LAND AND WATER PROBLEMS: AN INSTITUTIONAL PERSPECTIVE*

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The two questions to be addressed here are: (1) why is an institutional perspective on natural resource problems worthy of serious consideration by economists; and (2) what is the nature of that particular view of public policy questions concerning natural resources? The first question must be considered in a relative sense--as a methodological enquiry into the logic and robustness of the conventional wisdom. That is, the case for an institutional perspective must rest on our evaluation of the prevailing orthodoxy in terms of providing scientific guidance in matters of collective action. My purpose is to convince you of some important shortcomings of that orthodoxy. Once we have accomplished that, I can turn to a brief overview of the economics of collective action from an institutional point of view.

I. POLICY PRESCRIPTIONS AND THEORETICAL INCONVENIENCES

I will start by drawing your attention to four theoretical constructs in current economic thought; constructs that are at the center of policy prescriptions being advanced by many natural resource economists. The four concepts to be discussed here are Pareto optimality, the notion of Pareto-irrelevant externalities, the intertemporal allocation decisions of private resource owners, and the scientific basis for decisions about particular institutional arrangements.

Pareto Optimality

The concept of Pareto optimality is the foundation for collective action in economics, and its application in natural resource policy is widespread; benefit-cost analysis, as the applied extension of welfare economics, is predicated upon the (Kaldor-Hicks) potential compensation test. A potential Pareto improvement is said to exist when the gainers can compensate the losers and still retain a surplus. The problem is, of course, that compensation is never actually paid.

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Devotion to Pareto optimality is based on the widespread belief that economic efficiency is the only matter on which economists can pass scientific judgement. This view is so thoroughly ingrained in our discipline that one despairs of ever establishing its fallaciousness-- in spite of impressive theoretical evidence to the contrary [Chipman and Moore; Dobb; Field; Graaff; Lang; Little; Mishan 1969,1974; Nelson; Robbins; Tribe].

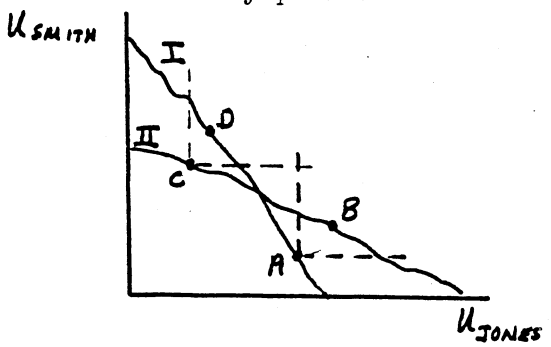
The myth of scientific objectivity in Pareto optimality can be addressed in two ways. A contract curve defines all possible points that are considered Pareto optimal in exchange space as well as in input space. A production possibility frontier defines all possible points that are Pareto optimal in output space. Since the contract curve and the production possibility frontier are infinitely dense it follows that there are an infinite number of Pareto optimal points. Now a single point on a production possibility frontier is mapped into a utility possibility frontier in utility space; such frontier also containing an infinite number of points. All of these points are feasible points in terms of technical efficiency. It is the constellation of prices that determines economically efficient points out of the larger set of technically efficient possibilities, assuming that all of the other conditions of competitive equilibrium are met.

Where do these prices come from, and what social sanction do they possess to play such a critical role in the economic organization of a society? Prices come from the interplay of demand and supply; the former is determined by the tastes and wealth position of the members of the society under study, the latter is jointly determined by technical conditions and property rights that bestow control over all inputs, goods, and services. That is, property rights establish the ability to withhold valuable items from the market--at least until the price is acceptable. And one's endowment determines one's ability to pay for scarce items. One's endowment also determines how long an individual can refrain from engaging in market activity; the millionaire can refuse to sell her labor long beyond when the pauper is forced back into the market.

When economists unequivocally endorse market outcomes and claim that income distribution is something for politicians and sociologists to worry

about--and that economists will confine themselves to matters of science--they are assuming that the current distribution of income is optimal [Azzi and Cox].

