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CONCEPTUAL ECONOMIC ISSUES IN CONSERVING THE CALIFORNIA CONDOR*/

Richard C. Bishop
University of California, Berkeley

The California condor (Gymnogyps californianus) is an endangered species of bird, the remaining population of which is located in southern California and possibly Baja California. At present, the known population stands at about 60 individuals, and the population appears to have declined since 1940 [6, 7]. This paper shows that the social costs of efforts to save the condor must play a central role in evaluating alternative policies affecting the bird. It then discusses some of the conceptual issues involved in estimating such costs. While the focus of the paper is on the condor, issues surrounding preservation of this species have much in common with many of the environmental questions which are being raised today.

The Economic Issues

To survive, the California condor will require nesting and roosting sites at traditional locations which are relatively free of human disturbances. Nests are particularly critical, and, fortunately for the condor, all nest sites known to have been active in the recent past are located on public lands. The principal nesting area is located in northern Ventura County within Los Padres National Forest. Second, the condor will require an adequate food supply. The most important present source of supply is the cattle industry in the U-shaped group of hills and mountains surrounding the San Joaquin Valley. The birds do not attack live animals but must subsist on whatever carrion becomes available to them. The extent to which free-living birds could adapt to artificial feeding is not well understood but may be constrained by the birds' seasonal movements to and from traditional areas [7].

Economics enters the picture because the land and other resources of the condor habitat could be used for other purposes that would reduce the condor's chances for survival. This is true throughout the habitat, but the situation is especially critical in the southern portion of the range. In the national forest of Ventura County, demands are such that petroleum exploration and development, mining, water resource development, and other activities if left unregulated could raise human disturbance to levels dangerous to condor survival. Grazing land in the southern part of the range is critical not only because it is needed to support nesting but also because it has been a traditional source of food for nonnesting birds in winter. Partly due to expansion of the Los Angeles metropolitan area, substantial amounts of grazing land are being converted to urban uses in southern Ventura and northwestern Los Angeles counties. Second-home developments are also turning up here and there. Conversion of grazing land to agriculture has been a major trend throughout the habitat for many years and is still chipping away at remaining rangeland.

There are substantial benefits associated with saving the condor. Many people receive satisfaction each year from seeing the live condors, in viewing pictures and movies, and reading about them in books, newspapers, and magazines. There are also vicarious benefits associated with condor conservation. Many people who will never see a condor or otherwise benefit directly from its continued existence still support efforts to save it and would be willing to pay something each year to express this preference. The level of interest in the fate of the species is indicated by various activities of the National Audubon Society. National Audubon has supported three research projects to study the bird and its problems, including the study which led to this paper and two biological studies [5, 6]. Condor affairs receive the full-time attention of one National Audubon Society employee as well as considerable amounts of time from other personnel. Concern about the birds has led to extensive research and management activities at the federal and state levels of government. Most significantly, there is the problem of irreversibility here. If society should allocate its resources in such a way as to start or accelerate environmental changes leading to the extinction of the condor, this decision would be binding on all future generations.

The benefits of condor conservation are not limited to those stemming from condor-oriented activities. Efforts to save the condor also entail preservation of open space, natural scenery, and wilderness; provision of outdoor recreation under proper controls; propagation of wildlife; maintenance of air quality; protection of watersheds and water quality; and other products. In other words, analysis of the benefits of condor conservation requires a joint-product rather than a single product approach.1/

Economic analysis of this problem is hampered by the fact that many of the most important benefits of condor conservation are extramarket. It is impossible to say what the condor is worth today relative to other goods and services, and who can say what it will be worth in years to come. Satisfactory market valuations are also lacking for many of the other products that result from condor conservation.

The California condor falls into Ciriacy-Wantrup's class of flow resources with a critical zone [4, p. 37-40]. The critical zone is reached for an animal species when its viability as a species becomes endangered, i.e., when preventing extinction becomes physically impossible or exceedingly expensive. Avoidance of the critical zone as an objective of conservation policy, he calls the safe minimum standard of conservation. He has shown that the costs of the safe minimum standard are small[2/] in most cases "if proper action is taken in time and if proper tools of conservation policy are employed" [emphasis added; 4, p. 245]. On the other hand, benefits from the safe minimum standard -- i.e., losses from irreversibility avoided -- are not small and frequently large, although generally they are uncertain and difficult to quantify precisely. Ciriacy-Wantrup concludes that it is rational for society to incur a relatively small but certain cost now in order to avoid the possibility of facing much larger losses in the future. The economic rationale for maintaining the safe minimum standard is the same as that which leads an economic agent to pay an insurance premium. Accordingly, the objective of our study is to provide a sound basis for social decision-making by analyzing the social costs of maintaining a safe minimum standard for the California condor.

Our empirical results are still incomplete and cannot be presented here. Rather, the remainder of the paper will focus on some theoretical issues associated with social-cost analysis, drawing on the condor case for examples. The discussion can be divided conveniently into the problems of cost evaluation and cost allocation.

