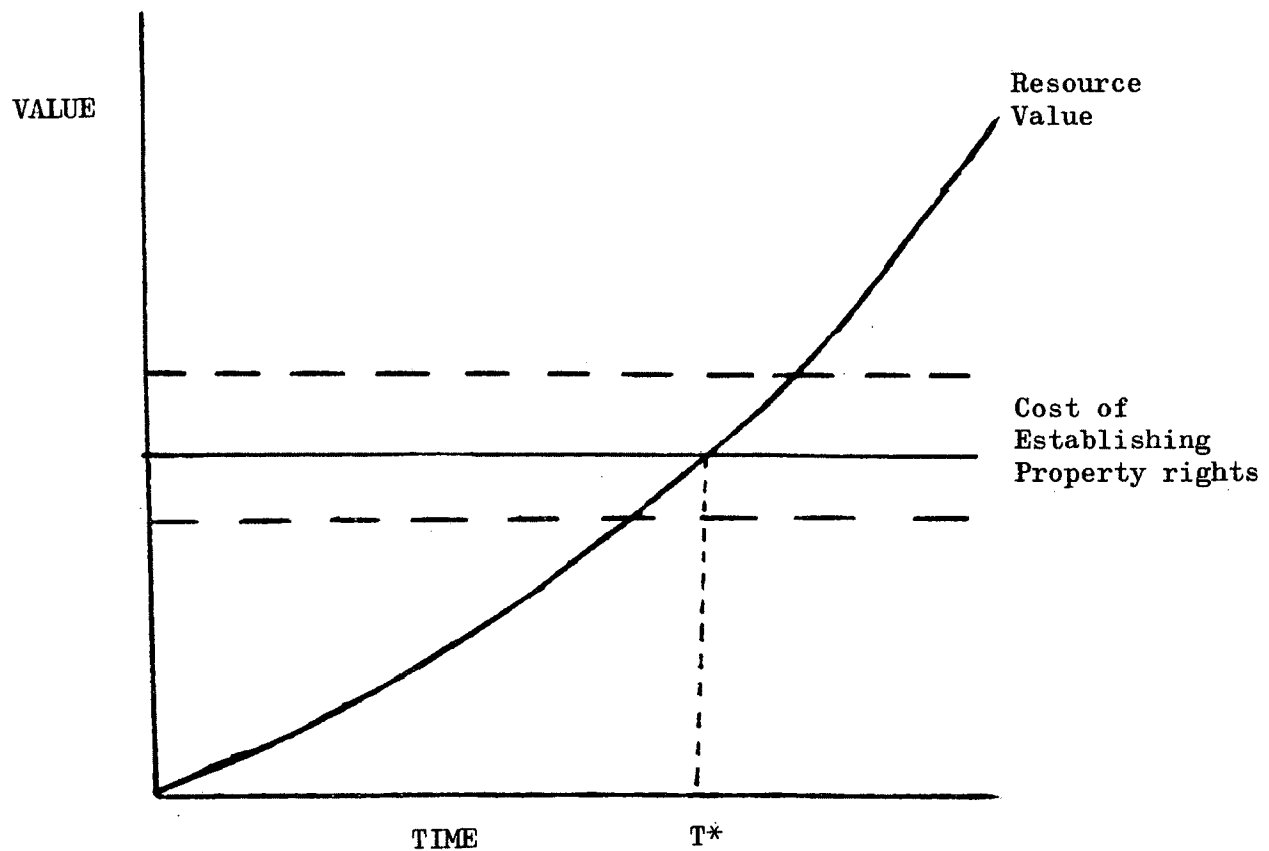
the dynamics of technological change and the impact of government policy. In addition, Umbeck's model (as well as those of Anderson and Hill and Demsetz) ignores the degree of transferability as a variable in determining the net benefits of establishing property rights to a nonexclusive resource. A more complete model building on Demsetz, Anderson and Hill, and Umbeck is illustrated in Figure 3-2.

Assuming that the value of a resource rises over time and the cost of defining, enforcing, and transferring private rights is constant over time, an individual would establish rights to a common property resource at time  $T^*$ . The costs of defining, enforcing, and transferring rights are, in effect, the component costs of establishing rights. Exogenous forces that alter these costs ultimately alter the optimal time for the establishment of private rights. These exogenous forces include technology and government activity. Changing technology will generally reduce these costs and speed up the process of rights establishment. Technological advances, such as barbed wire, hot metal branding, electrical meters, and pollution monitoring equipment, have all lowered the cost of defining, enforcing, and transferring rights.

Government activity, on the other hand, may either increase or decrease these costs depending on the specific action taken. At this point, it is unclear which has been the dominant impact; it is clear, however, that government policy has often influenced the evolution of property rights.<sup>26</sup> This observation is extremely important to the allocation of natural environments. Government activity in the form of law, police protection, subsidization, tax exemption, and trade

Figure 3-2

## Optimal Time for Establishing Rights to Common Property



restrictions can lower the costs of establishing private rights. On the other hand, government actions such as legal barriers to trade, regulation, and taxation can increase the cost of establishing rights.

As suggested in Chapter 2, federal land disposal policy often contained riders that significantly increased the cost of establishing private property rights to land.<sup>27</sup> Such restrictions also prolonged the period of common property resource use; in this respect, inefficiency was promoted. Public ownership, however, is the policy that

raises the cost of establishing private property rights the highest. Federal land reservation and acquisition along with court rulings on public wildlife ownership are two areas of public ownership important for this paper. In these cases, the cost of establishing property rights is quite high, perhaps even infinitely high in some cases. Along with the public ownership cost, other impacts are the indirect costs seen in the form of zero-priced competition. A partial reason, at least, for the relative lack of large-scale private outdoor recreation in Montana and Idaho is the fact that the federal government provides an enormous supply of these goods at a zero (or nearly zero) price. Accordingly, taxation, regulation, and licensure can also increase the costs of rights establishment.

While most of the literature has focused on the cost of defining and enforcing rights, the cost of transferring those rights is also an important variable in the establishment of property rights. The cost of transferring rights is largely influenced by the legal framework of a society. For various reasons, many types of transfers are restricted or prohibited by law; as such, they are quite costly. In our society, certain transfers of property rights have been prohibited because of ethical objections to the trade; drug trafficking, gambling, prostitution, and slavery are common examples. Legal restrictions on the transferability of property rights also has implications for the protection of natural environments. Ownership of instream surface water has generally not been held to be "beneficial use" and, therefore, has not been considered a legitimate property right.<sup>28</sup> As such, the cost of establishing instream rights are prohibitively high.

Legal constraints on the transfer of groundwater rights have also reduced efficient water use and led to environmental degradation.<sup>29</sup> Case law has continually declared wildlife to be the property of the state; accordingly, the cost of establishing rights to wildlife resources is prohibitively high.<sup>30</sup>

While such exogenous variables as technology and government activity have been shown to influence the optimal time of property rights establishment, one endogenous variable--the nature of the resource in question--is also important. Stationary, tangible resources like rangeland or even domestic cattle present relatively few problems in defining and enforcing rights. Air and migratory wildlife, however, have "fugitive" characteristics that in and of themselves increase the costs of establishing property rights. Accordingly, one would expect resources with such fugitive characteristics to remain as common property for a longer period than other resources.

Research (by Dennen; and North, Anderson, and Hill) supports the model depicted in Figure 3-2 and help explain the process of property rights establishment to the American West that was briefly described in Chapter 2.<sup>31</sup> Dennen argued, consistent with the above theory, that there exists an optimal time to bring land into agricultural production from an idle (natural) state. Regarding public land disposal in the 1800s, he stated the argument in the following way: "There is some optimal path of releasing land from the public domain and bringing it into production which will maximize the value of output. Releasing land more quickly will reduce output, as will releasing land too slowly."<sup>32</sup>

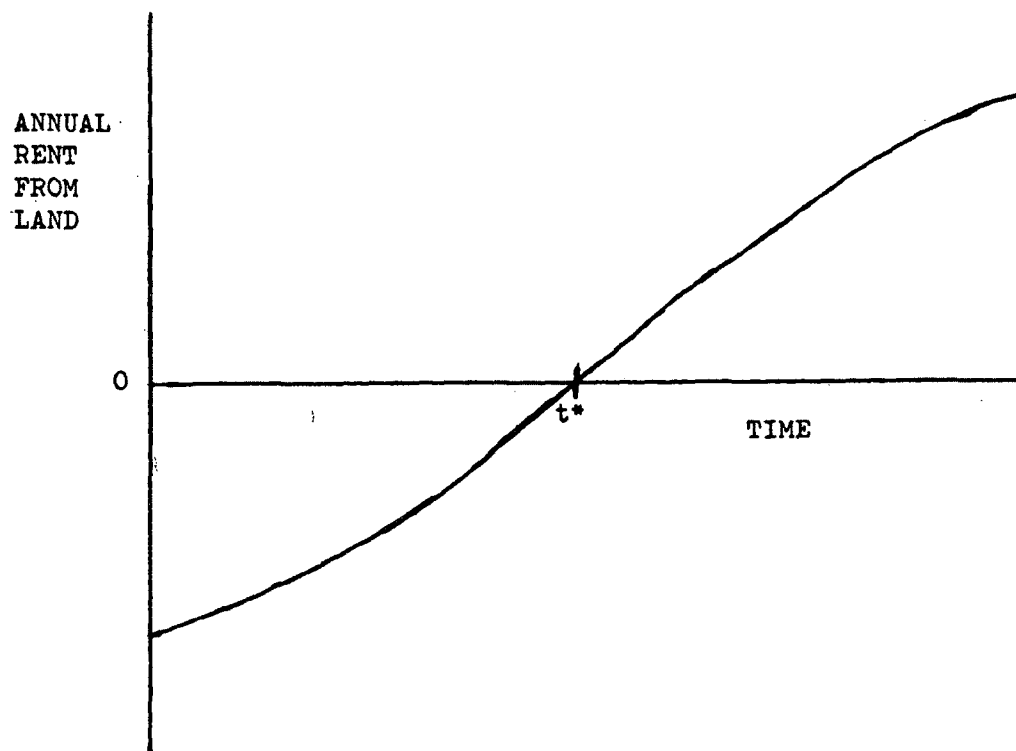
Dennen concluded that the Land Act of 1785, which authorized the sale of public land to the highest bidder (see Table 1-2), was the land policy disposal policy that most closely approximated the optimal solution. Consistent with the research by Johnson and Libecap (see Chapter 2), Dennen noted how homesteading policies forced land into production prior to the optimal time required to maximize value. These restrictive policies forced early production by requiring production in order to obtain legal patent to the land. As supporting evidence, Dennen cited both the high failure rate of prairie homesteads (which indicates that land was put into production "too soon") and the practice of idle land retention (for periods of up to 20 years) by land speculators during the era of land auction sales.

The land-rent model articulated by North, Anderson, and Hill in Growth and Welfare in the American Past elaborated Dennen's theory.<sup>33</sup> In their model (reported as Figure 3-3), an economically rational individual observing a parcel of land with rents rising over time (and beginning as negative) would establish property rights as soon as the net discounted present value (NDPV) of the land exceeded zero (some-time prior to  $t^*$ ). The rational owner would then put the land into production at time  $t^*$  in order to maximize NDPV. The observation of land speculation by Dennen is perfectly consistent with this model. Restrictive homesteading policies that required (among other things) cultivation, irrigation, and construction in order to secure legal patent (establish private property rights) forced land into production prior to  $t^*$ , thus dissipating rents and wasting resources.<sup>34</sup>

Figure 3-3

## Path of Land Rents Over Time

Source: Figure X.I; North, Anderson, and Hill, Growth and Welfare in the American Past, p. 117.



One can apply the Dennen and land-rent models to the protection of natural environments. Is it quite likely that rents to be captured from producing or protecting wildlife habitat on the Western range have been negative throughout most of U.S. history (just as were the rents from wheat production on the Great Plains in 1865), and the rational owner would be acting in a socially responsible manner not to



produce these goods. In 1983, however, many ranchers can capture significant rents by protecting wildlife habitat and selling the right to hunt and fish.<sup>35</sup> Whether or not these production changes occurred at  $t^*$  is an empirical question not addressed here. Efficient (wealth maximizing) policy would seek to stimulate production at  $t^*$ ; the area of environmental policy is no exception. Thus, the land-rent model also provides a framework for examining production changes on land where property rights already exist.

### The Structure of Property Rights

Theory that attempts to explain the evolution of property rights is of crucial importance but increases greatly in value when linked to a theory of property rights structure. Such a theory attempts to postulate the form of ownership that will emerge from common property under various circumstances and how those property rights will change over time. It also looks at the specificity of rights definition and enforcement. Demsetz originally identified three specific ownership forms: "communal ownership, private ownership, and state ownership."<sup>36</sup> Demsetz described these ownership forms according to the method of exclusion: in communal ownership no state or person can exclude others from use, in private ownership the owner may exclude users, and in state ownership the state may exclude users. Demsetz, however, did not attempt to formulate a theory as to the conditions fostering the different ownership patterns.

Following the literature concerning property rights evolution, Yandle has offered a theory describing the evolution of property

rights through four explicit stages.<sup>37</sup> His four stages, which closely follow rights regimes under Roman Law, are: (1) common property, (2) public property, (3) quasi-public property, and (4) private property.<sup>38</sup> In this scheme, Yandle notes the historical tendency for nation-states to establish rights to common property as overuse begins to show its face. Yandle applied his model to air quality--a quasi-public property--and described the changing rights structure over time. Yandle's model and categories are useful but he makes little attempt to specify the factor involved in altering property rights arrangements.

Dennen and Umbeck have advanced theories regarding the structure of property rights beyond the preliminaries offered by Demsetz and Yandle.<sup>39</sup> Dennen examined property rights to rangeland in the American West and suggested that three possible property rights regimes exist: (1) a regime in which exclusivity and intensity of use is controlled, (2) a regime that controls only exclusivity, and (3) a regime with no control (common property). From Cheung's rent-dissipation theory, it follows that regime #1 will yield the highest rent and regime #3 will ultimately dissipate all rents. Dennen's examination of grazing rules imposed by cattlemen's associations during the latter part of the 19th century supported the rent-dissipation model. Dennen's study also supported the implications of earlier property rights theories by illustrating how property rights became more clearly defined as resource value increased--regime #3 evolved into regime #2, which evolved into regime #1. As the gains from more explicit property rights definition become apparent, one would expect individuals

to invest resources in that definition; one expects the structure of rights to change in the direction of more explicit definition and enforcement.