The other attack on Pareto optimality would allow collective decisions to be made on the basis of the potential compensation test, but would then use the distributional issue to destroy the validity of the test. The argument would proceed as follows. A public project is contemplated that would allow the potential compensation test to be met. That is, it may be possible to move to a point on a higher utility possibility frontier. However, there is no guarantee that once we move from the status quo (goods bundle I) to the new situation (goods bundle II) that the ultimate distribution of goods and services would not be such that we actually occupy a Pareto-inferior point. That is, once at bundle II we discover that a move back to the original bundle would be a Pareto improvement. Ironically, this return to the original goods bundle could have been accomplished initially by a redistribution of the existing goods and services instead of by the public project; this is the Scitovsky paradox.



In Figure 1 this can be seen in that a move from point A (on I) to point B (on II) is the potential Pareto improvement promised by the public project. However, since the potential compensation test does not require that the gainers actually compensate the losers there is no assurance that the distribution of goods and services under II would not yield point C. Once we obtain C it is obvious that a Pareto improvement can be achieved by moving to point D. But, of course, point D could have been achieved by a simple redistribution of goods and services under the original configuration (I without the project) such that the utilities of the two individuals were given by point D. A move from a Pareto inferior point to one that is, by comparison, a Pareto improvement (a move from A to B) may not satisfy the

Pareto criterion for the simple reason that the ultimate distribution of goods and services (C) may imply that Smith was made better off at the expense of Jones; a clear violation of the Pareto criterion. Moreover, point C is Pareto non-comparable with point A; B is Pareto comparable with A, and D with C, but A is non-comparable with C and D, and C is non-comparable with A and B.

Those who insist on ignoring distributional aspects of collective action are guilty of distorting the very theoretical construct to which they appeal for "scientific" justification for their policy prescriptions. Our desire to separate the size of the social dividend from the way in which it is distributed ("efficiency" versus "equity") is inconsistent with the two Paretian value judgements that lie at the core of frequent pronouncements about optimality. The two value judgements are: (1) that individual preferences count; and (2) that a ceteris paribus increase in the welfare of one individual increases aggregate social well being. Only in a one-commodity world can we be sure of the size of the social dividend; in a multicommodity world it is not possible to combine the various goods and services into a single quantity without assigning weights. But those weights must be prices or coefficients from a Paretian welfare function. In either case the weights only tell us how to factor the multiple outputs based on the current distribution of income and goods and services. It is impossible to separate size from distribution for the simple reason that we do not know size until we know the distribution of income [Graaff].

Pareto-Irrelevant Externalities

The institutional structure--of which property rights are prominent in natural resource policy--determines which costs will be reckoned by which decision makers, and hence property arrangements over natural resources determine which outcomes appear to be efficient. Put somewhat differently, we rely on markets and the bargaining that occurs therein to define what we consider to be efficient. But property arrangements define markets in that property arrangements determine what is a cost, and who must pay to achieve certain outcomes. Hence, property arrangements determine what is efficient.

Let us consider the above in two parts, the first concerning the fact that property arrangements determine which costs get reckoned by which

decision makers. If the legal structure is permissive of the discharge of toxic agricultural chemicals by airplanes in disregard of those attempting to raise bees, then certain costs are necessarily borne by apiarists. If the legal structure is permissive of the diffusion of feedlot odors across suburban neighborhoods then feedlot owners (and consumers of beef) are not made to bear the costs imposed on those so harmed. If the legal structure is restrictive of any odors leaving feedlots then individuals can build next to a feedlot and force it to be closed down with total disregard for the costs to the feedlot.

We now consider the second part of the earlier proposition--that property arrangements determine what is efficient. Recall that we employ the existence of bargained exchange as proof of a Pareto improvement. The converse is, of course, that the absence of an exchange implies that the status quo is Pareto optimal. Now imagine a situation in which a farmer's errant pesticides eliminated the majority of a neighbor's bees. If the prevailing legal structure is permissive of spraying then the absence of a payment from the apiarist to bribe the farmer not to spray would indicate that it is Pareto optimal for the spraying to have occurred (and to continue in the future). On the other hand if the prevailing legal structure protects the apiarist then it is the farmer who must come forth with the offer of payment to be allowed to spray. If the farmer is unable to secure approval then no bargain would be struck, and no spraying would occur. In each instance it is the party not protected by the property structure that must make a payment to the other party. This payment is obviously a function of the budget constraint of the party forced to make the offer [Bromley 1978; Dick; Randall]. The bulk of the costs of transacting also fall on the party that is not protected by the property structure and this reduces the net bid that can be made to the other party.

