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PRIVATE PROPERTY, MARKET TRADE, AND WILDLIFE CONSERVATION

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The factors responsible for the decline of wildlife populations can be placed into one of two general categories: overexploitation of animal populations or modification of habitat, including indirect effects of such factors as pesticides. While overexploitation, and particularly illegal overexploitation, is not out of the picture, the major threats to wildlife today more often appear in the form of competition for habitat (Davis, et al.; Grimwood; Myers, 1974a, 1975; Riney and Hill; Tisdell, 1972a). There can be little doubt that in many cases the conversion of land from wildlife habitat to more intensive uses is a necessary part of economic development. At the same time, however, the high income elasticity of outdoor recreation, the "externality" character of habitat destruction, and the cultural and scientific values of wildlife have led many, including some economists, to question the continued diminution of wildlife populations and their habitat (Myers, 1974a; Plourde; Tisdell, 1972b). One approach has been to suggest that part of the problem is the "common property" character of the institutions for managing wildlife. A rather natural outgrowth of this observation is the recommendation that private property rights to wildlife ought to be established in order to create incentives for the management of wildlife and potential wildlife habitats in ways which would be more efficient (Davis, et al.; Hanke; Myers, 1974b).

The purpose of this paper is to examine the potential of private property rights and market trade in wildlife and related products to achieve conservation of wildlife and habitat where this is socially desirable.¹

In the first section we review the arguments for the private property approach, citing some examples where it appears to have worked successfully. Later sections will investigate some potential pitfalls of the approach, with the goal of specifying in the conclusions some conditions for which the private property approach would appear to be most promising.

The Potential Advantages of Private Property Rights to Wildlife

Advocates of private ownership and market exchange of wildlife point out that the traditional protectionist alternative offers no incentive to the private land owner to allocate land to wildlife habitat irrespective of its desirability on the basis of economic efficiency. On the other hand, in the attempt to maximize the present value of profits from use of resources, the private owner of wildlife would have more incentive to choose a rate of utilization which would provide for maintenance of the resource and its habitat. The following statement by Bachmura (p. 680) clearly summarizes what many economists have argued might be expected of this system of market incentives:

Where property management is internalized, as it is in private ownership, rewards for capital improvement of the asset, in terms of land improvement or enlargement of the owner's herd, are visible to the manager as well as potential buyers. Such an incentive system automatically organizes economic forces to safeguard and control animal stocks and associated land resources in consonance with market forces. Despite important limitations of this process, it does permit wide fluctuations in livestock in response to community demands.

What would happen if we could internalize the stock management of wild species? Responsible managers would manage the stock, and acquire assets to be used in supporting the stock, in response to community preferences. Given such a management decision, it would be reasonable to expect an increase in stocks. Stocks would be adjustable to changing community preferences.

Examples of the working of the process described by Bachmura can be found in the establishment of private hunting preserves in the United States, game ranches in Africa (Atwell and Tebbit; Mossman; Steel) and deer farms in New Zealand (Clouston). In some instances the market incentive has even been strong enough to stimulate the introduction of exotic species for commercial purposes, e.g. the ostrich in this country in the late nineteenth century (Doughty).

In addition to generating the initial system of costs and returns associated with the decision whether or not to allocate land to wildlife habitat, theory indicates that the market may be useful as an institution for providing the land owner with guidance on how factors should be combined to produce the output and on which wildlife-based products provide the greatest return. These relationships are typically quite complex given the nature of the ecological interrelationships among species. Often the information gained in the initial attempt to establish a wildlife enterprise leads to changes in the production pattern. It was originally believed, for example, that game ranching in Rhodesia would be economically successful because of the biological and ecological advantages that an array of wildlife species would have over domestic livestock in the production of meat (Dasmann; Dasmann and Mossman; Talbot). Experience gained in the early attempts to produce meat, however, led to the conclusion that a joint enterprise based upon meat production and to a greater extent, safari hunting yielded a greater economic return (Johnstone). The ensuing changes in the production pattern have had far reaching consequences for the state of conservation of some wildlife. Predators such as the lion and leopard which had previously been

eliminated in an effort to maximize meat production were suddenly elevated to the status of desirable outputs. Such information on production relationships and prices would not automatically be forthcoming in the absence of market exchange of wildlife and its derivative products. As Davis, et al. have observed:

Only if wildlife were established as an economic resource to be exchanged in legitimate trade would information be available to aid landowners in determining what to produce and how to produce it. By transmitting this information through prices paid by consumers to producers the markets can guide resources from lower to higher valued uses (p. 81).