Umbeck's study of property rights to California gold claims stressed the importance of contracting costs (which are ultimately a function of technology and the nature of the resource) in determining how property rights evolve out of common property. Umbeck described two potential types of regimes: (1) a "sharing contract" in which all rents from a land parcel are shared but outsiders are excluded, and (2) a "land allotment contract" in which outsiders are excluded and each miner has a claim to all the rent from a clearly specified portion of the parcel.<sup>40</sup> Sharing contracts will be chosen first when income variance is high and enforcement costs (for the contract group) are low because of the small number of individuals. As populations grow, land allotment contracts become more economical because enforcement costs in sharing contracts rise quickly and the gains from sharing decline as income variance declines (as population increases). Umbeck's evidence from the California gold rush supported his theory: the first contracts were all sharing, but as population increased land allotment contracts came to dominate.

A later article by Umbeck in 1981 examined the initial structure of property rights distribution by examining such variables as the degree of land homogeneity and the relative difference in individuals' abilities in violent force and productivity.<sup>41</sup> Where individuals have equal abilities to use violence (in order to obtain property rights) and to be productive, a homogenous resource will always be divided

evenly among the competing users. When a resource is nonhomogenous, it will be divided in parcel sizes inversely related to its productivity. In both cases, the initial wealth endowment is equally, not randomly, distributed. The California gold rush provided a test tube for Umbeck's theory because individual variation in abilities of violence and mining productivity were negligible. The evidence was supportive: rich gold lands were held in small parcels while large claims were generally less productive. Umbeck's theory may have something to say about the variance of size in agricultural operations across the country, especially with regard to the optimal size of an operation and its relationship to homesteading policies. In this regard, Umbeck's analysis is consistent with those who have suggested that land disposal policy was often inefficient.

The rather small body of literature dealing with the structure of emerging and changing property rights attempts to identify factors that ultimately influence the existing property rights structure. Beginning with common property, there are basically three paths to take: (1) the establishment of public ownership (only in the presence of a coercive state), (2) the establishment of private property rights, or (3) continued common property. Obviously, all three paths have been taken. Where the state has been absent, as it was in the California gold fields and on the cattle range of the Great Plains, private rights have often emerged through voluntary contracts to internalize the costs of continued common property.

Where the state has been present, policy has fostered both public and private rights to common property resources. In cases such as the buffalo

and the arid Western range, the state established ownership rights when it was perceived that private ownership would be socially unproductive. For such an irreversible resource as the bison (a fugitive resource on the verge of extinction), the establishment of public ownership to a common property resource would seem to be economically rational. When resource irreplaceability is not a concern, state intervention in the process of property rights evolution (to common property) may be socially unproductive.<sup>42</sup> There is evidence that under public ownership there exist few incentives for resource managers to significantly reduce the problems of common property overexploitation.

It is well-known, for example, that recreational use on many of the public lands is excessive and that optimally priced user fees (which could restrict use and allocate the resource to those who value it most) are rarely used. Johnson has offered a partial explanation for this by stating: "While one could argue that user fees may be appropriate for recreational use, the FS (Forest Service) not surprisingly has shown little interest in fees. With negatively sloping demand curves, user fees would reduce the number of visitations and the political support recreationists give the FS."<sup>43</sup> It is not clear, given the current state of the theory and evidence, what kind of policy is the most efficient method of handling the common property problem. While it is often difficult for individuals to establish property rights, it is also the case that government agents have difficulty in efficiently allocating resources.

Beyond Yandle's brief postulating, little theory has been advanced regarding the structure of public ownership that can emerge

from common property; research is needed in this area. Yandle, however, has suggested that private ownership will ultimately emerge from collective attempts at allocating common property. The work by Dennen and Umbeck indicate that property rights regimes are dynamic and change when exogenous forces make it economical to do so. In short, one can expect increased and explicit property rights definition with population increases, technological advances, and growing resource values. The recent development of conservation easements and lease arrangements to protect natural environments represents a detailed segregation and specification of property rights, one that is made possible by an increasing value for the resource (see Chapter 4, Appendix B, and Appendix C).

Umbeck's later work suggested that the initial property rights structure is influenced by the degree of resource homogeneity and by individuals' comparative advantage in violence (the ability to enforce rights) and productivity. In summary, existing research has identified resource value, technology, population, the degree of resource homogeneity, and individuals' comparative advantages as partial determinants of property rights regimes. A theory that addresses the impact of government activity on the structure and evolution of property rights would be most useful; yet, outside of some of the literature on rent-dissipating land policy, little is currently available.

#### Other Considerations

Thus far, I have examined the private protection of natural environments from both a demand-supply perspective and a property rights perspective. In this section, I will examine two other areas

relevant to private protection of natural areas: (1) de facto protection of natural areas and (2) nonprofit institutions and philanthropists. Each of these areas has been an important factor in private protection of natural environments, and any such analysis would be incomplete without their inclusion. The literature in each of these areas is quite scanty, and I will attempt here only to establish a basic framework for looking at the empirical data (outlined in Chapter 1). The property rights framework will also be utilized in these discussions.

#### De Facto Protection of Natural Environments

Perhaps one of the most overlooked mechanisms of protecting natural areas is through de facto protection by private owners. In such a case, the costs of development may simply outweigh the gains or there may be no conflict between resource development and natural area protection. Where this situation exists, the private profit-seeking landowner finds it in his own interest to preserve land in its natural state. To my knowledge, there exists no research documenting the extent of such preservation; the fact that it exists is illustrated by the lack of logging activities by Champion International in the Hellgate Canyon east of Missoula, Montana.<sup>44</sup> Untouched wetlands on the prairie of North Dakota provide another example of de facto preservation.

Recently there have been studies that suggest that federal agencies have developed significant areas of land that would be left in pristine conditions given the incentives of private ownership (see Chapter 1). Hyde has studied timber management by the U.S. Forest Service in the Pacific Northwest and southwestern Colorado and found

that timber harvest operations had been expanded into many areas where sales, administration, and roading costs exceeded the value of the timber.<sup>45</sup> In the Douglas-Fir region (Oregon and Washington west of the Cascade crest), Hyde found that 3.2 million acres of public forestland were allocated to timber, even though they were unprofitable for timber production. Hyde also found the Forest Service to be expanding its timber program into over 400,000 acres of roadless area in the San Juan National Forest (Colorado) despite the fact that roading costs alone exceeded the stumpage value of the timber.

Studies by Barlow et al. have supported the work by Hyde.<sup>46</sup> They found that "below cost timber sales" were common in many of our national forests. Chaining programs by the Bureau of Land Management are another example of land development by public agencies that does not cover its costs. Dams and canals built by the Bureau of Reclamation and the Army Corps of Engineers have often lacked economic justification and have disturbed natural areas. In short, there is a growing body of evidence that indicates that the profit-motive applied to our public lands would result in a significant amount of land preservation by default.<sup>47</sup> Perhaps because protection is not the overriding goal in these cases, many people are uncomfortable with these data. In any case, it is evident that the profit motive can provide strong incentives for protection simply by providing information concerning negative rents.

The existence of de facto protection of natural environments can be explained via the property rights models described in the previous section. Following North, Anderson, and Hill's land-rent model



(Figure 3-3), de facto protection will occur at all times prior to  $t^*$ , since production does not begin until that point. Policies that have encouraged production to begin prior to  $t^*$  not only are inefficient but also degrade environments that would otherwise be preserved for a time. Both the land-rent model and the optimal timing model (Figure 3-2) aid in the explanation of de facto protection that results from taking land out of production or even abandoning developed (cultivated) land. In these cases the "resource value curve" (Figure 3-2) and the "land-rent curve" (Figure 3-3) ultimately slope downward at some point, making it uneconomical to continue production or perhaps even to continue to define and enforce property rights. Farmland that has reverted back to rangeland or wetland constitutes an example of such de facto protection.

#### Economics of Nonprofit Conservation Organizations and Philanthropy

In the area of natural environment protection, nonprofit organizations have long played a major role in influencing policy and controlling resources. Groups like the Sierra Club and the Audubon Society were organized before 1900 and are familiar to most Americans. Today, there are literally hundreds of private nonprofit conservation groups with millions of members and operating budgets in the millions of dollars (see Appendix B). These organizations own land for conservation purposes, support scientific research and education, and engage in political activism. They are certainly a major factor in contemporary conservation issues.

While it is obvious that nonprofit firms should behave differently from profit-seeking firms (because of the different incentive structures), economists have not spent a great deal of time examining the behavior of nonprofit firms. Alchian and Allen have defined nonprofit firms as being characterized by "no group of trustees or directors or 'owners' who can decide to distribute the net gains to themselves as their own wealth, as can be done in a for-profit corporation. Funds must be spent in the enterprise to further the purpose of that enterprise."<sup>48</sup> Because there is a lack of "residual claimancy" in the nonprofit firm, one would expect lower internal (within the firm) efficiency when compared to a profit-seeking firm.<sup>49</sup> Managers of nonprofit firms are consistently observed reducing efficiency by utilizing the firm's resources in ways that add to their own nonpecuniary income.<sup>50</sup>

Nonprofit firms are typically granted tax exemptions and other legal privileges. Newhouse has suggested that a hospital's nonprofit status may be justified in an "ethical sense"; this might also be true for conservation organizations, depending on one's values.<sup>51</sup> This nonprofit status can also be justified via the theory of public goods. As was previously stated, there are certain aspects of natural environments that may lead to suboptimal production by profit-seeking firms. The nonmarket (existence, bequest, and option) demands noted by Krutilla may be captured by nonprofit conservation organizations more effectively than by profit-seekers. Because nonprofit institutions have specific goals other than profit maximization, they are able to garner funds from those who might otherwise be free riders.

The Nature Conservancy, for example, is an example of a conservation organization that is able to capture the existence, option, and bequest demand for preserving natural areas.

Nonprofit conservation organizations may also increase efficiency by reducing the transaction costs associated with protection-development trade-offs. Many protection-development trade-offs are characterized by a significant asymmetry of transaction costs; development interests are typically concentrated and well-defined, while preservation interests are usually widely diffused over individuals and area. Because of this cost asymmetry, different entitlements will yield different resource allocations--nonprofit conservation organizations that own land reduce the transaction costs of contracting for resource development and, hence, improve the efficiency of resource allocation for preservation purposes. For example, on public wilderness areas where development potential exists, the bargaining typically takes the following form: one or two development companies square off against a diffuse group of wilderness supporters. However, when conservation groups own land they become a concentrated and well-defined interest in the same manner as the oil company that might have an interest in developing a portion of the land.<sup>52</sup> As such, the costs of transacting are much reduced when compared to the public case.

While nonprofit conservation organizations may improve the efficiency of public goods production by capturing nonmarket demands and reducing the transaction costs of contracting, they may also lead to internal inefficiency (like government agencies) because of the absence of residual claimancy. Little, if any, research has been done

to examine the behavior of decision-makers within conservation organizations; but unless these groups are over-endowed with selfless, public spirited individuals, a certain amount of inefficiency must be expected. However, because private, nonprofit conservation organizations depend on voluntary contributions and donations, there does exist more incentive to be efficient than for government bureaucracies. As Sowell has stated, "The point is that a non-governmental organization subject to feedback from donors or customers has incentives and constraints that lead to institutional decisions more attuned to rational social trade-offs."<sup>53</sup> Because of this, one would expect such organizations to be quite aware of opportunity costs of alternative land allocation schemes; these incentives are likely to foster innovative contractual responses to the problem of externality. As will be shown in Chapter 4, this appears to be true in many cases (see also Appendices B and C).

Closely tied to the economics of nonprofit organizations is the role of philanthropy. Philanthropy (or charity) is and has been extremely important in natural area protection. John D. Rockefeller Jr., for example, was instrumental in establishing several national parks, museums of natural history, and preserving other scenic areas (see Appendix A). In Maine, ex-governor Percival P. Baxter donated a 200,000-acre preserve containing Maine's tallest peak, Mt. Katahdin, known today as Baxter State Park.<sup>54</sup> Many other charitable gifts by private individuals have aided the protection of natural environments, although few are as spectacular as the contributions of Rockefeller and Baxter (see Chapter 1 and Appendix A for more on this topic).

Economists have examined philanthropic behavior even less than they have examined the behavior of nonprofit firms. Yet, the behavior of philanthropists is well within the bounds of economic science. As Alchian and Allen noted, philanthropic behavior is quite consistent with economic man if one assumes that individuals gain utility from their giving.<sup>55</sup> From that base, economic theory can tell us how different rules might impact on the incentives to undertake charitable activities. For instance, tax laws that regard gifts of land to nonprofit conservation groups as tax-deductible charitable donations significantly increase the incentive for philanthropic behavior. As will be noted in Chapter 4, this fact has been extremely important to the success of many conservation groups.

Although I have only briefly touched on the issues involving the economics of philanthropy and nonprofit firms, it should be recognized that they play an integral part in private sector conservation. The absence of serious analysis of these points by economists is troublesome, given that nonprofit firms and philanthropists play such a large role in natural resource economics. A useful addition to the natural resource economics literature would be research into this portion of the private sector.

#### Summary

Before moving on to Chapter 4, where I will examine the record of privately protected natural areas within the context of the economic theory outlined here, it will be useful to summarize the major points of this chapter. First, the evidence suggests that during the course of American

history, there has been a gradual outward shift in the demand for natural environments. Regarding the supply of these goods, perhaps the most important factor—technology—was shown to push the supply in both directions, depending on the specific circumstances. No attempt was made to determine how the point of optimal allocation has changed over time.

As shown in Chapter 2, externality, public goods, and common property form the economic framework for analyzing the inefficiencies often associated with the private protection of natural areas. All three of these problems may be examined as cases of ill-defined property rights arrangements. Recent research in the public choice-property rights tradition has suggested that the problems of externality and public goods are often overstated by natural resource economists. The ability of individuals to "internalize" externalities through contracting and to produce public goods has only recently been articulated in the economics literature.

The property rights literature has also shown the process by which private rights to common property emerge and the form in which they emerge. Rights to natural areas do not appear to be an exceptional case in this process and can often be produced by the private sector if the demand exists. Government policy was shown to have an important impact on the cost of establishing property rights to resources and the subsequent cost of transferring those rights. Given the fact that many natural environments are characterized by legitimate public goods qualities, any type of cost increasing policy acts only to reduce net social welfare. Both the legal precedents against owning water for instream purposes and against private ownership of

wildlife have significantly hindered the private protection of natural areas.