Hence, we see that the optimal outcome--that is the situation from which no move would occur--is determined by the status quo structure of property arrangements. Under one legal structure continued spraying would be the efficient outcome; under the other legal structure no spraying would be efficient. Efficiency is thus seen to be a fickle master and as such we might expect it to lose some of its appeal to economists. This matter has

been explored at length elsewhere [Bromley 1976, 1978; Dick; Mishan; Randall].

The notion of Pareto-irrelevant externalities derives from the view that when no bargains can be struck to correct existing offsite costs then the externalities must be irrelevant in a Pareto sense. It should be clear that this is a tautology. We have simply defined certain offsite costs as irrelevant in Paretian terms. Given the prevailing distribution of income and property arrangements certain external effects are "optimally" ignored; atomistic bargaining has been rescued from the collectivists. But since Pareto optimality is not a concept which exists apart from any particular institutional structure we come perilously close to the position that what exists must be optimal, otherwise it would be changed [Dahlman; Demsetz].

To those inclined to defend "the market", that defense often rests on the market as a wonderfully efficient information system: "It is largely the efficiency of prices in transmitting information, and their effectiveness in providing incentive without coercion, which make the market system attractive [Stroup and Baden, p. 306]." Overlooked in this benediction is the large overhead cost--much of it at public expense--to collect and transmit this information. Additionally, scant attention is paid to the fact that what is transmitted is simply an artifact of prevailing property arrangements, technical conditions, and the wealth position of buyers and sellers.

The Presumed Providence of Private Property

Access to, and control of, the vast public domain has recently become an important issue to politicians, the general public, and some economists. A small group of economists approach natural resource problems from the so-called "property rights" paradigm. This position does not start from any philosophical or legal inquiry into the concept of property, nor is there much interest in understanding the social functions of property on a continuum from individual property, through common property, and on to the absence of property (open access). Indeed, there is confusion about the concept of property such that common property resources and open access resources are actually treated as synonomous [Alchian and Demsetz; Baden; Demsetz; Gordon; Johnson and Libecap; Libecap].

Most of these writers do not worry about the development of models for determining optimal resource decisions for the simple reason that such models imply a need for decisions to be made apart from the calculus of self-interested wealth-maximizing individuals. The view of this school tends to be that of solving the bulk of natural resource problems by creating individual (private) property rights in natural resources.

This approach would solve the problem of access to natural resources by granting exclusive rights to the highest bidder. The management problem is presumed not to exist since the private owner would maximize the future stream of net income and so optimally allocate use rates over time--taking the right amount today, leaving the socially correct amount for the next generation. Nor is the problem of social costs today much of a problem; private owners will bargain until all Pareto-relevant externalities have been eliminated.

While some of this literature recognizes that turning public lands over to private entrepreneurs involves the exchange of one type of external cost for another [Stroup and Baden], it is not uniformly circumspect. The so-called Sagebrush Rebellion, coupled with a national administration that pays frequent tribute to the "magic of the marketplace", seems to have inspired a more unequivocal posture on the myriad benefits to be realized from establishing individual rights in the public lands. One particularly strident view with respect to western rangeland is that expressed by Baden:

> On the basis of theory, logic, empirical data, casual observation, and intuition, many agree that government is the most efficient engine ever designed for the generation of plunder. As government allocates and regulates more and more resources in society, rational individuals will increase their efforts to influence the allocative- regulative process. This is especially evident when dealing with the public lands [p.2].