With no market exchange the trade may become clandestine and data on the volume and prices of wildlife products would not be readily available. Government tax revenues from the industry would be lost and product quality would likely be low. Moreover, prohibition of trade may not be successful if the economic rewards from illicit trade are great. Market trade, in contrast, could yield marketing statistics and tax revenue. Product quality would probably improve in response to price incentives and the free flow of technical information between processors and suppliers. In addition, under a system of private ownership and market exchange, the owner of wildlife would have a direct interest in the enforcement of personal property rights. This self-policing trait of the market might reduce public law enforcement costs and permit wildlife management agencies to devote a greater portion of their budgets to research and management activities. A less obvious but equally important advantage of the market approach to wildlife conservation would be the reduction in the social costs of the illicit trade which arise out of the increased opportunities for corruption and the demonstration effect of contempt for laws.

In calling attention to these advantages of the market, Hanke (p. 219) has even gone so far as to suggest that the prohibition of trade in alligator products embodied in the Endangered Species Act of 1973 constitutes "the most serious threat that the alligator has ever faced." With respect to privately owned lands, Hanke has suggested the following policy change:

To save the alligator and to increase the efficiency with which land is used, we must delete the alligator from the Endangered Species list, thereby giving it a market value. The result: alligators will be able to compete effectively with other forms of land use, and landowners will have every incentive to manage, protect, and regularly crop alligators in order to maximize the value of their property (p. 219).

In summary, the advantages of the market approach to wildlife conservation lie in the potential for an increase in the economic efficiency with which resources are used and in the ability to promote conservation at less social cost than is incurred with the protectionist alternative. These arguments amply illustrate that vesting private property rights in wildlife may be capable--in some instances, at least--of facilitating conservation. Still, it is important to recognize some of the potential pitfalls of the approach. As Hanke has pointed out (p. 219), when recommendations for public policy are put forth to achieve socially desirable goals, it is incumbent on the serious scholar of policy analysis "to determine whether these results will actually occur or whether there will be unintended consequences." We would submit that introduction of private property rights and market trade could well have consequences which are "unintended" and unanticipated by those advocating such changes. Further, depending upon the particular circumstances, such an approach may generate results inimical to the conservation objectives.

The Many Determinants of the Private Optimum State of Conservation

It is important to recognize at the outset that the private optimum state of conservation depends on myriad economic forces. Ciriacy-Wantrup has shown that income, time preferences, discount rates, uncertainty, prices and price expectations, credit, taxation, market form, and economic instability as well as property rights may influence the plans of private resource users.

Bearing this in mind, let us look more closely at the concept of property. To consider private property or public property or common property on the conceptual level alone is of limited usefulness in an analysis of conservation economics. These concepts are consistent with, and will vary with, a variety of complex institutional arrangements (Ciriacy-Wantrup and Bishop). When, for example, the expression "private property rights to wildlife" is used, is it meant that rights to the animals are vested separately from ownership of the habitat, or are the rights assigned to the individual upon whose land the animals occur? Yet a third interpretation could be the assignment, to specific individuals, of controlled, long-term harvest rights to wildlife but with actual ownership of the animals retained in the state. These details are important for conservation economics for they define the latitude that the resource owner has to decide resource use and hence influence the system of incentives associated with those utilization decisions.

Another factor to bear in mind is that the rights to wildlife and land are interrelated with the rights to other resources. A recent reminder of this is the case of the Devil's Hole pupfish, a resident of the Death Valley National Monument and an endangered species (Bean).

The fate of the pupfish is in question because water levels have been declining in Devil's Hole as a result of groundwater pumping by neighboring ranchers. If the pupfish and the land upon which it occurs were in private ownership, the survival of the species still would not be assured since the determination of water rights remains to be settled. In any event, there would be nothing to prevent the private owner from ignoring the extramarket values of the pupfish and putting the water to an alternative use.