Models by Dennen and by North, Anderson, and Hill have described an optimal time path for putting idle land into production. These models may also be applied to the efficient path of production changes on a given parcel of land. Today, there certainly exists more rents to be captured from natural area protection than could be 200 years ago. Through traditional market allocation along with de facto preservation and nonprofit-philanthropic conservation, there is reason to believe that the private sector can be quite successful in protecting natural environments.

## NOTES

1. Gwartney and Stroup, Economics, p. 41. This is not true of all goods, however. The doctrine of conspicuous consumption and so-called Giffen goods are two exceptions.
2. Ibid, pp. 379-380; Hirschleifer, Price Theory and Applications, 2nd ed. (New York, New York: W.W. Norton, 1979), pp. 20-22; Svetozar Pejovich, Fundamentals of Economics: A Property Rights Approach (Dallas, Texas: The Fisher Institute, 1979), pp. 50-56; and Donald S. Watson and Mary A. Holman, Price Theory and Its Uses, 4th ed. (Boston, Massachusetts: Houghton Mifflin, 1977), pp. 12-13.
3. Seneca and Taussig Environmental Economics, p. 9.
4. Irland Wilderness Economics and Policy, pp. 107-114.
5. North, Anderson, and Hill Growth and Welfare in the American Past, pp. 23-25.
6. Ibid, p. 22.
7. See Louis Harris, "Public Likes Conservation," Sierra (July/August 1982), pp. 15-17. Harris found that 83 percent of those polled favored strengthening the Clean Air Act, 93 percent favored strengthening the Clean Water Act, and 65 percent were opposed to reducing environmental regulations that protect human health.
8. For example, a public owner is likely to provide environmental goods at a zero price, which will stimulate a level of demand higher than that which is optimal. A private owner is much less likely to provide goods at zero price.
9. Clayne R. Jenson, Outdoor Recreation in America: Trends, Problems, and Opportunities, 3rd ed. (Minneapolis, Minnesota: Burgess, 1977). The figures on the next page show recent trends in visitation to federally owned recreation areas and state parks.



Figure 14. Graph showing trends in number of visitors to areas managed by certain federal agencies.

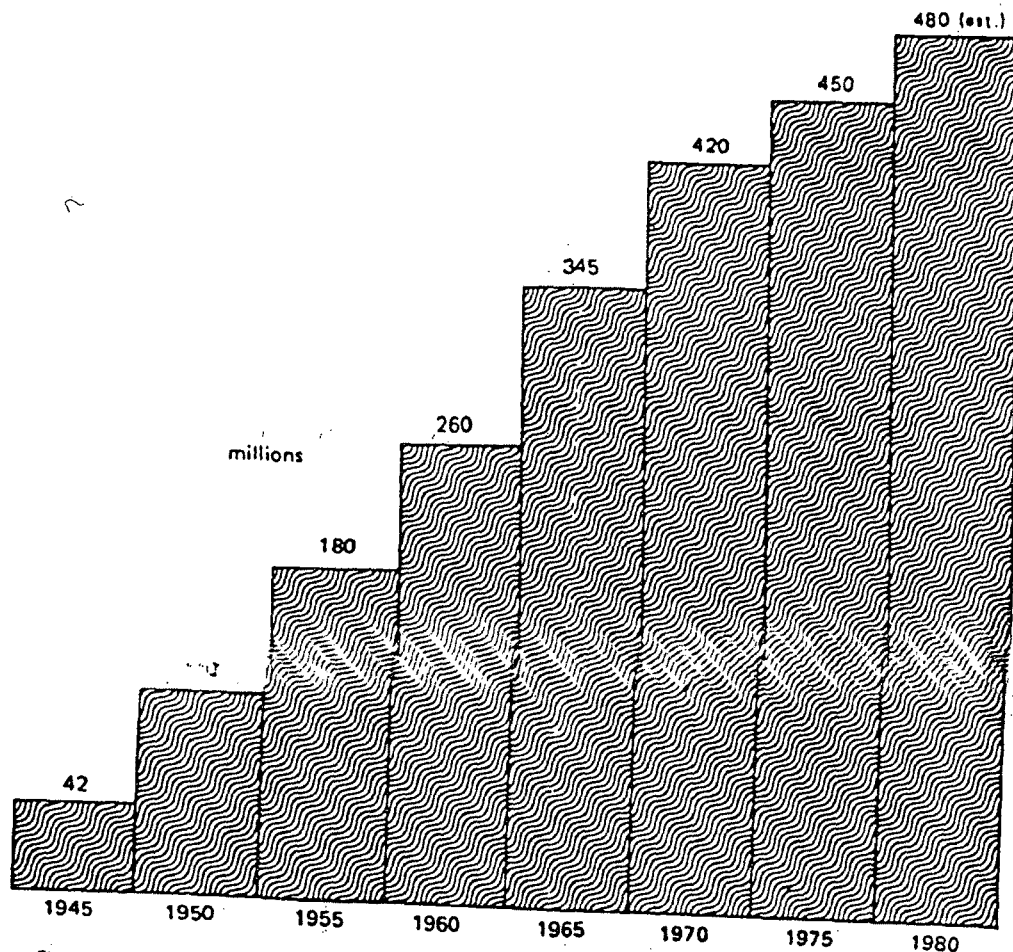
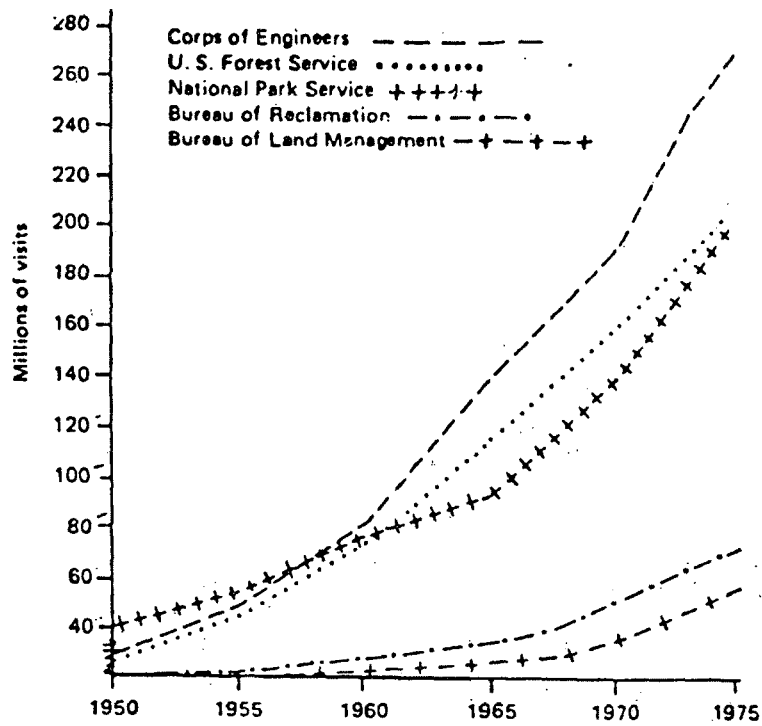


Figure 15. Graph showing trends in number of visits to State Parks in the United States.

10. Gwartney and Stroup, Economics, p. 44.
11. Ibid, pp. 43-54; Hirschleifer, Price Theory and Applications, pp. 30-39; Pejovich, Fundamentals of Economics, pp. 91-106; and Watson and Holman, Price Theory and Its Uses, pp. 22-25.
12. Pejovich, Fundamentals of Economics, p. 101.
13. Krutilla, "Conservation Reconsidered." This point has been termed the "asymmetrical technological change" argument.
14. Ibid, p. 783. What Krutilla refers to as supply is actually an analysis of the impact of technology on the stock of natural areas.
15. Land reclamation on North Dakota coal land has actually increased wildlife habitat in many cases. See Russel Stuart, "Surface Mining and Wildlife," North Dakota Outdoors (November 1974), pp. 2-7. Stuart, a former North Dakota Fish and Game Commissioner, states that some "reclamation attempts have actually resulted in greater production of species of wildlife than is found on the surrounding intensively farmed areas." See also Larry Kruckenberg, "Lesson in Variety," 37 North Dakota Outdoors (May 1975), pp. 15-19.
16. It should be kept in mind throughout this analysis that well-defined, enforced, and transferable property rights are required for efficient market transactions.
17. Demsetz, "Toward a Theory of Property Rights."
18. Ibid, p. 348.
19. Ibid. See also John Baden, Richard Stroup, and Walter Thurman, "Myths, Admonitions, and Rationality: The American Indian as a Resource Manager," Economic Inquiry 19 (January 1981): 132-143.
20. Anderson and Hill, "The Evolution of Property Rights."
21. Ibid, p. 167.
22. John Umbeck, "The California Gold Rush: A Study of Emerging Property Rights," Explorations in Economic History 14 (July 1977): 197-206. See also idem, "A Theory of Contract Choice and the California Gold Rush," Journal of Law and Economics 20 (October 1977): 421-437, and idem, "Might Makes Rights: A Theory of the Formation and Initial Distribution of Property Rights", Economic Inquiry, 19 (January 1981): pp. 38-59.
23. Umbeck, "The California Gold Rush," p. 199.
24. Ibid, p. 200.

25. Obviously it is not always the case that the value of a resource increases over time. However, it is generally true the value (demand) of natural environments has increased during American history (see Figure 3-1).

26. Refer to Chapters 1 and 2 for a partial examination of federal land disposal and reservation policy.

27. Libecap and Johnson, "Property Rights, Nineteenth-Century Federal Timber Policy, and the Conservation Movement."

28. Terry L. Anderson, The Water Crisis: Ending the Policy Drought (Washington, D.C.: The Cato Institute, 1983), Chapter 5. See also Phillip A. Hoose, "Leaving Water in Western Streams," The Nature Conservancy News (January/February 1979), pp. 25-30. Hoose describes the legal barriers that The Nature Conservancy has faced when attempting to purchase water rights for instream purposes.

29. Terry L. Anderson, Oscar R. Burt, and David T. Fractor, "Privatizing Groundwater Basins: A Model and Its Applications," in Terry L. Anderson, ed., Water Rights: Scarce Resource Allocation, Bureaucracy, and the Environment (San Francisco: Pacific Institute, 1983), pp. 223-248.

30. See note 11 in Chapter 2 for a discussion of the law involving state ownership of wildlife.

31. R. Taylor Dennen, "Some Efficiency Effects of Nineteenth-Century Federal Land Policy: A Dynamic Analysis," Agricultural History 15 (October 1977) 718-736; and North, Anderson, and Hill, Growth and Welfare in the American Past, Chapter 10.

32. Ibid, p. 727.

33. North, Anderson, and Hill, Growth and Welfare in the American Past, pp. 113-120.

34. "Rent-dissipation" was first described by Cheung in "The Structure of a Contract and the Theory of a Non-Exclusive Resource."

35. For an elaboration of the system of private wildlife management that has developed in Texas during the 20th century, see George V. Burger and James G. Teer, "Economic and Socioeconomic Issues Influencing Wildlife Management on Private Land" (paper presented for a conference on "Wildlife Management on Private Lands," Milwaukee, Wisconsin, May 3-6, 1981). In 1974, for example, hunters paid Texas landowners \$108 million for hunting rights.

36. Demsetz, "Toward a Theory of Property Rights," p. 354.

37. Bruce Yandle, "Resource Economics: A Property Rights Perspective" (paper presented at a Liberty Fund Conference, "Market

Perspectives in Natural Resource Economics," June 10-14, 1982, Big Sky, Montana).

38. Yandle describes quasi-public property as: "Public decisionmakers identify certain rights to use. Amount of total rights to be allocated determined by authority. Rights are then rented or sold with restrictions on use. Finally, rights when issued may be sold to other users. Price plays some role in allocative process." He distinguishes public property by: "Law, regulations, license used to allocate . . . price is not used in allocative process."

39. R. Taylor Dennen, "Cattlemen's Association's and Property Rights in Land in the American West," Explorations in Economic History 13 (October 1976): 423-436; Umbeck, "A Theory of Contract Choice and the California Gold Rush"; and idem, "Might Makes Rights: A Theory of the Foundation and Initial Distribution of Property Rights."

40. These contract types are roughly analogous to Dennen's regimes #2 and #1, respectively.

41. Umbeck, "Might Makes Rights."

42. The reasons for this are outlined in the section in Chapter 2 entitled "Government Failure."

43. Ronald N. Johnson, "Budget Maximization and Agenda Control: The Case of the U.S. Forest Service," unpublished, May 1982, p. 19.

44. While Champion International has harvested some of the most valuable trees in this steep and scenic canyon, the fact that the costs of logging in such rugged terrain are comparatively high has protected the amenity values of the canyon.

45. For an expanded discussion of Hyde's work, refer to Chapter 1.

46. Refer to Chapter 1 for a discussion of Barlow et al.

47. Refer to Chapter 1 for a discussion of government activities that have degraded natural environments as a result of inefficient programs.

48. Alchian and Allen, University Economics, pp. 132-135.

49. Ibid, pp. 132-135. See also Joseph P. Newhouse, "Toward a Theory of Non-profit Institutions: An Economic Model of a Hospital," American Economic Review 60 (March 1970): 64-74; and Barry P. Keating and Maryann O. Keating, Not-For-Profit (Glen Ridge, New Jersey: Thomas Horton and Daughters, 1980). The inefficiencies inherent to nonprofit firms are documented in these articles.

50. Such nonpecuniary income might include such things as prestige, leisure time, and workplace amenities. It should be noted that similar problems exist for those who manage corporations with a large number of dispersed stockholders who find it costly to monitor the behavior of the managers.

51. Newhouse, "Toward a Theory of Non-profit Institutions," p. 64.

52. For a discussion of the asymmetrical transaction costs argument, see Guido Calabresi, "Transaction Costs, Resource Allocation and Liability Rules," in Robert Dorfman and Nancy S. Dorfman, ed., Economics of the Environment (New York, New York: W.W. Norton, 1977), pp. 252-259.

53. Sowell, Knowledge and Decisions, p. 141. In making this point, Sowell also states that: "A nongovernment organization, such as the March of Dimes could - as it did, after conquering polio - turn its attention to other serious diseases, but if it had a government mandate strictly limited to polio, it would have little choice but to continue into such activities as writing the history of polio, collecting old polio posters, etc., while children were still dying from birth defects or other maladies".