Along similar lines, Libecap has recently argued for turning over the western rangelands to private owners. Specifically he argues that:

> Private property rights are essential for long-term decision making regarding investment in improvements, stocking practices, and land allocation. Those profit maximizing decisions of ranchers also maximize the net social value of rangeland and its contribution to production. There appear to be no significant external effects from private range use and, hence, ranchers (unlike bureaucrats) incur the full social costs and benefits from their efforts [p. 101].

This position implies great confidence in the intertemporal allocation decisions of rangeland owners, and--as stated--considers the external effects of range use in the current time period to be negligible. This view is consistent with widely held notions that if there are no external effects then private property will lead owners to select use rates on a socially optimal intertemporal path. However, a careful excursion into the very models that the private-property advocates consider to be imbedded in the genetic code of homo oeconomicus would reveal a complicating factor [Page]. The "iron law of the discount rate" would be a particularly inconvenient theoretical issue to those who regularly celebrate the efficiency--not to mention the beneficence-- of private property (sometimes called "residual claimancy" to make it sound less exclusionary and hence less threatening; see Baden).

In CONSERVATION AND ECONOMIC EFFICIENCY, Page notes that: "It is generally recognized among economists that a number of biological resources, like ocean fish, are being overexploited. The reason given is that fish and many other natural resources are treated by the market system as common property resources. However, the market system,even corrected for its failure with respect to common property resources, still tends to bring many biological and geomorphic resources to extinction [pp. 165-66]."

The crucial variables in the time path of resource use are the discount rate and the rate of natural productivity of the renewable resource (for stock resources this rate is zero). The iron law of the discount rate is the "harsh side" of the present value criterion since it reveals that presumed socially beneficial maximizing by individual resource owners is quite consistent with complete destruction of a resource. This is not a

happy discovery for those who place their full faith in the magical wonders of private property. Nor would it be pleasant to be reminded that a precarious cash flow position, uncertainty, or specific tax laws might all combine to lead a private owner to liquidate a particular natural resource. The legal doctrine of "waste" exists for precisely this reason.

Note that the issue here is not one of being for or against private ownership of certain goods; there clearly are instances where complete privatization is both equitable and efficient. Rather, the question here is one of turning over complete control of future income streams to single decision makers who must answer to no-one for their actions. In a world of breathtaking greed and acquisitiveness the burden of proof regarding intertemporal efficiency and equity must rest with those who predict such happy outcomes from thoroughgoing privatization of natural resources. To assert that this will occur by dint of the invisible hand is to let faith masquerade as science.

Efficiency and "Optimal" Institutional Arrangements

The final theoretical inconvenience deals with the widespread presumption that we can use (presumably) objective efficiency criteria to determine the optimal structure of institutional arrangements--most often those institutions which concern valuable objects (property institutions). To a certain extent this discussion draws on some of the prior arguments, but it warrants its own separate treatment.

We can identify two quite common applications of the efficiency criterion in matters of determining the "optimal" property arrangements. The first is the use of efficiency as a normative guide to the ownership of public lands; that is, would it be more "efficient" to leave them under public control or turn them over to private control? The second is the use of efficiency analysis to determine whether a particular party ought to be allowed to discharge pollutants into the environment. Let us consider the theoretical issue before turning to the two examples.

Recall that for any particular structure of resource endowments there is a unique efficient point--this will be an equilibrium point under conditions of thoroughgoing perfect competition (and all of the conditions that implies). Efficiency and inefficiency have a clear meaning within that

institutional milieu, and we might confidently use conventional methods to seek out obvious inefficiencies. But it is beyond the scope of our paradigm to compare a particular allocative point (efficient or otherwise) with a point inside of a different institutional structure.

That is, since the essence of different institutional arrangements is to create alternative access to income streams--and so to make some better off and others worse off (at least relatively speaking)--there can be no scientific basis for comparing two allocations existing within two different institutional settings. This implies that we cannot derive scientific conclusions to say that the status quo allocation of resources under the prevailing institutional milieu is to be preferred (or is to be considered less desirable) than an efficient allocation under an alternative institutional environment. Moreover, we have no scientific way of concluding that an inefficient allocation of resources in the status quo is less preferred than an attainable efficient allocation under a new institutional structure.