Even assuming away complexities such as those described above, potential problems with making wildlife private property are not difficult to identify on the conceptual level. Vesting ownership of migratory species in land owners, for example, will not change their fugitive status nor the resulting incentives for depletion. Ownership of migratory populations by individuals who could then rent or buy habitat throughout the range may sound fine in theory but is likely to become uneconomical if it is necessary to negotiate many such transactions as would be the case for migratory species. Even for nonmigratory species, granting ownership of wildlife to land owners may not lead to conservation if property rights in the land itself are unstable. This can be a particularly serious problem in poorer countries where pressures on wildlife habitat are often acute. Such instability could well encourage the liquidation of the newly acquired wildlife asset by the landowners.

The success of property rights systems is always contingent on sufficient enforcement of rights. That there will be an incentive for owners of wildlife to protect their property is true if the wildlife in question has market value. That there will be sufficient incentive to

assure conservation is not so clear. One need only note the recent growth in beehive stealing (Newsweek; Cooper) to obtain some idea of the potential problems here. In the southern United States, alligator poachers have even stolen animals from privately owned exhibits and breeding pens (Carr, Laycock). To eliminate the market or at least a large share of the market through legal restrictions together with public controls to maintain habitat may be a more effective conservation tool in such cases.

Other examples of the relationships that can exist between conservation and property could be given were space available. It is also clear that the other determinants of the private optimum may raise similar questions. Uncertainty about the appropriate management practices, prospects of disease, future prices, or other variables may discourage conservation even if property rights are secure. Taxes may affect utilization plans in a number of ways. For example, taxes (such as the real property tax in the U.S.) which are not particularly sensitive to economic fluctuations may cause depletion during economic downturns. Credit institutions may also thwart conservation efforts if small resource users do not have ready access to capital markets for the funds necessary to achieve conservation. This problem may be particularly serious in capital-scarce, low-income countries.

One of the most powerful economic forces impinging on wildlife conservation decisions under private ownership would be the discount rate. Recent work by Clark (1973a, b), Beddington, et al., Plourde, and Smith has shown that depletion at rates exceeding the maximum sustainable yield of a species may be economically efficient from the point of view of

Individual operators. This is not the result of an ownership system based on common property but rather depends on the biological growth potential of the species in question vis-a-vis the discount rate. The owner of wildlife might find it quite rational to deplete the asset. The cumulative result may even be extinction of species. Nor would an extremely high discount be required for such a result. Clark (1973a, p. 958) speculates that a rate of 10 to 20 percent would be sufficient to cause extinction of the blue whale.

The first caveat, then, is that while establishment of private property rights and market trade may set conserving forces in motion, this result is by no means guaranteed. Other offsetting economic forces may concomitantly come into play which would lead to depletion.

Extramarket Considerations

All the supposed advantages of private property rights in wildlife are predicated on the existence of the marketable goods and services which would be forthcoming were wildlife under private ownership. Little difficulty is encountered in selecting examples where marketable products are present, such as ivory, alligator hides, and leopard skins. Furthermore, although many forms of wildlife enjoyment such as viewing and photography are often operated on an extramarket basis today, much could be done to incorporate these activities into the market. Still, the fact that many of the benefits of wildlife conservation are extramarket and must remain so because of product characteristics has important economic implications.

First, the private property solution offers no hope for those species

with little market potential. The lack of such market potential need not be an indication of low economic value. The cardinal in the backyard, the hawk soaring along the highway, and the flock of gulls along the sea-coast could hardly be considered to be without economic value; yet to actually capture willingness to pay in such instances is very difficult. Similar remarks are applicable to the oft-times subtle and poorly understood roles that various forms of wildlife play in maintaining ecological balance and stability. Indeed, the arguments relating to public goods are applicable here. It will be shown below that society even has a stake in the wildlife varieties that have no present market or extra-market economic value. Institutions other than the market must be depended upon to conserve these resources.