54. Irland, Wilderness Economics and Policy, pp. 172-174.

55. Alchian and Allen, University Economics, pp. 135-136.

## CHAPTER 4

### THE PRIVATE PROTECTION OF NATURAL ENVIRONMENTS: MECHANISMS AND INSTITUTIONS

In the preceding chapters, I have critically examined the conventional view that state intervention is required to insure the protection of natural environments. In addition, several concepts in economic theory were described in relation to the problem of protecting natural areas. In this chapter, I will examine the data shown in Chapter 1 by first looking at the mechanisms of protecting natural areas in the private sector. In addition, I will apply the property rights theory (described in Chapter 3) to the data shown in Chapter 1 and Appendices B and C. Finally, I will offer some alternative institutional arrangements that might further enhance the ability of the private sector to protect natural environments.

#### The Mechanisms for Private Protection of Natural Environments

The mechanisms available for the protection of natural environments in the private sector are numerous. As with any set of voluntary contracts, they are characterized by diversity and flexibility. In the following section, I will briefly describe five mechanisms and give examples of each. During this examination, the importance of different property rights arrangements will be emphasized.

#### Fee Simple Ownership Natural Resources

The most direct way for the private sector to protect natural areas is through fee simple ownership of natural resources. Most often this takes the form of land ownership, but it may also include

ownership of water or wildlife (when legal institutions allow it) The protection of natural areas by private landowners may take place with or without profit-seeking and with or without specific conservation goals. Nonprofit conservation organizations like The Nature Conservancy may purchase land solely for preservation and scientific purposes. Profit-seeking firms like the International Paper Corporation, the Diamond-A Cattle Company, and the R-Ranch make a profit by managing their lands for wildlife, aesthetics, and recreation. Such management entails protection of natural environments. De facto protection is also important in the private sector; perhaps most importantly in the Eastern states where landowners provide the bulk of the region's scenic areas, open space, and wildlife habitat because of the absence of large tracts of public land.

#### Lease Arrangements

Leasing is also a method by which those in the private sector can protect natural areas, generally at a lower cost than fee simple purchase of the land. Land leases for hunting have been used for years and are especially common in areas where public lands are scarce.<sup>1</sup> Recently, H and H Hunting Unlimited leased over 200,000 acres in central Montana in order to provide quality hunting for upland game birds and big game animals (see Appendix C). These lease arrangements allow agricultural landowners to capture some of the benefits of providing wildlife habitat. Nonprofit organizations have also used leaseholds on property as a method of securing protection of valuable natural areas.<sup>2</sup> Essentially, leases represent a more specific definition of property rights than does outright land ownership.

### Conservation Easements

Conservation easements are perhaps the most recent innovation by non-profit conservation groups and are currently quite widely used.<sup>3</sup> Brenneman defined an easement "as a privilege on the part of the person entitled to it to make some use of the land subject to it in derogation of the possessory rights of the owner of the land."<sup>4</sup> He further stated that "it is a property right, and its possessor is entitled to protection of it against not only the owner of the property subject to it but against all others."<sup>5</sup> In simple terms, an easement is nothing more than a specific property right to land held by a party other than the landowner.<sup>6</sup>

A conservation easement gives the conservation group a property right in land development, recreational use, or whatever is desired to meet the goals of both the landowner and the group. Because such easements are voluntary contracts between the landowner and the conservation group, they may be tailored to fit each different land parcel (see Appendix E for an example of an actual easement). Each easement is different and allows both the landowner and the conservation group great flexibility in achieving their goals.

Since conservation easements are typically held to be a charitable donation to a non-profit organization, the landowner may often have significant tax incentives to grant an easement, particularly if the land has high development potential. In Montana, one group (the Montana Land Reliance) has protected over 21,000 acres through conservation easements (see Appendix B). In another example of conservation via easement, The Nature Conservancy has secured a complex ease-



ment agreement with a diverse group of landowners in order to protect 9 miles (4,240 acres) of the lower Blackfoot River in western Montana.<sup>7</sup>

### Restrictive Covenants

Covenants that limit land use alternatives may also be used to protect natural environments. They are utilized in both the profit-seeking and non-profit sectors of the private economy.<sup>8</sup> Unlike easements, which essentially are interests in land held by a party other than the owner, covenants are mutual agreements between two or more parties for the performance of some action. Restrictive covenants for the purpose of protecting natural environments restrict land use options so that environmental quality is maintained or enhanced. In recent years, entrepreneurs have been able to capture the benefits of protecting natural areas by placing restrictive covenants on their housing developments (see Appendix F for an example of a protective covenant). For example, developed property on the expansive Forbes Trinchera Ranch in south central Colorado is subject to scrutiny by a private environmental control committee.<sup>9</sup> The use of covenants allows landowners to avoid or minimize the free rider problem and benefit from the protection of natural environments often thought of as positive externalities-public goods.

### Assistance to Government Agencies

The final way the private sector works to protect natural areas is by assisting government agencies, particularly in the area of land

acquisition for wildlife habitat and scenic areas. Because government agencies are often characterized by sluggish responses to public demands or legislated mandates, non-profit conservation organizations have played important roles in land acquisition for public use. Much of Redwood National Park, for example, was acquired for the National Park Service through the private efforts of the Save-the-Redwoods League (see Appendix B). When land that is valuable for such public uses as wildlife refuges or parks is available for sale, government agencies frequently are unable to obtain funding in time to make the purchase. Non-profit groups have a strong history of purchasing such land with the intent of selling it or donating it to such agencies as the Fish and Wildlife Service for recreation or wildlife management. Some groups have also "loaned" funds to agencies that are attempting to purchase land. For example, when private landholders within the Boundary Waters Canoe Area (a wilderness area in Minnesota) sought to sell their inholdings, the Izaak Walton League of America Endowment purchased many of these parcels and later turned them over to the Forest Service for wilderness management (see Appendix B). In these cases, public good aspects of natural area protection are met through private transactions; in addition, these activities help minimize the free rider problem.

#### Applying the New Resource Economics Paradigm

Although the data in Chapter 1 (and associated appendices) does not lend itself to precise quantitative analysis, it is useful to examine individual cases in reference to externality, public goods,

and common property issues in natural resource economics. As already mentioned, market allocation of resources tends to be efficient when property rights are well-defined, enforced, and transferable. Thus, as expected, the private sector has been most efficient in protecting those natural environments for which property rights can be established at the lowest costs. Since the Cross Ranch and the International Paper Company were described in the most detail in Chapter 1, I will begin with those examples. Then I will examine selected pieces of data displayed in Appendices B and C with respect to entrepreneurship, the structure and evolution of property rights, law and property rights, contracts and externalities, and awareness of opportunity costs.

With regard to the Cross Ranch, the land sales contract drawn up by The Nature Conservancy (see Appendix D) represents an attempt to minimize external effects of potential land use schemes on areas adjacent to the acreage most valuable for protection. For example, The Nature Conservancy reserved all mineral rights to the land for sale and restricted land use to agriculture and grazing only. In addition, they reserved the right to approve any residential or commercial construction as well as the right to access and excavation of any archeological site that does not "unreasonably interfere with the buyer's agricultural use of the property." These stipulations will minimize any future externalities that might have arisen from such activities as surface mining or housing development. Essentially, these stipulations within the sales contract provide an example of how

private contracting can minimize externalities, much in the same manner as Cheung described beekeeper-orchard grower contracts.<sup>10</sup>

Another interesting aspect of the Cross Ranch project is its relationship to a corporate farming act on the books in North Dakota since the 1930s. This legislation prohibits ownership of agricultural land by any nonfamilial corporations, but it has not been vigorously enforced to date. Technically, however, all non-profit corporations that own farmland, including churches, university alumni associations, and The Nature Conservancy, are in violation of the law. Because of fears that family-owned farms might be endangered by corporate purchases, there are currently efforts being made to increase enforcement of this law. If strictly enforced, this law would prohibit The Nature Conservancy from owning the Cross Ranch preserve.

The law represents a cost-increasing variable as depicted by the model found in Figure 3-2; the enforcement of the corporate farming act would very definitely increase The Nature Conservancy's cost of establishing property rights to the Cross Ranch. In short, the cost of transacting a trade would increase because of limitations on rights transferability. One way this cost might be seen (if the law is enforced) is through transferal of the property to some individual or family who agreed to manage the land as would The Nature Conservancy. For future purchases, The Nature Conservancy might have to work through private buyers who met the requirements of the law. Such activities, by raising the cost of establishing property rights, would ultimately delay rights establishment (to nature preserves) at the margin.

As shown in Chapter 3, exogenous variables, such as government policy, can significantly influence the cost of establishing property rights to resources. This ultimately influences resource allocation. International Paper (IP), for example, has forest land parcels that lie within many different state boundaries. Their management is determined, in part, by the political and economic conditions found in each state. In Louisiana, for example, IP has invested little in wildlife production primarily because there is no trespass law in that state. While the local police juries of the parish government system may enforce trespass on the small holdings of familiar individuals, there is no such enforcement of rights for large commercial landowners like IP. Essentially, Louisiana law makes the cost of establishing property rights to wildlife habitat so high that on IP's Louisiana land it remains a common property resource open to exploitation by anyone. There is simply no incentive for IP to invest in wildlife resources when the institutional setting precludes them from capturing any returns on their investment.

IP's holdings in the Pacific Northwest (Washington and Oregon) represent another case where exogenous variables have increased the cost of establishing property rights to wildlife and recreational resources. IP owns approximately 1/2 million acres in the Northwest, but it has no wildlife-recreational management program for these holdings. The explanation for this fits well into the model depicted in Figure 3-2. First, IP's land in this region is surrounded by vast areas of federal land, most of which are open to public access at a zero price for hunting, camping, and other outdoor recreation.<sup>11</sup>

Second, IP's land consists of parcels that were originally part of the railroad grant system; these lands are characterized by checkerboard (alternate sections were granted to railroads) ownership patterns. Because of the zero-priced competition provided by public land holdings and because IP's ownership rights to land are not contiguous, the cost of establishing property rights is quite high. As such, there is less incentive for IP to invest in wildlife-recreation production on its Pacific Northwest forests than there is on its southern and eastern lands.

IP's rather recent push toward investment in wildlife and recreation production represents a shift in land use that can, in part, be explained by Dennen's optimal-time-of-production model and by the land-rent model (Figure 3-3) of North, Anderson, and Hill. Both of these models were described in Chapter 3. As resource values change, it makes economic sense for the rational owner to change his investment level as well as his production mix. Just as there exists an optimal time to establish property rights and bring land into agricultural production (in order to maximize rent), there exists an optimal time to bring land into wildlife-recreation production. Given the general trends in demand for protecting natural areas (see Chapter 3), IP's rather recent shift toward wildlife-recreation production is consistent with both the Dennen model and the land-rent model.

There are several other cases of private protection of natural areas, which illustrate the theory found in the previous chapters. The theory of entrepreneurship is readily applied to profit-seeking protectors of natural environments. As Kirzner has noted, the role

of entrepreneurship in economic theory is often ignored; this is equally true in natural resource economics.<sup>12</sup> Kirzner further suggested that the entrepreneurial element in economics is "that element of alertness to possibly newly worthwhile goals and to possibly newly available resources."<sup>13</sup>

Many of the firms shown in Appendix C can be described in terms of entrepreneurship—entrepreneurs responding to new demands or utilizing new combinations of resources. Timberline Reclamation, the firm that provides stream reclamation services, is an example as is Oregon Aqua Foods, the salmon ranching enterprise. Other examples include the R-Ranch, a wilderness ranch in northern California in which individuals buy shares in the ranch; the many profitable wild game ranches in Africa; and the emergence of nordic ski centers which provide outdoor amenities as part of the package. In each of these cases, some entrepreneur or group of entrepreneurs perceived a demand for a new product or new means of production. And in each case, the entrepreneur reaped significant rents from his alertness. The fact that these entrepreneurs have been successful suggests that demand for protected natural areas has increased over time. The problem with the theory of entrepreneurship—a problem that has often been recognized—is that the theory lacks analytical rigor. Currently, the theory is somewhat abstract and all-encompassing; it appears to explain many things, yet it is a difficult theory to test. Thus, while the role of the entrepreneur is certainly crucial to the protection of natural environments, it is a theory that must be referred to with caution.

A theory more applicable to the data displayed in this chapter is Dennen's optimal-time-of-production model and the land-rent model of North, Anderson, and Hill. Just as it was applied to International Paper's production of wildlife-recreation goods, it can be applied to other cases where land use changes have occurred. The 14,000-acre Burnt Pines Plantation in Georgia was formerly a land of cotton fields; today, it is managed exclusively (and profitably) for the production of wild game, including quail and white-tailed deer. The R-Ranch wilderness ranch was a livestock ranch until the early 1970s; today, it is managed for outdoor recreation, wildlife, and amenities. As resource values have changed, rational owners seeking to maximize rents put the land into the protection of natural areas so that rents from amenity, recreation, and wildlife production could be earned. As with agricultural production, there exists an optimal time to shift land use toward the protection of natural areas.

Following the model depicted by Figure 3-2, the optimal time of establishing property rights and beginning production depends on exogenous cost variables as well as the resources' value over time. The influence of a corporate farming act on the Cross Ranch is but one example of government policy altering these optimal times. Laws that restrict or prohibit transactions are also important cost-increasing variables. Current case law, which regards wildlife and instream water rights as public property, has already been mentioned as leading to instances where the cost of establishing property rights is infinitely high. Such laws do little to promote efficiency and may in some cases stifle innovation. For example, in 1969 Malcom Forbes purchased



168,000 acres of mountainous terrain along the crest of the Sangre de Cristo Mountains in south central Colorado. His intent was to establish a game preserve—the largest in the continental United States. Because the wildlife on Forbes property were legally considered public property, state wildlife officials required Forbes to drive off all native game from his property, fence it, and restock it with its own game. These requirements essentially raised the cost of establishing rights to the wildlife significantly beyond the benefits Forbes perceived, and the game preserve was not established.<sup>14</sup>

Oregon Aqua Foods, the Weyerhaeuser Company subsidiary that ranches salmon on the west coast has also been significantly influenced by government policy. In 1971, Oregon passed legislation that allowed release and recapture of salmon; this legislation lowered the cost of establishing rights to the salmon.<sup>15</sup> In the neighboring state of Washington, however, salmon ranching is currently unlawful. The cost of establishing rights to the salmon was also lowered by technological improvements: new hatcheries were built and new release-recapture facilities and transportation techniques were developed. Because the salmon have a "homing" sense and will return to their release site at maturity, Oregon Aqua Foods have de facto rights to all those salmon that survive the rigors of ocean life, which include both natural phenomena and sport fishermen.