Cost Evaluation

While efforts required to save the California condor would involve some direct costs for management and research, the costs of not exploiting the petroleum, phosphate, water, and other resources of the condor habitat appear to be far larger. To evaluate the social cost of postponing development of these resources where such development would threaten the condor, a benefit-cost framework is being utilized. Whichever resource is being analyzed, it appears that alternative, but possibly more expensive, sources of supply are present outside the condor habitat. Hence, our approach to benefit estimation has much in common with the alternative cost approach which is commonly applied in evaluating water resources projects. If X units of a particular good or service could be produced in the condor habitat at a cost of $Y and outside the habitat for $Z, then the gross benefits of producing these X units in the habitat are taken to be $Z minus $Y. Such estimates of benefits may contain two components: (1) differences in production costs within and outside the condor habitat, and (2) differences in transportation costs which are entailed in serving the same markets as the resources of the condor habitat would serve. These gross benefits are also net benefits unless there are externalities, unemployment, excess capacity in the industry in question, or other such considerations. The net benefits of exploiting the resources of the condor habitat are the social costs of not exploiting those resources in order to conserve the condor and provide the other goods and services that such conservation efforts entail.

Economic theory is helpful in isolating potential problems which may result from use of the alternative cost approach. So long as such things as externalities and unemployment are included in the calculations and so long as prices and total consumption of the goods and services in question do not change in response to whether the resources of the condor habitat are exploited or not, a strong theoretical case can be made for this approach. Suppose, however, that producing a good in the condor habitat would cause the supply curve for that good to shift, causing a decrease in its price and an increase in consumption. The alternative cost method is really a way of estimating the Ricardian rent that would accrue to producers in the condor habitat under perfect competition. Hence, it would yield an overestimate of the aggregate change in rent if the price declines since a decrease in price would cause a decrease in the rents to producers outside the habitat. On the other hand, the alternative cost approach would not include any allowance for the changes in consumption and consumer surplus that would result from a lower price.

It is worthwhile to watch for such potential problems, but there are good reasons to believe, in the condor case at least, that the effects of changes in prices on benefits

will be of only secondary importance. First, the potential contributions of resources in the condor habitat to total supplies are so small that substantial changes in prices appear unlikely. Second, when one is speaking of developing petroleum, water, land for urbanization, or other resources, he is dealing with intermediate and long-run supply curves which are generally more elastic than their short-run counterparts. The more elastic the market supplies the less will be the impact of new sources of supply on prices and consumption. Third, monopolistic influences in many of the markets involved may mean that nonprice competition will predominate. Finally, as noted above, any underestimation of gross benefit because changes in consumption are not accounted for by the alternative cost approach would be partially offset by overestimation of changes in producer rents.

For all these reasons, when production of some good or service within the condor habitat would conflict with efforts to save the species, an alternative cost approach appears to be a practical method of getting at the most significant costs of foregoing such production.

Cost Allocation

The second dimension of cost analysis is cost allocation. Cost evaluation and cost allocation are closely related and cannot be completely separated because of the possibility of double counting. However, issues of cost analysis are not truly resolved until the allocation problem is faced because of the existence of jointness as mentioned above. The land of southern California is a scarce resource capable of producing a large array of products -- some competing, some neutral, and some complementary to condor conservation. Hence, to charge the cost of land-use controls that benefit the condor exclusively to condors as a "product" would be just as erroneous as charging the total cost of a multipurpose water project against one of the project purposes, such as irrigation.3/ The key question is: How would the emerging complex of land-use policies as they apply to southern California have to be altered to achieve the objective of conserving the condor? It is in these marginal changes in the policy mix that the true social cost of condor conservation comes to light. Note, also, that it is land-use objectives and not land-use results that count. If efforts to save the condor help us to achieve other objectives as well, it certainly would not be correct to charge the total cost to the condor.4/

Conclusion

It is worthwhile to note in conclusion how much the condor problem has in common with many of the environmental questions being asked today. Again and again, someone somewhere proposes to develop some resource. This results in an outcry against the proposal on the grounds that it will do irreversible harm to other resources. Of course, in analyzing such questions, economists should quantify benefits and costs in dollar terms whenever possible. However, in cases where extramarket goods are important and uncertainty is great -- and especially where resource development will cause some resource to reach its critical zone -- economists can make a contribution by analyzing the social costs of postponing development of the resource in question. Experience gained in the condor study indicates that this cost analysis should focus primarily on the cost of satisfying the same demand from alternative sources (including environmental costs at the alternatives) and on careful allocation of costs within a joint-products framework.

FOOTNOTES

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1/ The theory of joint costs in production is treated by Ciriacy-Wantrup in [3].

2/ This conclusion is based on the assumption that the resources in question is nearing its critical zone due to actions by man. If natural causes are involved, the cost of avoiding irreversibility could be large or small depending on the circumstances. Where human

actions are the source of difficulty, costs are generally small in at least three respects. First, with proper timing and choice of tools, costs are absolutely small. Second, the costs of avoiding the critical zone are small relative to the benefits -- that is, the potentially large losses which are avoided because irreversible actions have not occurred. Third, the social costs of the safe minimum standard as an objective of conservation policy are small when compared to expenditures for safeguarding the continuity of society in other fields, such as national defense and public health [4, p. 254-56].

3/ The problem of cost allocation in water resources policies is discussed in [2].

4/ This point was made clear to me by S.V. Ciriacy-Wantrup.

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