Furthermore, even when wildlife is capable of producing some market values, it is probable that not all the economic values will be registered in the market price. While the meat and hides of large herbivores, for example, may readily be exchanged in the marketplace, it may not be institutionally possible to collect the full values from viewing them while still alive. In addition, since destruction of habitat is often irreversible, option value may become an important factor (Weisbrod; Arrow and Fisher; Cicchetti and Freeman). It is also necessary to take account of existence demand. Existence demand is relevant when people are willing to pay something merely in order to know that something exists, quite aside from their future intentions to benefit directly from the wildlife form. For example, many are willing to have the blue whale survive even though they have no plans ever to view a blue whale or consume whale products (Krutilla; Barkley and Seckler). To the extent that

these benefits of conservation are not reflected in the price, the market will not achieve optimality.

Krutilla and Fisher have recently argued forcefully that it may not be necessary to measure all the benefits of preserving a natural environment to justify preservation. Dollar values for only a portion of the benefits may exceed costs. Likewise, it may not be necessary to bring all the benefits of wildlife into the market in order to generate incentives of sufficient magnitude to achieve some conservation. But it is not valid to assume that the existence of market values will be sufficient to create incentives to conserve species which also have significant extramarket values. Alligator hides, for example, may be valuable, but this may not be an incentive to conserve alligator habitat for recreational enjoyment of the alligators or any other flora and fauna which occur in the habitat. From a private point of view alligator farms may prove to be more economical than attempting to harvest the animals from their natural marshland habitat.

This brings us to our second concern. Since many of the benefits of wildlife conservation are extramarket, granting property rights to private resource users may produce little or no conserving effect. In any event, it will not be sufficient to achieve optimality in most cases.

Market Trade and International Wildlife Conservation

In some instances the relationships between wildlife products in the marketplace may dramatically influence the international conservation of particular populations and species. These relationships occur within domestic markets as well as on the international level, but the latter

may have more serious consequences for wildlife. To the extent that products derived from a plentiful population or species are complementary with or substitutes for those derived from rare populations or species, significant forces for depletion of the latter group may be set in motion by permitting market trade. Market incentives for the exploitation of the plentiful group may be sufficiently strong to render protection of property rights to the endangered group unenforceable. This could happen even if the wildlife were relatively sedentary and privately owned. Consider the leopard as an example illustrating substitutability between international populations of a single species. Privately owned leopards, harvested on a sustained yield basis in, say, ~~Zaire~~ might command such a high price that private owners of leopards in Kenya or Somalia would find it uneconomic to control theft of their animals.

A similar interrelationship exists between species in some cases. For example, we might focus on the many species of crocodiles and alligators. Some of these species are gravely threatened with extinction while other species or subspecies are capable of sustained harvest. The leather from different species is highly substitutable in the market (King and Brazaitis). Suppose that the harvest of alligators in Louisiana, where they are plentiful, were deemed feasible on a biological basis and that private property rights and market trade were established. The result could well be the creation of market incentives for the demise of other crocodylian species, especially since law enforcement dollars are scarce in the poorer countries where most of the threatened species are located.²

The examples presented illustrate yet a third concern to keep in

mind when considering the market approach to wildlife conservation. Under private ownership, market exchange of wildlife may result in the generation of externalities which produce a tendency for depletion. This is particularly relevant if the externalities are transmitted across international boundaries since domestic resource allocation will be subject to exogenous depletive forces.

The Private Optimum and Public Policy

Most of what has been said so far can be summed up by saying that there are several reasons to suspect that the private optimum state of conservation will sometimes vary from the social optimum. In addition to such factors as instability of property rights, divergences between the private and social rates of discount, uncertainty, and the problems of translating extramarket benefits into private revenues, we might have explored other topics, such as the distorting influences of most systems of taxation and the assignment of property rights as piecemeal welfare economics in a second-best world. Given the space constraints, let us instead move beyond optimization for a moment.