Salmon ranching illustrates an important point about "wildlife ranching" that is frequently ignored. Whenever individuals are able to establish rights to wild species in order to "cultivate" them for marketable products, they concurrently reduce the harvest pressure on

the remaining wild population that frequently exist as a common property resource. Salmon ranchers not only supply salmon for the public fishery, they make it less feasible for commercial fishermen to over-exploit the resource by out-competing them. This is also true for alligator, duck, and turtle farming, as well as big game ranching.<sup>16</sup> Laws that have prohibited the marketing and trading of commodities from wild species have often had the predictable (from an economic point of view) impact of devastating the species they were designed to protect.<sup>17</sup>

Another aspect of government policy that influences the cost of establishing property rights and the optimal time of production is the extensive federal land holdings in the West. These lands often provide goods from protected areas at zero or near zero prices, thus reducing the incentive for private landowners to manage for wildlife, recreation, or amenities. It is not surprising that International Paper, Boise Cascade Corporation, and St. Regis Paper have wildlife management programs on their Eastern lands and no programs on their Western lands (see Appendix C). Burlington Northern, which has timber land only in the West, also has no intensive wildlife program. Lease and fee hunting is quite well-established in the South and the East where private land dominates; in the West, it exists on a relatively small scale.

Taxes are also an important factor in determining how private institutions will protect natural areas. Non-profit conservation groups receive tax-exempt status under section 501(C)(3) of the Internal Revenue Service tax code. This exemption significantly increases

the potential for conservation groups to secure rights to natural environments for preservation purposes.

As mentioned with respect to salmon ranching, technology is another factor that influences property rights establishment. Barbed wire fencing, for example, dramatically lowered the cost of establishing rights to the Great Plains and shortened the period of non-exclusivity. Innovative contractual arrangements can be examined as innovations in technology. Leases, for example, offer a way of establishing rights to fugitive resources at a lower cost than fee simple ownership. H and H Hunting Unlimited leased over 200,000 acres of central Montana rangeland for hunting from different owners. Such a lease is a technological advancement, which allows H and H to establish hunting rights to contiguous acres of land that they do not own (see Appendix C). They are able to capture economies of scale in management and policing.

The Diamond-A Cattle Company of New Mexico, a large landowner in New Mexico and Texas, has recently purchased a recreation lease on a ranch in Colorado, giving them the right to guide hunters, fishermen, and sightseers on a piece of property they do not own.<sup>18</sup> The use of the lease significantly reduces the costs of acquiring property rights to recreational land. Conservation easements used by non-profit organizations to preserve land also represent a cost-decreasing technological change (see this chapter and Appendix B). While new innovations in contracting are rarely, if ever, examined as a change in technology this approach is useful in that it allows one to more closely analyze the dynamics of evolving property rights.

In closing this section, a few notes should be made. Although the data displayed in Appendices B and C offer examples of privately protected natural environments that follow the theory in Chapter 3, caution should be observed when drawing conclusions from such data. These examples do not provide a "test" of the theory and should not be taken as conclusive evidence. There are, however, a few modest conclusions that can be drawn from the data in this chapter. First, the private sector can and does protect natural areas when property rights are defined, enforced, and transferable. Second, voluntary arrangements (contracts) in the private sector often allow innovative and flexible responses to the problems of externality and nonexclusivity. Third, government policies can both increase and decrease the incentives for the private protection of natural areas by altering the costs of establishing and transferring property rights.

#### Institutional Alternatives

While it is true that private protection of natural environments is quite extensive, there is no attempt to state whether or not this private protection is socially optimal. Assuming that it is likely to be suboptimal (for reasons that include public good characteristics of certain natural areas and government activity that reduces incentives for private protection), it is appropriate to make a few suggestions regarding institutional alterations that might encourage private protection of natural areas. The goals of these possible institutional changes are fourfold; (1) reduction of transaction costs in order to encourage the production and trade of valuable goods, (2) internaliza-

tion of the costs and benefits of economic activity, (3) allowing exclusive and transferable rights to valuable resources, and (4) minimization of opportunities for rent-seeking in the public sector.<sup>19</sup> Below I offer several possible institutional changes that, in varying degrees, attempt to foster these goals.

Perhaps the most straightforward alternative is the idea of "privatizing" some or all of the publicly owned lands.<sup>20</sup> The rationale for moving public lands toward private ownership is essentially twofold. First, private ownership would minimize the bureaucratic inefficiencies described in Chapter 1. Many of these efficiencies have resulted in degraded natural environments (see Chapter 1). (An additional and complementary alternative is the elimination of costly government subsidy programs to natural resource developers, some of which were described earlier in Chapter One.) Both privatization and the elimination of subsidies could result in an increase in the protection of natural areas. A second reason for privatization is to increase the efficiency of natural resource utilization. Economic theory has often shown the efficiency of the private sector when property rights to resources are secure and transferable.

The argument for privatization is strongest for those lands primarily valued for commodity production; that is, lands where the rights to the resources in question are easily defined, enforced, and transferred. Timber and range lands fit into this category, and privatization of such land would likely result in increased efficiency of production as well as limiting development to those areas where benefits exceed costs. Publicly owned lands valued primarily for wildlife, re-

creation, and natural amenities are generally thought to be less suitable for private ownership because of the difficulty of establishing exclusive rights to such resources. However, privatization programs that utilize such tools as (1) preemption clauses that recognize the legitimate, existing rights of public lands users, (2) compensation packages for those who suffer losses, and (3) publicly held covenants (which restrict development) to certain scenic or irreplaceable resources<sup>21</sup> might be able to protect public values and still have the benefits of private sector efficiency.

Another possible alternative is the removal of legal barriers to ownership and transfer of certain natural resources. Wildlife and water (both instream and underground) are resources characterized by significant legal barriers to ownership and transfer. Removal of these barriers would create more incentives for private entrepreneurs to protect natural areas as well as increase the scope of activity for non-profit conservation organizations. Removal of these barriers would not necessarily mean that the state would (or should) have to relinquish all rights to wildlife, for example. Institutions, however, could be made to accommodate the efforts of people like Malcolm Forbes who wish to establish game preserves in a natural environment. They could also be made to accommodate groups like The Nature Conservancy, who wish to protect water resources for their instream values.

Another alternative would be the establishment of public-private institutions that create incentives for the private protection of natural areas. Many programs along this line are already in existence

and are often quite successful. The most noticeable area of involvement is the effort by state wildlife agencies to aid private landowners in the production and maintenance of wildlife habitat.<sup>22</sup> One interesting approach to land preservation is the Maryland Land Trust, a state-funded easement program that works with private landowners in much the same way as local private land trusts do.<sup>23</sup> Another innovative program is the Bureau of Land Management's (BLM) "stewardship" program in which private ranchers who lease BLM land are given complete management authority (incentive) subject to review by a board of ranchers and agency representatives.<sup>24</sup> Regarding wilderness management, it has been suggested that "wilderness endowment areas" replace the current management framework.<sup>25</sup> Management authority would be vested in a Congressionally appointed "wilderness endowment board" that would be able to allow development of an area if it perceived that a net gain in wilderness protection could be achieved through purchase of additional areas. All of these institutional changes attempt to internalize costs and benefits of natural area protection by making the decision maker more responsible with respect to his actions.

A final alternative is the infusion of market-type institutions into the public sector. These could include contracting the private sector for such land management activities as campground and wilderness maintenance, fire control, timber and range surveys, and recreation management. Some of these suggestions have already been used by certain agencies. Another change involves the extensive use of user charges, set at a market clearing price (based on management objec-

tives regarding resource carrying capacity). The user fees would accomplish several things. First, they would raise revenue for the agency. Second, they would minimize subsidies to the extent that the charges cover the opportunity cost of the land use. Third, they would reduce congestion problems in popular locations. Fourth, they would disperse demand for natural areas to both the private sector and less utilized portions of the public domain. Such charges could be implemented for a variety of activities, ranging from campsite use to fishing access to backcountry travel. As always, an equilibrium pricing system is important for efficiency gains.

Though I have touched on several possibilities for creating additional incentives for the private protection of natural environments, I have by no means exhausted the possibilities. The ideas I have outlined could be used separately or in innovative combinations.

### Summary and Conclusions

Early in Chapter 1, I stated that the modern, conventional view holds that the state must be actively involved in order to protect natural environments. The private sector is generally not trusted as a protector of natural environments. In direct contradiction of that view, I presented evidence that shows that the private sector does, in fact, protect a vast amount of natural environments. In addition, I presented evidence that government activity has often degraded natural areas. The paradigm of the new resource economics, with emphasis on the property rights theory, was used as an analytical tool to aid in the explanation of this contradictory evidence. Finally, I offered



some alternative institutional (property rights) arrangements that might be utilized to further encourage the private sector to protect natural areas.

Although the data base for this paper is limited, there are some modest conclusions that can be drawn from the analysis. One such conclusion is that the private sector (both through profit and non-profit firms) is protecting natural environments when well-specified property rights arrangements exist. In addition, the activity of government was shown to be an important factor in determining the cost of establishing and transferring rights. Because many natural areas have legitimate public good characteristics, government activity that increases the cost of protecting these areas is essentially wealth destroying. The section that considered "institutional alternatives" is an attempt to channel government activity toward that which reduces the costs of protecting natural environments. In short, this paper suggests that the conventional wisdom regarding the role of the state in protecting natural areas is one that overlooks the potential of the private sector and overestimates the potential of the public sector.

## NOTES

1. See Chapter 1; Appendix C; Burger and Teer, "Economic and Socioeconomic Issues Influencing Wildlife Management on Private Land"; and Tober, Who Owns the Wildlife.
2. Russel L. Brenneman, Private Approaches to the Preservation of Open Land (New London, Connecticut: The Conservation and Research Foundation, 1967), pp. 33-35, 129-131.
3. For a complete description as well as specific examples of conservation easements, see *ibid.*, pp. 20-36, 96-102; Phillip M. Hoose, Building the Ark: Tools for the Preservation of Natural Diversity Through Land Protection (Covelo, California: Island Press, 1981), pp. 115-137; and Montana Land Reliance-Land Trust Exchange, Private Options: Tools and Concepts for Land Conservation (Covelo, California: Island Press, 1982).
4. Brenneman, Private Approaches to the Preservation of Open Land, p.22.
5. *Ibid.*, p.22.
6. An easement is essentially one part of a bundle of rights that are tied to the land. The contract itself specifies and defines the parameters of that right.
7. May 13, 1983, telephone conversation with Suki Molina of The Nature Conservancy's Montana Field Office. This particular easement includes nine separate easements with eight different landowners.
8. Legal aspects of restrictive covenants are described in Brenneman, Private Approaches to Preservation of Open Land, Chapter 4.
9. April 6, 1983, personal letter from Ron P. Trujillo, member Environmental Control Committee for Forbes Park Landowners Association. Trujillo outlined the following as part of the duties of the Committee: (1) approval of house plans or any other plans to improve the property, (2) control and approval of contractors, and (3) control of camping privileges.
10. Cheung, "The Fable of the Bees: An Economic Investigation."
11. Most of the major national parks charge entry fees and some user fees, but they are generally considered to be set far below that which would clear in a market setting. In fact, all federal user fees for recreational land have been "frozen" since 1979. In Oregon, 52.55 percent (32,370,216.6 acres) of the land is federally owned. In Washington, 29.485 percent (12,588,442.4 acres) is federally owned. In contrast, only 5.978 percent (2,229,375 acres) of Georgia is federally owned. See Coggins and Wilkinson, Federal Public Land and Resources Law, p. 3.

12. Israel Kirzner, Competition and Entrepreneurship (Chicago, Illinois: University of Chicago Press, 1973), p. 30.
13. Ibid., p. 35.
14. Rod L. Horn, "Forbes Trinchera Ranch, Costilla County, Colorado: History, Land Uses, Wildlife and Land Management" (paper prepared for Dean Lueck, March 25, 1983), pp. 2, 3.
15. William J. McNeil, "Private Salmon Ranching in Oregon," Farm and Land Realtor 32 (November 1980): 8-11, and Oregon Aqua Foods brochure.
16. See Appendix C; Davis, Hanke, and Mitchell, "Conventional and Unconventional Approaches to Wildlife Exploitation"; Steve H. Hanke, "How to Save Alligators," Policy Review 1 (Winter 1975): 218-220; David Hopcraft, "Natures' Technology: The Natural Land-Use System of Wildlife Ranching," Vital Speeches of the Day 46 (May 15, 1980): 465-469; and Robert J. Smith, "Resolving the Tragedy of the Commons by Creating Private Property Rights in Wildlife," Cato Journal 1 (Fall 1981): 439-468.
17. Ibid.
18. January 14, 1983, telephone conversation with Tony Dickenson, Wildlife Biologist for the Diamond-A Cattle Company, Roswell, New Mexico.
19. "Rent-seeking" has been defined as "the resource-wasting activities of individuals in seeking transfers of wealth through the aegis of the state." From James M. Buchanan, Robert D. Tollison, and Gordon Tullock, eds., Toward a Theory of the Rent-Seeking Society (College Station, Texas: Texas A & M University Press, 1980), p. ix.
20. For an examination of the arguments for privatizing public land, see Richard L. Stroup and John A. Baden, "Externality, Property Rights, and the Management of Our National Forests," Journal of Law and Economics 16 (October 1973): 303-312; Marion Clawson, The Federal Lands Revisited, unpublished manuscript, 1982; Libecap, Locking Up the Range; and Vernon L. Smith, "On Divestiture and the Creation of Property Rights in Public Lands," Cato Journal 2 (Winter 1982): 663-686.
21. John Baden and Dean Lueck, "A Property Rights Approach to Wilderness Management" (paper presented at The Wilderness Society Conference on "Federal Lands and the U.S. Economy," November 1982).
22. Some examples include Indiana's Wildlife Habitat Cost-Share Project, which provides cash reimbursements for landowners who develop wildlife habitat; Kansas's WHIP (Wildlife Habitat Improvement Program), which encourages landowners to improve and develop wildlife habitat by providing both financial and technical assistance to the landowner; Michigan's Public Access Stamp Program, which coordinates

and administers a public access (for hunting) lease system in which landowners receive up to \$4.00 per acre for land left for wildlife; and Mississippi's Cooperative Deer Management Assistance Program, which gathers data on Mississippi deer populations, involves landowners in deer management decisions, and provides management assistance to participating landowners. Brochures describing these programs can be obtained from the state wildlife management agencies of the respective states.

23. The Maryland Environmental Trust holds 72 easements totaling 15,570 acres. The trust monitors the sites to assure compliance with the terms of the easement. The trust is supervised by a 15-member voluntary Board of Trustees appointed by the Maryland governor. The trust receives funds from the Maryland General Assembly but is also authorized to accept gifts of land and money from private donors. Information from David P. Miller, Executive Director of the Maryland Environment Trust in an October 26, 1983, letter.