In the absence of decisive information on the nature of the social welfare function--that is, who counts more Smith or Jones-- there is no scientific basis to make judgements about maximizing social well being strictly on the basis of efficiency criteria. Economists are wont to equate economic efficiency with social optimality and hence it is quite understandable that there should be confusion on this matter. All that can be said is that Pareto optimality is necessary for social optimality--it is hardly sufficient.

When discussing the assignment of property rights to lands that are currently under public control the temptation is practically irresistible to compute the net present value of goods and services arising under the two different institutional arrangements. Then the conclusion is reached that the institutional structure yielding the highest net present value is to be preferred. This is fallacious for the simple reason that it rests on the potential compensation test. We see similar logic applied to matters of pollution control; often expressed as giving the right to pollute to the "highest bidder" [Posner].

However inconvenient it may be, property arrangements determine access to income streams; the political process is, to some extent, a tussle over

such streams. Since there is no divine authority to whom we might appeal for guidance on the appropriate income stream for each member of society, the problem reduces to one of taste and political expediency. Any logician could remind us that one cannot derive normative conclusions from the logical postulates of the private-property advocates. Considering one efficient outcome socially preferred to another outcome (which may or may not be efficient within its own institutional structure) is doing precisely that.

II. TOWARD AN INSTITUTIONAL PERSPECTIVE

The above discussion has focused on theoretical issues which are often ignored by economists intent on making policy recommendations. The essence of that discussion is that Pareto optimality--and economic efficiency analysis--are not an adequate basis for guiding collective action. This is doubly so when such action involves changes in the institutional arrangements that define individual and group opportunity sets. It is the nature of these opportunity sets, and how they become defined, that is of interest here.

On Institutions

At the most general level of abstraction, a social system contains three major components. One is the natural environment and the physical capital that has been created to utilize raw materials in the manufacture of goods and services. A second component is the structure of social conventions and rules that both control and liberate humans in their dealings with each other. Subsumed here are those conventions, and rules that define individuals vis-a-vis objects of value and their associated income stream. This latter subset is referred to as property relations. The third component is the superstructure wherein we find the belief system, values, art, religion, and science. The superstructure has a dual role of legitimizing those relationships in the structural component (this is the role of science, religion, and values), as well as searching for new structures (art and science). The structural component provides the working rules for the going concern that we call society. The first component (infrastructure) represents the productive base of the system [Harris].

Our interest here is in the structural component, for this is where we find institutions. Note that institutions are not organizations; small wonder that there is confusion when many believe that an institution is the Soil Conservation Service, or the Department of Justice.

Institutions are collective conventions and rules that establish acceptable standards of individual and group behavior. As such, organizations are defined by institutions. That is, when institutions define a going concern--be it a farm, an insurance company, or a government bureau-- we must distinguish between the institutions as the norms and principles that define the organization, and the organization itself which is the operationalization of the institutions.

Since institutions define organizations, firms are simply the physical manifestation of a constellation of institutions. The relevance of this for our present purpose is that externalities--being the result of a divergence between the nominal and real boundaries of a going concern--are reduced to institutional problems. And when economists advocate "corrective taxes" the rationale is to eliminate that divergence. Hence, an institutional perspective would start with the firm as a variable concept rather than as a fixed and immutable entity. The analysis would then focus on the implications of changes in the choice domain of the firm.

The Firm

Since firms embody institutional arrangements, we can say that the firm is a socially sanctioned organizational entity that has authority to make allocative and redistributive decisions in whatever manner it chooses, and for its own reasons. The firm is a centralized contracting agent that engages in a team production process. It is a specialized surrogate market. Outside of the firm price movements guide resource flows; inside the firm these market transactions are replaced by entrepreneurial direction.

The reason for the existence of the firm can be found in the necessity of avoiding the costs of carrying on all transactions--every day--in a market. Team production will become a firm if it yields an output larger in value than the output possible through separable production in decentralized markets. But this larger value must be sufficient to cover the costs of

organizing and disciplining members of the team. If this joint value is not adequate to cover these extra costs, the activity will occur across decentralized markets. Simply put, firms arise to reduce transaction costs [Coase, Williamson].