Public policy must not be limited merely to matters affecting social well-being over the next decade or two. It must also be concerned with the long-run future. Long-run concerns are of particular relevance in dealing with wildlife because of the potential irreversibility of depletion of habitat as well as extinction of species and subspecies. What a society defines as a "natural resource" at any point in time is very much a function of its tastes and preferences, population, policies, and institutions, and technology. For example, the American bison is to

us a resource of great historical value and a valuable gene-pool for meat animal breeding. To the Plains Indians only a little over a century ago the bison was the basis for an entire economy. This economic role of the bison for the Plains Indians was actually a relatively recent event in North America, having been the result of "new technology" in the form of horses brought by the first Europeans. Previously the Plains Indians had apparently been rather sedentary semi-agriculturalists, an adaptation which may have been the result of the rising population and new technologies which caused the so-called Pleistocene overkill (Smith).

Because the future course of preferences, population, policies and institutions, and technology cannot be foretold, there is great uncertainty about the "ultimate" implications of irreversible reductions in the diversity of the earth's biota. Options are foreclosed when wildlife becomes extinct and habitat is permanently lost. The future ability of society to adapt and evolve may be affected. If sufficient critical zone flow resources, including wildlife, are irreversibly depleted, the very viability of societies may be affected (Ciriacy-Wantrup, p. 251-253; Carter and Dale). It is doubtful whether the market with its short time horizons can be depended upon to make sound choices in situations where irreversibility is an issue. There seems to be little choice but to depend on public implementation of alternative conservation strategies such as the safe minimum standard of conservation which is aimed at avoiding irreversible depletion of critical zone flow resources (Ciriacy-Wantrup, p. 253).

Finally, public policy must be concerned with distributional equity. Establishment of private ownership and market trade in wildlife would

constitute a substantial redistribution of wealth in many cases. Consider, for example, the deer herds of the United States. Under the present system, state residents at least have access to the resource at modest cost. Without restraint, however, many of the herds would be quickly exterminated. To cope with this, hunting seasons are often quite short and other regulations have been enacted. Suppose that ownership of the deer were vested in the owner of the land where the deer reside. Gains to the land owner and those who are willing and able to pay the going price would be at the expense of those who would not pay the higher fees for hunting, including those who could not afford to hunt because of low incomes. Society may choose instead to maintain the current distribution of wealth at the expense of some efficiency.

Conclusions

As pressures on wildlife continue to grow, institutional innovations to protect society's interests in wildlife will become increasingly important. There may well be opportunities where the "invisible hand" can be harnessed in this capacity. But before advocating private ownership of wildlife as a conservation policy, we suggest that careful study within the conceptual framework of analytical institutional economics (Schmid) would be desirable. In particular we would suggest studies of the consequences for wildlife of different means of assigning private property rights. Sufficient cases also exist where market trade has been prohibited in wildlife products following decline of a species (e.g., elephant ivory, spotted cat furs, and alligator skins) to permit empirical analysis of this institutional alternative.

Drawing on the analysis in this paper, we would suggest the following hypotheses about the relationships between private ownership and wildlife conservation: Nonmigratory populations are the most promising for private ownership. The species chosen should have high and fairly stable market potential and be subject to inexpensive enforcement of property rights. Efforts to conserve wildlife through private ownership are likely to be unsuccessful for species with low reproductive and growth potentials. Stability of property rights in wildlife and related resources is a prerequisite of success and this is likely to be a source of problems in some low income countries. Creation of markets for products utilizing seriously threatened species from locations where control of exploitation is difficult would increase the likelihood of extinction.

While experimentation with private ownership would be desirable, special care would be required to ensure that all conditions appear favorable before a threatened species or subspecies could be turned over to private incentives. This would require consideration of the socio-political habitat as well as biological and ecological factors. The potential problems discussed in this paper appear serious enough to create doubts about the prospects for wide applications of private ownership of wildlife. Institutional innovations within the overall structure of common property and public ownership will probably have to be the major focus of the wildlife conservation efforts in a large share of the cases where serious depletion is in the offing.

FOOTNOTES

¹The terms "conservation" and "depletion" will be used in this paper as they have been defined by Ciriacy-Wantrup (p. 51). Conservation (depletion) is defined as a redistribution of the planned physical rates of use of a natural resource over time in the direction of the future (present).

²Concern about the substitutability between populations of alligators in the different states in the species' range is explicitly contained in the Endangered Species Act of 1973 (16 U.S. Code 1531-1543, 87 Stat. 884).

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