24. The Experimental Stewardship Program was authorized by the Public Rangeland Improvement Act of 1978. Currently, there are three formally designated Experimental Stewardship Program areas; one each in Idaho, Montana, and California. The goals of the Experimental Stewardship Program (ESP) are to: "1) provide incentives to livestock operators to practice good land management on the public lands and 2) to foster local cooperation between land management agencies, state agencies, livestock operators, and the public." Each ESP is administered by a Steering Committee composed of individuals representing land management agencies, state agencies, environmental concerns, and ranching livestock communities. These committees develop an overall plan for land areas regardless of political and ownership boundaries. See Annual Report, FY1981, Experimental Stewardship program, submitted by Challis ESP Area, East Pioneer ESP Area, and Modoc/Washoe ESP Area.

25. Richard L. Stroup and John Baden, "Endowment Areas: A Clearing in the Policy Wilderness?" Cato Journal 2 (Winter 1982): 691-708.

APPENDIX A  
THE CONSERVATION ACTIVITIES OF  
JOHN D. ROCKEFELLER, JR.

Source: Nancy Newhall, A Contribution to the Heritage of Every American: The Conservation Activities of John D. Rockefeller, Jr. (New York: Alfred A. Knopf, 1957)

The Conservation Activities of  
John D. Rockefeller, Jr.

Acadia National Park (Maine)

--gave 2,700 acres of Mount Desert Island to U.S. government for parkland

Colonial Williamsburg, Virginia

--allotted funds to aid in the purchase and restoration of this historic city

Forest Hill Park (Cleveland, Ohio)

--gave \$10,000 and 266 acres to the city in 1938

Grand Canyon National Park (Arizona)

--gave funds to establish a museum

Grand Teton National Park (Wyoming)

--gave 30,000 acres of the Jackson Hole Basin to U.S. government to add to park

--formed Jackson Hole Preserve Inc. in 1940

--gave \$6,000,000 in 1952

Great Smoky Mountains National Park (North Carolina and Tennessee)

--gave 500,000 acres to U.S. government to help establish park in 1926; entire park area came from private funds and private land

--gave \$5,000,000 from the Laura Spelman Rockefeller Memorial

The Hudson Valley (New York)

--gave Fort Tyron Park to New York City in 1930

Mesa Verde National Park (Colorado)

--established in museum in the 1920's

The "Palisades" (New Jersey and New York)

--gave 700 acres and \$3,000,000 to Interstate Park Commission to preserve a scenic area of tall prisms of traprock on the Hudson River

Redwood National Park (California)

- gave \$2,000,000 to the Save-the-Redwoods-League in 1918 for the purpose of preserving the redwood forests
- gave \$1,000,000 to buy the South Calavera Grove in 1954

Shenandoah National Park (Virginia)

- contributed and aided the organizational effort to establish the park in 1926; the park was entirely dependent upon private funds and private land and required \$1,200,000 and 193,480 acres

Virgin Islands National Park (Virgin Islands, Caribbean Sea)

- established in 1959 from land bought by the Jackson Hole Preserve Inc.

Yosemite National Park (California)

- gave \$1,750,000 in 1928 toward the purchase of more than 15,000 acres of heavily timbered forestland to be added to the park

APPENDIX B  
NON-PROFIT CONSERVATION ORGANIZATIONS  
INVOLVED IN ACQUIRING AND MANAGING LAND



NON-PROFIT CONSERVATION ORGANIZATIONS INVOLVED IN ACQUIRING AND MANAGING LAND

<u>Name/Address</u>	<u>Purpose</u>	<u>Number of Members</u>	<u>Acres</u>	<u>Funds</u>
Bates-Morris Mountain Conservation Assn. Maine	To preserve and protect a beautiful, wild Maine beach and promote scientific research--open to public access for hiking and hunting	N/A	Privately donated easement to The Nature Conservancy then established association to administer land which has been leased to Bates College Department of Biology  See: William C. Dennis "Private Land and Public Amenities"	N/A
The Big Sur Land Trust Carmel, California	Preserve open space along the Big Sur Coast	N/A	4,000 protected under easement, ownership and lease	Approx. \$80,000 since 1978
Buckeye Trail Assn. Inc. Worthington, Ohio	To establish a scenic trail linking the four corners of Ohio	N/A	Established 900 mile trail linking public and private land (some land is owned, some is leased)	Mostly volunteer work
Chesapeake Bay Foundation Annapolis, MD	Preserving natural heritage of Chesapeake Bay	9,000 (in 1981)	Approx. 1,500 owned. Approx. 1,100 in conservation easements	Approx. \$750,000 in 1981
The Collier County Conservancy Naples, Florida	Preserving the natural environment of Collier Country, Florida	N/A	Purchased approx. 10,000 acres now included in National Parks and Seashores	Approx. \$3 million since 1964

<u>Name/Address</u>	<u>Purpose</u>	<u>Number of Members</u>	<u>Acres</u>	<u>Funds</u>
Connecticut River Watershed Council, Inc.	N/A	1,500	3,137 acres	\$250,000 total revenue in 1980. See: Terry Anderson, John Baden, and Richard Stroup, "Reports to the U.S. Department of Interior", February 1982
Ducks Unlimited Chicago, Illinois	Preserve and restore waterfowl habitat	425,000	2.9 million in Canada (under easement and lease)	\$25,033,100 total revenue in 1980
Eagle Valley Environmentalists, Inc. Apple Rivers, Illinois	Preservation of the bald eagle	1,000+	Approx. 1,700 owned 400 easement	N/A
The Green Mountain Club Inc. Montpelier, Vermont	Organized to build the Long Trail, a footpath that follows the crest of the Green Mountains from Massachusetts to Canada	4,200	Maintains and protects the 430 mile long trail system. Footpath completed in 1931. Also operates a system of 70 shelter huts.	40 percent of the land is private; the rest is government and managed via special use permits
Izaak Walton League of American Endowment Iowa City, Iowa	Organized in 1943 to "help rebuild outdoor America" by acquiring land of unique natural value. Land is given to government agencies for management	N/A	Generally assist government acquisition by loaning funds (by acting quickly ex. BWCA inholdings) Has provided land for Glacier, Everglades and Redwood National Parks.	N/A

<u>Name/Address</u>	<u>Purpose</u>	<u>Number of Members</u>	<u>Acres</u>	<u>Funds</u>
Jackson Hole Land Trust Jackson, Wyoming	Preserve open land in the Jackson Hole Valley	N/A	700 acres in' easement. Use of finding conser- vation buyers/conser- vation easements	N/A
Hawk Mountain Sanctuary Hawk Mountain, PA	Reserve bird habitat	5,500	2,000 acres owned	Daily fees for visitors--40,000 visitors annually
Marin Agricultural Land Trust Novato, California	"To secure agricultural lands in perpetuity for agricultural uses"	N/A	Uses conservation easements to "protect" land, currently have 5,900 potential acres. See: "Marin County's Agricultural Land Trust" by J. Tevere MacFadyen <u>Country Journal</u> , (Feb. 1983):76-83.	N/A
The Mohonk Preserve New Pultz, New York	A non-profit corporation operating a private wildlife preserve	N/A	5,400 owned	Allow hiking, climbing--sell day permits
Montana Land Reliance Helena, Montana	Preserving agricultural land	N/A	21,800 (by conservation easement)	N/A
Natural Area Council	N/A	N/A	2,500 acres. Title has since been transferred to the Virginia Outdoors Foundation (a state agency) for management. See: Anderson Baden and Stroup "Report to U.S. Dept. of Interior"	N/A

<u>Name/Address</u>	<u>Purpose</u>	<u>Number of Members</u>	<u>Acres</u>	<u>Funds</u>
National Audubon Society New York, New York	(in part) preserve wildlife and natural environments	450,000	75 wildlife sanctuaries Approx. 300,000 acres	Approx. \$20 million annually
National Wildlife Fed- eration Washington, D.C.	Assists NFWS in pur- chasing land for wildlife refuges	4,600,000	Aided NFWS in acquiring 4,200 acres of wildlife habitat	\$30,429,946 in total revenue in 1980
The Nature Conservancy Arlington, Virginia	Preservation of ecological diversity	156,000	Approx. 2.8 million acres owned, also use easements, voluntary stewardship	\$34,000,000 raised in 1982
North American Wildlife Federation Washington, D.C.	To promote and sponsor wildlife research	N/A	6,090 acres See: Anderson, Baden, and Stroup "Report to U.S. Dept. of Interior"	N/A
The Ottaugauchee Regional Land Trust Woodstock, Vermont	Protecting productive agricultural and forest lands	N/A	Approx. 10,000 by ownership, easement and lease	N/A
Peninsula Open Space Trust Menlo Parks, Calif.	Preservation of open space in San Mateo and Santa Clara counties, California	1,100	Ownership, voluntary stewardship, creative developments and easements. Often transfer land to public agencies for man- agement.	N/A

<u>Name/Address</u>	<u>Purpose</u>	<u>Number of Members</u>	<u>Acres</u>	<u>Funds</u>
The Ruffed Grouse Society Corapolis, Pennsylvania	Improving habitat for forest wildlife	10,000	Research, forest consulting	\$400,000 in 1981
Save-the-Redwoods League San Francisco, California	Preserve Redwood forest	Approx. 60,000	230,000 now included in California Redwood state parks, Redwood National Park (some purchased, some received as gifts)	Over \$37 million since 1918
The Sierra Club Foundation San Francisco, Calif.	Owens and preserves parcels of land in its effort to promote environmental quality. Affiliated with the Sierra Club. Only accepts donations of land; does not actively seek acquisition	N/A	Approximately 1,000 owned, including a parcel that contains a shelter hut on Mt. Shasta at the 8,000 foot level	N/A
Society of <u>Tympanuchas Cupido Pinnatus</u> Ltd. Milwaukee, Wisconsin	Dedicated to the preservation of the prairie chicken	1,200	10,000 acres	Purchase land and lease it to state for prairie chicken management. Allow grazing, haying, and other activities which do not harm the prairie chicken population.
Sunny Valley Foundation New Milford, Connecticut	Preservation of agriculture and silviculture in the Northeastern states	N/A	2,000 acres of hiking trails, natural areas, and agriculture	N/A

<u>Name/Address</u>	<u>Purpose</u>	<u>Number of Members</u>	<u>Acres</u>	<u>Funds</u>
The Trust for Public Land San Francisco, California	Preservation of urban open space and recreational lands	N/A	84,000 acres have been acquired and turned over to federal, state, and local government agencies for management. See: Anderson, Baden, and Stroup "Report to U.S. Dept. of Interior"	\$4,673,831 total revenue in 1980
Unexpected Wildlife Refuge Newfield, New Jersey	Preserve beaver and other wildlife habitat	N/A	300 owned	N/A
United States Ski Educational Foundation Aspen, Colorado	Operates the Alfred A. Braum Hut System, a system of six alpine huts located in the Aspen-Ashcroft Wilderness Area--\$5.00/day/person--reservations required	N/A	N/A	N/A
World Wildlife Fund - U.S. Washington, D.C.	Wildlife preservation	Approx. 67,000	Has assisted governments in purchase of land for 260 parks and preserves	Approx. \$2 million annually (\$3,953,505 in 1981)

See also 1981 Directory of Local Land Conservation Organization for a list of over 400 private land conservation groups

N/A denotes information is unavailable.

APPENDIX C  
PROFIT-SEEKING INSTITUTIONS THAT  
PROTECT NATURAL ENVIRONMENTS

PROFIT-SEEKING INSTITUTIONS THAT PROTECT NATURAL ENVIRONMENTS

<u>Name/Address</u>	<u>Business</u>	<u>Assets</u>	<u>Acres</u>	<u>Other</u>
Aluminum Company of America (ALCOA)	Originally purchased woodland to control erosion and siltation in a watershed it would be using for hydroelectric power  --Currently ALCOA is working with The Ruffed Grouse Society to improve wildlife habitat on 30,000 acres of the Little Tennessee River watershed	N/A	90,000 acres of timberland	N/A
Boise Cascade Corp. Boise, Idaho	Lease hunting on southeast lands/open public access of northeast midwest and western lands/ maintain a system of primitive public camp- grounds	N/A	2,664,000 acres	N/A
Burlington Northern St. Paul, Minnesota	Forest products industry	N/A	1,492,000 Open land policy for dispersed recreation. Sells permits for firewood. Sells guiding rights to backcountry guides and outfitters.	-Washington, Idaho. Montana, Oregon. Has wildlife and watershed professionals on their staff.



<u>Name/Address</u>	<u>Business</u>	<u>Assets</u>	<u>Acres</u>	<u>Other</u>
Burnt Pine Plantation Marietta, Georgia	Manage for quail and deer in a natural environment/a profit seeking hunting preserve	N/A	Greater than 14,000 acres of Georgia piedmont	-Use prescribed fire -Manages for trophy whitetailed bucks -Hires wildlife biologists
California Land Management Services, Inc. Menlo Park, Calif.	Contracts out for security, patrol, routine maintenance, resource management, and interpretive services for private and public parks, watershed lands, recreational facilities and open space areas	N/A	N/A	-Boasts 20% - 30% cost saving to agencies -custom tailored contracts
Diamond-A Cattle Co. Roswell, New Mexico	Working cattle operation with fee hunting/recreational lease on Colorado ranch	N/A	2,000,000 acres	N/A
Eastern Slope Land-owners Association Great Falls, Mont.	Fee hunting on private rangeland/wildlife consultant hired to assist landowners in fish and game management	N/A	Approx. 250,000	N/A
Eco Realty Ovando, Montana	Real estate firm dedicated to maintaining environmental quality in Montana	N/A	-Arranges conservation buyers to protect natural and agricultural areas	N/A

<u>Name/Address</u>	<u>Business</u>	<u>Assets</u>	<u>Acres</u>	<u>Other</u>
Gulf Oil Corporation Wyoming	Waterfowl habitat provided by oil refinery holding ponds	N/A	N/A	N/A
Forbes Trinchera Ranch Fort Garland, Colo.	Original intent to establish a game preserve. Now a working ranch with fee hunting/protective covenants on development/environmental control committee	N/A	180,000 acres	-Land is of high amenity and recreational value. Borders the rest of the Sangre de Cristo Mountains
H and H Hunting Unlimited Grassrange, Mont.	Fee hunting on private range/land is leased from ranchers/hunters are limited and are assured of a place to hunt	N/A	200,000 acres	H and H split revenue with the individual land-owners
Hopcraft Ranch Masai Group Ranch Nairobi, Kenya	Wildgame ranching/animals are harvested by expert marksmen/meat is sold on European market	N/A	22,000 acres 96,000 acres	See "Preservation for Profit" <u>New York Times Magazine</u> , September 12, 1982, pp. 50
International Paper Company Dallas, Texas	Wildlife, recreation and aesthetics policy/hunting leases/works with The Nature Conservancy to preserve natural areas	N/A	8,410,000 acres	Largest private landowner in the United States

<u>Name/Address</u>	<u>Business</u>	<u>Assets</u>	<u>Acres</u>	<u>Other</u>
Kachemak Bay Wilderness Lodge Homer, Alaska	Vacation lodge with hiking trails	N/A	N/A	-Established a nonprofit marine research and education project
Land Improvement Contractors of America Maywood, Illinois	Organization of con- tractors involved in land leveling, land- clearing, irrigation, erosion control, pollution control, waste management, reclamation and rec- reational construction	N/A	N/A	N/A
Little St. Simons Island St. Simons Island, Georgia	Pristine barrier island retreat-resort. Activities include birding, hiking, fishing, photography, etc.	N/A	12,000 acres	N/A
Lone Mountain Ranch Big Sky, Montana	Skiing, hiking, fishing, packing ranch	N/A	Approx. 2,000 acres	N/A
Louisiana-Pacific Corporation Portland, Oregon	Land is generally open to public access/some campgrounds and picnic areas have been constructed	N/A	N/A	N/A
Meadowlark Farms Sullivan, Indiana	N/A	Reclaimed mining land for agricultural and wildlife uses	N/A	See: Carol L. Cornforth, "Reclamation Commitment Proves Rewarding." <u>Coal Mining and Processing</u> (March 1973).