The firm is a constellation of contracts among owners of factors of production, and the coordination decisions fall into two categories. First we have those items to which full control has been acquired through purchase; in the factory this would be the raw materials, the equipment, and so on. Second we have those items to which partial and temporary control has been acquired through the payment of wages, salary, retainers, and commissions.

The compelling logic of the firm is internal sovereignty, coordination, and control. The size of the firm is a function of the number of individual transactions that come under the control of the coordinator rather than passing through a market. The social justification for the firm rests on the efficiency with which complex production processes can be organized and coordinated.

Externalities exist when decisions made by a firm hold important implications for other firms (or consumers) beyond the recognized boundaries of the firm, and there are no contracts for those impacts. The emphasis is on contracts since we defined a firm in terms of contracts that permitted the firm to acquire control over certain important factors of production. When services are used by the firm--or when disservices are visited on others by the firm--in the absence of contractual agreements and accompanying compensation then atomistic wealth maximization may be anti-social, as well as being inefficient.

Since the firm is defined by the domain over which it has complete control, we see here a situation in which there is an incongruity between the nominal domain of the firm, and the real domain of the firm. The nominal domain is that which is assumed by the firm, and that which is defended mightily in legislative and judicial proceedings concerning the firm's managerial autonomy from the larger society. The real domain of the firm encompasses all of the services used--and disservices created-- for which contracts may or may not exist. When economists (or others) discuss

land and water issues it is invariably a conversation about the divergence between the presumed nominal domain of the firm, and its real domain.

For the most part, neo-classical economics views the firm as a production function. Williamson argues that so viewing the firm makes it difficult to assess the firm as a governance structure. To this I would add that viewing the firm as a production function causes us to miss the dynamic that shows up in altered choice sets for the firm; to simply be concerned with shifts in the position or the shape of a production function is to overlook the essence of what constitutes a firm. What defines the firm is the range of choice for command decisions (extra-market control) not the physical (or even economic) relationship between services which enter through one door and products which leave via another. It is the position of the boundary of the firm--that frontier which divides market processes from command processes--that is of increasing interest in economic analysis.

The resource economist should be interested in a number of public agencies that are also defined by institutional arrangements. The Environmental Protection Agency, the Soil Conservation Service, the Bureau of Land Management, and the Forest Service are organizational manifestations of particular institutional structures. The private firm and the public agency come together at certain points on their respective boundaries to mediate conflicts. Social progress is a problem of constantly reassessing the division of entrepreneurial authority as between these two entities. When the public sector takes back some authority earlier granted to the private sector--and many forget the crucial fact that private firms receive their sanction and "franchise" from the citizenry through government--there will surely be cries of anguish, and charges that someone's "freedom" has been reduced. However, one person's government intervention is another's government protection. This joint determination of the legitimate range of choice leaves neither party happy, but it is a necessary aspect of the modern mixed economy.

III. AN INSTITUTIONAL PERSPECTIVE ON NATURAL RESOURCES

Most resource economists operate in complete isolation from--and ignorance about--the role of the courts and the legislatures. Commons spent the greater part of his life attempting to determine the ways in which new

income streams were accorded protection by the state. To be satisfied with values and prices that emanate from markets is to overlook fundamental sources of value in a capitalist economy. It is the courts and the legislatures (and to a lesser extent administrative agencies) where rights, duties, privileges, and exposures are debated, considered, and determined. An institutional perspective would necessarily be concerned with this process of value determination. Our natural tendency, however, is to search for instances where volitional exchange might be relied upon for indications of value, as well as for solutions to a variety of resource problems; where such trades are possible we usually seem satisfied that efficiency has been enhanced. We have no such confidence that equity will be improved. However, in most matters of natural resource policy, actual trades are never made--all exchange (and so compensation) is hypothetical. And, as indicated earlier, what is efficient need not qualify as an improvement in aggregate welfare.