<u>Name/Address</u>	<u>Business</u>	<u>Assets</u>	<u>Acres</u>	<u>Other</u>
Oregon Aqua Foods, Inc. (owned by Weyerhaeuser Company) Springfield, Oregon	Private salmon ranching "An investment in tomorrow's salmon today"	Salmon enter the "public" fishery of the open ocean where they mature	Owns hatchery and return-release site/facility	Chinook, coho, and chum salmon are raised  See: "Private Salmon Ranching in Oregon" by William J. McNeil, <u>Farm and Land Realtor</u> , November 1980, pp. 8-11
The Pelican Club Carrabelle, Florida	Resort hotel on Dog Island, a 1800-acres barrier island off the Florida coast. The majority of the island is owned by The Nature Conservancy and maintained in a pristine condition	N/A	1,800 acres	N/A
Pines Recreational Park Alturas, California	Provide remote back-country recreation	Sold over 2800 private shares	7,000 acres	See: "Playground for a Price" <u>Time</u> , January 15, 1979, p. 47
Potlach Corporation San Francisco, Calif.	Opens land to public hunting	N/A	1.3 million	Owns forestland in Idaho, Minnesota and Arkansas
R-Ranch Jeff Dennis Siskiyou County, Calif.	Private recreation	2500 ownership shares were sold ranging from \$4950 to \$9000 per share/shareowner is allowed unlimited recreational use	5,119 acres	See: <u>Time</u> , January 15, 1979

<u>Name/Address</u>	<u>Business</u>	<u>Assets</u>	<u>Acres</u>	<u>Other</u>
Simpson Timber Co. Seattle, Washington	Forest products company	N/A	N/A	Donated land to The Nature Conservancy on Skagit River for a bald eagle sanctuary
St. Regis Paper Company New York, New York	Wildlife management programs (especially on their east Texas lands)/ public hunting and camping allowed/leases to hunting clubs/fee fishing/experimental forest preserves/ worked with The Nature Conservancy to preserve natural areas	N/A	3,179,000 acres	N/A
Timberline Reclamation Inc. Bozeman, Montana	An environmentally oriented multi-disciplinary firm providing planning and engineering worldwide (fishery consultants and aquatic services)	N/A	-Have been involved in a broad range of environmental engineering projects from land reclamation to acid mine waste stabilization	-Have done stream reclamation work in 17 states and 2 foreign countries
United Farm Agency Kansas City, MO	Real estate business	N/A	N/A	-Advertise for "wilderness" buyers specializing in ranch/rural land for recreationists
Weyerhaeuser Company Seattle, Washington	Forest products company	N/A	5,923,000 acres	-Constructed perches for bald eagle population

See: Peterson's Hunting, November, 1982, for a directory of private hunting preserves in 42 states.

See: Outside, December, 1982, for a survey of private nordic skiing acres in the United States.

APPENDIX D  
TERMS OF SALE CONTRACT FOR CROSS RANCH  
LAND OWNED BY THE NATURE CONSERVANCY

TERMS OF SALE

1. All bids must be in writing and filed with the law offices of Atkinson, Dwyer & Klemin, P.O. Box 1176, Suite 414, Dakota Northwestern Bank Building, 400 East Broadway, Bismarck, North Dakota, on or before 2:00 p.m., April 22, 1982. Bids will be opened at 2:00 p.m., April 22, 1982, in the conference room in the basement of the Dakota Northwestern Bank Building. Bidders need not be present but may attend. There shall be no right to increase the bids orally at the time of sale.

2. Bids may be submitted on any of Parcels I, II, III, IV, V and VI, or on any combination of parcels. Bids will not be accepted on a per acre basis.

3. All bids must be accompanied by an earnest money deposit in the sum of ten percent (10%) of the bid price in the form of a cashiers or certified check. The deposit will be returned to all unsuccessful bidders on the date of sale.

4. Seller reserves the right to reject any or all bids.

5. The balance of the purchase price from all successful bidders shall be due and payable within thirty (30) days from the date of sale, or as soon thereafter as any necessary survey work is completed. Seller will provide successful bidders with a current abstract of title for buyer's examination prior to conveyance of the property.

6. All survey work deemed necessary by the Seller to adequately define the boundaries of the parcels conveyed shall be done by and at the expense of the Seller.

7. Conveyance of the parcels to successful bidders shall be made by Warranty Deed, subject to all easements, restrictions, mineral leases, mineral reservations, rights-of-way and exceptions of record.

8. Seller reserves all oil, gas, coal, gravel, clay, uranium and other minerals, with full right of ingress and egress to search for and remove the same.

9. Parcels I, II and III shall be used only for agricultural purposes and such restriction shall be contained in the deeds of conveyance.

10. Parcels IV, V and VI shall be used only for pasture and grazing land and shall not be plowed or cultivated. Such restrictions shall be contained in the deeds of conveyance.

11. No residential or commercial structures of any kind shall be constructed or placed upon the property conveyed without the express written consent of the Seller. Such restriction shall be contained in the deeds of conveyance.

12. Seller reserves the right of access for itself or its agents to all parcels for purposes of archaeological research, excavation and removal of artifacts, provided such activity does not unreasonably interfere with the buyer's agricultural use of the property.

13. Successful bidders shall be required to enter into an agreement not to compete with the Seller for the lease on Section 36, Township 143 North, Range 82 West for a period of five (5) years from the date of the agreement as a condition for the conveyance of the property.

Maps of the parcels and recent title information are available upon request. For further information, contact Lawrence R. Klemin, P.O. Box 1176, Bismarck, North Dakota 58502. Telephone (701) 255-2586.

THE WORD "BID" SHOULD BE CLEARLY AND DISTINCTLY MARKED ON THE OUTSIDE OF THE ENVELOPE CONTAINING YOUR BID.



APPENDIX E

EXAMPLE OF A CONSERVATION EASEMENT

(Courtesy of the Ottawaquechee Regional Land Trust)

SAMPLE CONSERVATION AGREEMENT

WARRANTY DEED  
AND  
GRANT OF CONSERVATION RESTRICTIONS

WHEREAS, \_\_\_\_\_ is the owner in fee of certain real property situated in \_\_\_\_\_ County, Vermont, which has aesthetic, recreational and natural resource values in its present state, as well as value resulting from its potential future development as residential or commercial property, which property has not yet been subject to excessive development; and

WHEREAS, this property contains \_\_\_\_\_ acres of open land which is presently in active agricultural use and \_\_\_\_\_ acres of forested lands which is under management for the production of forest products; and

WHEREAS, this property provides habitat for many species of game and non-game wildlife, and is used from time to time by members of the public for hiking, skiing, hunting, and other types of recreation; and

WHEREAS, the OTTAUQUECHEE REGIONAL LAND TRUST, INC. is a non-profit corporation incorporated under the laws of the State of Vermont whose purpose is to preserve undeveloped and open space land in order to protect the aesthetic, recreational, cultural, educational, scientific and natural resources of the State through non-regulatory means, thereby reducing the burdens on local and state governments; and

WHEREAS, the economic health of Vermont is closely linked to its agricultural and forest lands, which not only produce food products, fuel, timber and other products, but also provide much of Vermont's scenic beauty, upon which the state's tourist and recreation industries depend; and

WHEREAS, the State of Vermont has repeatedly sought to foster the conservation of the state's agricultural, forest and other natural resources through planning, regulation, land acquisition and tax incentive programs, including, but not limited to, Title 10 V.S.A. Chapter 151 (Act 250); Title 24 V.S.A. Chapter 117 (Regional and Municipal Planning and Development Act); Title 10 V.S.A. Chapter 155 (Acquisition of Rights and Interests in Land); Title 32, V.S.A. Chapter 124 (Current Use Taxation), Title 32 V.S.A. Chapter 231 (Property Transfer Tax Act); and Title 32 V.S.A. Chapter 235 (Land Gains Tax); and

WHEREAS, the parties to this Grant and Agreement recognize the scenic and natural values of the property, and share the common purpose of conserving these values by the conveyance of a conservation restriction and to prevent the use or development of the property for any purpose or in any manner which would conflict with the maintenance of these scenic and natural values, except as hereinafter specifically provided; and

WHEREAS, the conservation of this property as open space land is consistent with and in furtherance of the municipal plan adopted by the Town of \_\_\_\_\_ and the regional plan adopted by \_\_\_\_\_;

NOW, THEREFORE,

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KNOW ALL PERSON BY THESE PRESENTS that \_\_\_\_\_ of the Town of \_\_\_\_\_, \_\_\_\_\_ County, Vermont, on behalf of themselves, their heirs, successors and assigns (hereinafter "Grantors"), in consideration of the agreement of Grantee to accept and enforce in perpetuity the conservation restrictions contained herein, and the payment of One Dollar and other good and valuable consideration, receipt of which is hereby acknowledged, hereby grant, sell, give, and convey unto the OTTAUQUECHEE REGIONAL LAND TRUST, INC., a Vermont non-profit corporation organized and existing under the laws of the State of Vermont, having its principal place of business in Woodstock, Vermont, its successors and assigns (hereinafter "Grantee"), a certain parcel of land lying and being in, \_\_\_\_\_ County, State of Vermont (hereinafter referred to as "Parcel A", in fee simple absolute, free from all encumbrances except those rights and restrictions further reserved herein to the Grantors, such Parcel A being described as follows:

A \_\_\_\_\_-shaped parcel of land containing \_\_\_\_\_ acres, more or less, which is part of the land and premises conveyed to Grantors by Warranty deed of \_\_\_\_\_ dated \_\_\_\_\_, recorded at Book \_\_\_\_\_, Page \_\_\_\_\_ of the \_\_\_\_\_ Land Records, to which deed, and the deeds and plans referred to therein, reference may be had for a more complete description. A further description may be had by reference to a survey map prepared by \_\_\_\_\_, dated \_\_\_\_\_, entitled \_\_\_\_\_, and recorded simultaneously herewith, at Book \_\_\_\_\_, Page \_\_\_\_\_ of the \_\_\_\_\_ Land Records, such \_\_\_\_\_-shaped parcel being designated as Parcel A upon such survey map. This conveyance is made together with the right of access over and across Parcel B, so identified upon the above-described survey map, the exact location of such access to be determined from time to time by the Grantors at a location providing reasonable ingress and egress to the Grantee, its successors and assigns. Such right of access shall constitute an appurtenance to said Parcel A, and shall run with the land in perpetuity.

The said Parcel A is conveyed together with the appurtenant benefit of a perpetual conservation easement and restriction (as more particularly set forth below) across certain other lands of Grantors (hereinafter referred to "Parcel B" or "Protected Property") contiguous with the lands conveyed in fee to Grantee hereunder, said Parcel B being more particularly described as follows:

A \_\_\_\_\_-shaped parcel of land containing \_\_\_\_\_ acres, more or less, which is part of the land and premises conveyed to Grantors by Warranty Deed of \_\_\_\_\_, dated \_\_\_\_\_, recorded at Book \_\_\_\_\_, Page \_\_\_\_\_ of the \_\_\_\_\_ Land Records, to which deed, and the deeds and plans referred to therein, reference may be had for a more particular description. A further description may be had by reference to the survey map prepared by \_\_\_\_\_, dated \_\_\_\_\_, entitled \_\_\_\_\_, and recorded simultaneously herein at Book \_\_\_\_\_, Page \_\_\_\_\_ of the \_\_\_\_\_ Land Records, such \_\_\_\_\_-shaped parcel being designated as Parcel B under such survey map.

The rights granted to Grantee consist of covenants on the part of the Grantors to do or refrain from doing, severally and collectively, the various acts set forth below. It is hereby agreed that these covenants shall constitute a servitude upon the land and will be for the benefit of the Grantee which accepts and agrees to enforce such covenants on behalf and for the benefit of the general public, through the preservation of wildlife habitats, non-commercial recreational opportunities and activities, productive agricultural and forestry uses, and other natural and scenic values of the Protected Property for present and future generations.

THE RESTRICTIONS hereby imposed upon the above described Property, and the acts which Grantors shall do or refrain from doing, are as follows:

1. The Protected Property shall be used for agriculture, forestry, non-commercial recreation, and open space purposes only. No residential, commercial, industrial, or mining activities shall be permitted, and no building or structure shall be constructed, created, erected or moved onto the property, except as specifically reserved by the Grantors under this Grant.

2. No rights-of-way, easements of ingress or egress, driveways, roads, or utility lines shall be constructed, developed or maintained into, on, over, under or across the property, except as specifically reserved by the Grantors under this Grant.

3. There shall be no signs, billboards, or outdoor advertising of any kind erected or displayed; provided, however, that the Grantors may erect and maintain reasonable boundary markers, directional signs, signs restricting hunting or trespassing on the property, memorial plaques, and temporary signs indicating that the property is for sale or lease. In addition, small signs informing the public if any agricultural or timber products for sale or being grown on the premises are permitted. Grantee, with the permission of Grantors, may erect and maintain signs designating the property as land under the protection of the Grantee.