While some will view this situation as one of extreme nihilism, I am not so inclined. It is only nihilistic if we insist that the only legitimate role for economists is to pass judgement on efficiency--leaving distributional considerations for others. That view has, hopefully, been adequately discounted in the earlier discussion. But what can economists do? I believe it is possible to consider an expanded social choice domain in which efficiency and distributional matters are treated explicitly. We might think of a formulation that attempts to define in general terms the kind of society we wish to have. If that goal is defined in terms of certain attributes--per capita income growth, employment, minimum income levels, certain levels of environmental quality--then economists more than any other scientists are well equipped to offer guidance in attaining those objectives. Ours is, after all, the science of choice. We can formulate alternative means of achieving prespecified ends and can assist in identifying those that seem the most feasible. This, too, is a form of efficiency analysis. But it is not an efficiency analysis that ignores goals other than narrow economic efficiency. It is, instead, an analysis which recognizes that few wish to be inefficient in achieving prespecified goals.

On this analytical tack, it would become obvious that private firms and public agencies are but two organizational forms for achieving certain ends. Access to, and control over, public lands would not be determined on the basis of the net economic benefits from timber sales, or grazing permits, or mineral leases but would instead be considered in a broader context of providing a suitable environment in which a number of competing uses might exist side by side.

In pollution problems we would assist in striking a balance where public and private nuisances exist, and in the process would illustrate the advantages of a policy that emphasizes the spatial separation (where possible) of incompatible uses. If separation is not possible, then equitable policies can be suggested to minimize the costs of change.

The presumed rights of land owners will continue to be challenged as new tastes and preferences call into question existing land-use practices [Braden; Bromley 1981]. In each of these instances economists can offer valuable analytical insights. An institutional perspective would proceed from a recognition that the boundary of the firm--the domain of choice open to the entrepreneur--is a policy variable along with tax policy, public expenditure policy, and the like. After all, our economic system encompasses a number of instances where choices formerly thought to reside entirely with the firm are now understood to be matters of collective choice. Examples would be federal meat inspection, state inspection of milk-handling procedures, worker safety, impact standards for automobile bumpers, and speed limits. All of these are institutional arrangements that alter the presumed sanctity of the firm.

With the firm viewed as a variable concept rather than as a production function, our analytical attention can focus on the interplay between command decisions, market decisions, and those choices that have been removed from the firm entirely. This would contrast to current practice which seems confined to studying the cost implications of various "restrictions" on the choice set of the firm. Under this common form of analysis, economists are reduced to comparing "efficiency losses" with the presumed "efficiency gain" to be realized from the regulation. Such partial analysis not only imparts great sanctity to the status quo, it distracts us from inquiring into the larger economic issues concerning prevailing

property entitlements. By so constraining our analytic focus, we ask too little of our discipline, and we are relegated to rather minor accounting of the effects of policy choices that almost certainly perpetuate a social sub-optimum.

Those of you living in the West are acutely aware of the struggle over the benefit stream arising from the public lands; some individuals wish to climb mountains on motorcycles, others wish to picnic on dung-free meadows, still others wish to be spared the trauma of seeing a tree being cut down, some aspire to get rich from the minerals lying beneath the meadow, and still others want their cows to have the grass in that meadow--and without being harassed by picnickers. The problem is, of course, one of competing uses.

There are some economists who would have us believe that the access problem ought to be solved by determining the most efficient allocation scheme based on willingness to pay on the part of would-be user groups. However, to advocate the market solution to competing uses of the public lands on the grounds that it would be "more efficient" is to ignore the logically prior question of collective choice over the desired scope of bargained exchange in society [Okun]. I remind you that not all things which are scarce and valuable are bought and sold. And, of course, what is to be bought and sold changes through time; people were commoditized long before land, though in recent times humans have become less alienable, while land as a commodity is now quite well accepted.

I would argue that the proper perspective on access to, and control of, the public lands would start with a careful study of our European heritage wherein only a very few could avail themselves of hunting and fishing activities. Private-property advocates overlook this institutional heritage in their quest to convince us of the current "inefficiencies" of public land administration. Since the original decision on reserving certain lands in the public domain was not made on economic efficiency grounds, it requires a special boldness now to insist that "inefficiency" requires privatization. I can well imagine a scenario in which New York's Central Park might be sold to the highest bidders for yet more skyscrapers--all in the name of economic efficiency. In the upper midwest we have thousands of lakes where public access is restricted by private landowners comprising a distinct minority of

the financially comfortable. It would be difficult indeed to prove that economic efficiency or equity is well served by this particular institutional arrangement. But of course, this issue--just as with control over the public lands--must ultimately be decided on the basis of social tastes writ large; no presumptively objective analysis that is absent a vision of the relevant social welfare function can pretend to resolve this dispute on putative efficiency grounds. After all, it was with a particular social welfare function in mind that our founders determined that certain natural resources would remain the common property of all--not the private property of the fortunate few. Economists would do well to admit that resource allocation decisions--and in this instance the prior institutional arrangements that define and determine those allocations--carry quite as much social legitimacy as those allocations arising from a market. Markets are, after all, creations of society and not conversely.

Therefore, it seems to me that matters of control over scarce and valuable natural resources ought to be decided on a basis of broad social instrumentality rather than on the basis of narrowly construed--and publicly scorned--Pareto optimality. Such an instrumental focus would concentrate on avoiding obvious inefficiencies, but would pay considerable attention to the various individuals and groups affected by certain policies. It is important to know who gains and who loses by the policy alternatives.

In closing, let me suggest three fundamental economic questions concerning natural resource use.

1. Who is in control of the management rules (institutions) that determine the time-rate of use of natural resources?
2. Who is in a position to receive the benefits arising from any particular use pattern?
3. Who is exposed to the costs arising from the use of natural resources?

By focusing on the question of who is involved in these three questions we come immediately to what I consider to be the essence of natural resource economics. Most orthodox economists show considerable aversion to analysis that focuses on questions of who controls natural resources, who benefits from that control, and who pays for current use patterns. Unfortunately, these are the very questions that occupy those in a position to make policy. We can continue to disregard their research agenda, but to do so is to insure remaining outside of the policy process.

An institutional perspective on natural resource problems is decidedly not opposed to rigorous theoretical models; indeed my criticism of economic orthodoxy is that it is carried out in isolation from well-established conclusions in welfare economics. The theory of orthodoxy is a rather selective theory--using concepts which can be formulated in dynamic optimization terms, ignoring inconvenient concepts where needed. The institutional economists is quite justified in returning an epithet that has for so long been smugly hurled in his/her direction; that is the charge of insufficient attention to economic theory.

A reformulated economics of natural resources would start with careful attention being paid to those who seek access to the benefit streams, those who control use rates, and those who bear the costs of use. This attention would take the form of analysis that focused on alternative institutional arrangements to deal with particular resource conflicts; consistency across diverse regions of the country may be less important than workable solutions to local problematic situations. Land use conflicts are a good example of this. Efforts to devise institutional arrangements for national policy are thwarted by the intensely local nature of the problem.

My work in the developing countries convinces me that natural resource economists might profitably borrow methods employed by agricultural economists concerned with the development of markets, or production schemes, or credit schemes. While this work is not without its failures, it has been characterized by a refreshing degree of relevance owing, in large part, to its particularism. A constant alertness to new problematic situations, and a willingness to innovate, would seem to hold some promise; even if this must come at the expense of elegant but dubious generality.

Concern for natural resources is a public policy problem precisely because markets do not produce socially acceptable results, or because market processes cannot be instituted. Economists have often been relegated to the role of making critical comments about existing public policy, but offering in return little more than formal and irrelevant policy fictions. An institutional perspective on natural resource problems would start with the public problem out "on the ground" and devise conceptual models to explain that situation; orthodoxy need not be abandoned in the process. But neither should received theory motivate the enquiry to the extent that the

problem on the ground is distorted beyond hope. Most importantly, we must avoid invoking Pareto optimality as a collectivist norm in the belief that it has theoretical or popular sanction; it enjoys neither.

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