4. The placement, collection or storage of trash, ashes, human and agricultural waste, sawdust, vehicles or equipment, or any unsightly or offensive material on the property shall not be permitted except at such locations, if any, and in such a manner as shall be approved in advance in writing by Grantee. The spreading of manure, lime, or other fertilizer for agricultural practices shall be permitted without such prior written approval.

5. There shall be no disturbance of the surface, including but not limited to filling, excavation, removal of topsoil, sand, gravel, rocks or minerals, or change of the topography of the land in any manner, except as may be reasonably necessary to carry out the uses permitted on the Protected Property under the terms of this Agreement, provided that in no case shall surface mining of subsurface oil, gas or other minerals be permitted.

6. The Protected Property shall not be subdivided.

7. No use shall be made of the premises, and no activity thereon shall be permitted which, in the reasonable opinion of the Grantee, is or may possess the potential to become inconsistent with the intent of this grant, such intent being the preservation of the premises predominantly in its natural

condition, the protection of environmental systems, the protection of the property's scenic beauty, and the encouragement of the sound utilization and conservation of agricultural and forest resources.

NOTWITHSTANDING THE FOREGOING, Grantors reserve the following rights in the Protected Property:

1. The right to establish, reestablish, maintain and use cultivated fields, orchards, and pastures in accordance with generally accepted agricultural practices and sound husbandry principles.

2. The right to conduct maple sugaring operations in accordance with generally accepted practices.

3. The right to harvest timber and other wood products, together with the right to construct and maintain logging roads necessary to effect such harvest, in accordance with generally accepted forestry practices and in accordance with a forest management plan for which Grantor has received the prior written approval of Grantee, except that Grantors may harvest firewood for heating residences and structures located on the Protected Property without submission and approval of a plan. Grantee's approval of forest management plans that may be submitted from time to time shall not be unreasonably withheld or conditioned, if such plans have been approved by a professional forester and if such plans do not violate the terms of this Agreement. Disapproval by Grantee of a forest management plan proposing a clearcut (removal of more than 75% of the basal area) shall not be deemed unreasonable. However, Grantee may approve such plan in its discretion if consistent with the purposes of this Agreement, such as to permit the planting of a different species of trees or the establishment or reestablishment of a field, pasture or garden.

4. The right to utilize, maintain, establish, construct and improve water sources, courses, and bodies within the Protected Property for uses otherwise permitted hereunder, provided that Grantors do not unnecessarily disturb the natural course of the surface water drainage and runoff flowing over the property. The construction of ponds or reservoirs shall be permitted only upon the prior written approval of Grantee. Such approval shall not be unreasonably withheld or conditioned, unless such construction would conflict with an important purpose of this Agreement, such as the protection of a natural resource or wildlife habitat.

5. The right to clear, construct, and maintain trails for walking, horseback riding, skiing, and other non-motorized recreational activities within and across the Protected Property, except that snowmobile travel shall also be permitted.

IT IS HEREBY AGREED that the construction of any buildings, structures or improvements, or any use of the land, otherwise permitted under this Agreement, shall be in accordance with all applicable ordinances, statutes and regulations of the Town of \_\_\_\_\_ and the State of Vermont.

GRANTEE shall make reasonable efforts from time to time to assure compliance by Grantors with all of the covenants and restrictions herein. In connection with such efforts, Grantee may make periodic inspection of all or any portion of the Protected Property, and for such inspection and enforcement purposes, the Grantee shall have the right of reasonable access to all of

Parcel B. In the event that Grantee becomes aware of an event or circumstance of non-compliance with the terms and conditions herein set forth, Grantee shall give notice to Grantors of such event or circumstance of non-compliance via certified mail, return receipt requested, and demand corrective action sufficient to abate such event or circumstance of non-compliance and restore the Protected Property to its previous condition. Failure by the Grantors to cause discontinuance, abatement or such other corrective action as may be demanded by Grantee within 48 hours after receipt of notice shall entitle Grantee to bring an action in a court of competent jurisdiction to enforce the terms of this Agreement and to recover any damages arising from such non-compliance. Such damages, when recovered, may be applied by Grantee to corrective action on the Protected Property, if necessary. If such Court determines that Grantors have failed to comply with this Agreement, Grantors shall reimburse Grantee for any reasonable costs of enforcement, including court costs and reasonable attorneys fees, in addition to any other payments ordered by such Court. The parties to this Grant specifically acknowledge that events and circumstances of non-compliance constitute immediate and irreparable injury, loss and damage to the Protected Property and, accordingly, entitle Grantee to such equitable relief, including but not limited to injunctive relief, as the Court deems just. The remedies described herein are in addition to, and not in limitation of, any other remedies available to Grantee at law, in equity or through administrative proceedings.

PROVIDED, HOWEVER, that Grantors reserve to the benefit of Parcel B conservation easements and restrictions encumbering Parcel A, such reserved easements and restrictions to be the same as those conveyed to Grantee herein encumbering Parcel B, and to be appurtenant to Parcel B, permanent and perpetual, and running with the land. Grantee hereby agrees that those persons owning Parcel B from time to time shall have the use and enjoyment of Parcel A, to the extent that such possession, use and enjoyment are not inconsistent with the rights and obligations, easements, and restrictions conveyed to the Grantee by this deed.

The Grantors shall pay all real estate taxes and assessments levied by competent authorities against the Protected Property, as well as against Parcel A, and shall hold Grantee harmless from the same.

INVALIDATION of any provision hereof shall not affect any other provision of this Agreement.

TO HAVE AND TO HOLD said granted premises, with all the privileges and appurtenances thereof, to the said Grantee, OTTAUQUECHEE REGIONAL LAND TRUST, INC., its successors and assigns, to their own use and behoof forever; and we the said Grantors, \_\_\_\_\_ for ourselves and our heirs, executors and administrators, do covenant with the said Grantee, OTTAUQUECHEE REGIONAL LAND TRUST, INC., its successors and assigns, that until the sealing of these presents we are the sole owners of the premises, and have good right and title to convey the same in the manner aforesaid, that they are free from every encumbrance, and we hereby engage to warrant and defend the same against all lawful claims whatever.

IN WITNESS WHEREOF, we set our hands and seals this \_\_\_\_\_ day  
of \_\_\_\_\_, 198\_.

Signed, sealed and delivered in the presence of:

GRANTORS:

\_\_\_\_\_  
Witness to Both

\_\_\_\_\_

\_\_\_\_\_  
Witness to Both

\_\_\_\_\_

\_\_\_\_\_  
Witness

GRANTEE:

OTTAUQUECHEE REGIONAL LAND TRUST, INC.

\_\_\_\_\_  
Witness

By: \_\_\_\_\_  
Its Duly Authorized Agent

STATE OF VERMONT  
WINDSOR COUNTY, ss.

At \_\_\_\_\_, Vermont, this \_\_\_\_ day of \_\_\_\_\_, 198\_\_,  
\_\_\_\_\_ personally appeared and  
\_\_\_\_\_ acknowledged this instrument, by \_\_\_\_\_ sealed and subscribed, to  
be \_\_\_\_\_ free act and deed.

Before me,

\_\_\_\_\_  
Notary Public

STATE OF VERMONT  
WINDSOR COUNTY, ss.

At \_\_\_\_\_, Vermont, this \_\_\_\_ day of \_\_\_\_\_, 198\_\_,  
\_\_\_\_\_, duly authorized officer of the Ottawaquechee  
Regional Land Trust, Inc., personally appeared and \_\_\_\_\_ acknowledged this  
instrument, by \_\_\_\_\_ sealed and subscribed to be \_\_\_\_\_ free act and deed and  
the free act and deed of the Ottawaquechee Regional Land Trust, Inc.

Before me,

\_\_\_\_\_  
Notary Public

APPENDIX F  
EXAMPLE OF RESTRICTIVE COVENANTS DESIGNED TO  
PROTECT NATURAL ENVIRONMENTS

Source: Declaration of Covenants, Conditions, and Restrictions for  
Forbes Park, Costilla County, Colorado, pp. 8,9.



**ARTICLE VIII  
PROTECTIVE COVENANTS**

The following restrictions, conditions and covenants, collectively called "Protective Covenants", are imposed upon all the Lots, Condominium Units where applicable, and Common Areas without limiting or altering the provisions of Article VII.

- (a) Any tank for the storage of gas or liquid shall be hidden from the view of other Lots and the Common Area.
- (b) No kennel or other facility for raising or boarding dogs or other animals for commercial purposes shall be kept in Forbes Park. No animals of any kind shall be raised, bred or kept in Forbes Park except reasonable numbers of dogs, cats or other ordinary household pets. No poultry may be kept in Forbes Park. No dog shall be allowed to run loose except when accompanied by a person capable of keeping such dog under surveillance and control.
- (c) All refuse, rubbish, trash, garbage or waste shall be kept, disposed of or removed in a sanitary manner. All household refuse and rubbish, trash, garbage or waste shall be kept in closed containers inside a building or other approved enclosure until taken to a disposal place operated or licensed by the proper public authority for such disposal. Nonhousehold refuse, rubbish, trash, garbage or waste, other than dead leaves and fallen limbs shall not be permitted to remain exposed on a Lot.
- (d) Any vehicle, whether selfpropelled or not, permitted to remain on any Lot or Common Area shall be kept in a licensed and operable condition. Any vehicle, whether selfpropelled or not, shall be parked in such a manner that it is not a nuisance, aesthetically or otherwise, to other Members. A truck larger than three-quarter (3/4) ton rating shall only be kept on a Lot inside an approved building except during any period of authorized construction. A vehicle shall not be parked on that part of any road normally used by vehicles being driven on such road. The provisions of this paragraph shall not apply to Declarant during time of construction of roads.
- (e) Noxious, obnoxious, noisy, unsightly or otherwise offensive objects or activities, specifically including vehicle repairs, barking dogs and littering shall not be permitted nor shall anything be permitted that may be an unreasonable annoyance or nuisance to other Owners.
- (f) A professional quality sign of not more than four (4) square feet in area shall be allowed to be displayed on a Lot for any purpose and one (1) additional sign of not more than four (4) square feet in area shall be allowed to be displayed for advertising such Lot or improvement thereon for sale, lease or rent.
- (g) A structure of a temporary or mobile nature, motorhome, mobile home, camper truck, travel trailer, camping trailer, other vehicle used or designed for camping, or tent, shall not be placed on a Lot for more than three (3) consecutive nights and days more than once each calendar month except that the Committee may grant a permit (1) for any of the above to be placed on a Lot and used for longer periods of time during construction of a dwelling, diligently pursued, or, (2) for vacation camping under the conditions and procedures provided in Article VII hereof. Subject to the prior written approval of Declarant, with respect to the real property described in Exhibit C, the Board may designate a part of the Common Area as a storage area for all vehicles that are prohibited from being placed on a Lot.
- (h) All septic systems operated with water from wells drilled under permits obtained pursuant to the Decree of the District Court in and for Water Division No. 3, State of Colorado, Case No. W-3312, shall be limited to sewage disposed of by septic tank and absorption fields, the effluent of which shall return to groundwater in the drainage basins in which such wells are located. Said absorption fields and septic tank installations shall be constructed in conformance with the standards and requirements of state and county health authorities. Notwithstanding the foregoing requirements, the Committee may approve an evaporative field septic system if the construction of a septic tank and absorption field would cause a hardship in any particular situation and if the Committee is permitted to do so under a modification of the Decree in Case No. W-3312.
- (i) Any outdoor fire shall be made in a facility or a receptacle having a properly operating spark screen. All fireplaces whether inside a building or outdoors shall have an operational approved spark screen covering the top of the chimney. Any condition which creates a fire hazard shall not be permitted on a Lot.
- (j) No single-family residence or Condominium Unit, exclusive of open porches, garages and carports, shall be less than six hundred (600) square feet in main floor area. No more than one (1) single-family residence plus appropriate ancillary buildings may be erected on a Lot not designated a Commercial Lot. No commune, cooperative or similar type living arrangement shall be permitted anywhere in Forbes Park.
- (k) All water derived from wells permitted by the State Engineer of the State of Colorado pursuant to the provisions of the Decree of the District Court in and for Water Division No. 3, State of Colorado, in Case No. W-3312, shall be used for domestic in-house use only.
- (l) No commercial enterprise shall be operated other than on a Commercial Lot.
- (m) Building materials shall not be placed on a Lot nor shall foundation work be started for any improvement unless such improvement has previously been approved by the Committee. Once approval is obtained, such improvement must be completed within twelve (12) months after building materials are first placed on such Lot or foundation work is begun.
- (n) A wire fence shall not be permitted on a Lot except one such fence enclosing not more than 1600 square feet for the purpose of enclosing household pets.
- (o) Hunting shall not be permitted.
- (p) Firearms, explosives, fireworks or arrows shall not be used, shot or discharged except in such areas as may be designated by the Association for such use, shooting or discharging.
- (q) Explosives shall not be used for construction purposes unless such use has been approved by the Committee.

- (d) Excessively noisy vehicles of any kind, all-terrain vehicles, trail-bikes, helicopters, aircraft or motorcycles shall not be used anywhere in Forbes Park.
- (s) Chain saws shall not be used without a proper spark arrester on the exhaust and chain saws or other noisy equipment shall not be operated before 8:00 A.M. or after 5:00 P.M.
- (t) All telephone, electrical power, and other receiving or transmission lines shall be placed underground except that such lines on poles shall be permitted (1) in the case of major lines to areas of Forbes Park as Declarant deems appropriate and (2) where the Committee determines underground lines are unreasonably expensive or otherwise impractical.
- (u) Existing tree lines on all Lots and Commercial Lots shall not be disturbed or altered and, wherever practicable, all improvements shall be placed a reasonable distance behind such tree lines as determined by the Committee.
- (v) Any tree having a diameter at the base greater than four (4) inches shall not be cut down without prior approval of the Committee.
- (v) A Lot shall not be subdivided or partially leased except a Commercial Lot owned by Declarant.
- (x) Snowmobiles shall not be operated except in transit to or from such parts of the Common Areas as the Association and Declarant may from time to time designate as snowmobiling areas.
- (y) Any vehicle requiring its operator to have an operator's license under the laws of the State of Colorado shall be operated only by a person having a valid operator's license.
- (z) All improvements shall be maintained in such a manner that they do not become (1) unsightly, (2) in disrepair, (3) unsanitary or (4) a fire hazard.
- (za) No guest house, garage, carport or other outbuilding shall be constructed on any Lot until after commencement of construction of the dwelling house on the same lot.

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