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Property Rights of Landholders in Non-Captive Wildlife and Prospects for Conservation

Abstract

In order to reduce the rate of human-induced biodiversity loss of wild species, it has become increasingly important to stem this loss on private and tribal lands and to find effective policies to do this. Some writers believe that granting landholders commercial property rights in wildlife might be effective in dealing with this matter and result in the sustainable use of wildlife. This paper explores this view using economic theory. In doing so, it takes into account the total economic valuation concept. While granting of commercial property rights is found to be effective for conserving some species, it is predicted to be a complete failure as a means of conserving other species. In addition, particular attention is given to the economics of the utilisation and conservation of non-captive fugitive (or mobile) wildlife. The economic theory involved is contrasted and compared with that for the exploitation of open-access resources.

Keywords biodiversity, fugitive resources, open-access, property rights, wildlife conservation.

Property Rights of Landholders in Non-Captive Wildlife and Prospects for Conservation

1. Introduction – Importance and Context

Considerable concern has been expressed in recent decades about continuing human-induced biodiversity loss in the wild (May et al., 1995; Ehrlich, 1995), as well as a loss of genetic diversity in domesticated and cultivated species (see Tisdell, 2003). Several factors have contributed to human-induced biodiversity decline of non-captive biota. These factors include appropriation of wildlife habitats by humans and their alterations to more productively serve human economic goals (Swanson, 1984 *a,b,* 1985); competition of humans with other species for food sources and their other means of subsistence (eg. harvesting of animals or plants by humans at the lower end of the food chain thereby depriving higher order species of food) and the direct over harvesting of wild species by humans.

Most of the world's land area is now in private or tribal hands, as also are some water bodies or parts of these. This land area far exceeds the proportion of protected area under state control. Consequently, the continuing survival of many species, especially those that have a large home range or are migratory, depends on their ability to use private or tribal lands without undue molestation or loss of habitat. See, for example, Bandara and Tisdell, (2002). If a species is harvested on such land, its continuing survival requires its rate of harvesting to be sustainable.

While tribal lands are not significantly large everywhere, they are in some parts of the world. For example, the major proportion of land in Northern Australia belongs to Aboriginal tribes, their share being especially high in the Northern Territory, the far north of Western Australia and Cape York in Queensland. Similarly, in the north east of Canada, most land belongs to Inuits. Comprehensive consideration of the impacts of property rights, attenuated or otherwise, requires attention to both private and tribal decisions about land use. However, here I'll concentrate primarily on the analysis of decisions by private landholders and assume that in relation to commercial activity their primary aim is one of private profit maximisation.

The economic analysis of the utilisation and conservation of wildlife on private lands and the question of whether private property rights are likely to be effective in conserving non-

captive wildlife has been given consideration by economists for around a half century, Ciriacy-Wantrup (1968) suggested that assignment of private property rights to landholders in fugitive wildlife species is likely to be ineffective in ensuring their conservation and optimal utilisation. He expected similar failures to occur to those that arise in the case of open-access resources because of the mobility of the species involved.

Colin Clark (1973, 1976) discovered that even when wildlife or natural biota are immobile or non-fugitive eg. natural stands of timber, private commercial use could be expected to eliminate their stock if the growth in their net economic value is less than the rate of interest.[1] However, elimination of a wild species on private land can even occur where the rate of return from commercial private utilisation of a species exceeds the rate of interest because there may be an even more profitable use of the land requiring the extinction of this species.[2]

Nevertheless, commercial use of relatively immobile wildlife species can on occasions result in their conservation. These will be cases where their use constitutes the most profitable form of land use and the return on this use is **not** less than the rate of interest. In such cases, failure to give property rights to landholders for commercial use of species can result in elimination of these species on private land.

In examining the extent to which property rights of landholders in non-captive wildlife can contribute to the conservation of wildlife, the following issues will be considered in turn: total economic value of wildlife and conservation prospects, variations in the patterns of mobility of wild species, basic consequences for conservation of private appropriation non-consumptive use rights in wildlife, and similarly consequences of consumptive use rights in wildlife on private land. In the latter case, it will be shown that only some of the market failures arising with open-access occur in this case. A brief discussion of some relevant Australian policies follows with concluding comments.

2. Total Economic Value of Wildlife and Basic Prospects for Conservation as a Result of Commercial Use of Wildlife

The view that wildlife and natural areas can be considered as having a total economic value consisting of use values and non-use values has become widely accepted. Proponents of the concept include Albani and Romano, (1998). Economic use value is generally divided into direct and indirect use value. Indirect use value may, for example, involve the use of wildlife for illustrating books and television documentaries.

Direct use of wildlife may be consumptive (as in the case of recreational hunting or fishing or the capture of animals for meat and other products) or non-consumptive, as in the case of the use of animals for viewing by tourists. In most cases, use values are marketable because exclusion is possible and profitable.

By contrast most non-use values are not marketable. For wildlife species, these include existence, bequest and option values. These attributes have the characteristics of pure public goods.

Hence, many wildlife species are mixed goods in the sense that they have attributes making them private goods as well as attributes that make them pure public goods.

The relative importance of these attributes varies according to the type of wildlife species considered. The total economic value of some fish seem virtually to be accounted for by their direct consumptive use value eg. mullet. On the other hand, most of the value of some species consist of their non-use value eg. today most whale species in Australia, tree kangaroos (Tisdell and Wilson, 2003), and in Sri Lanka, the Asian elephant (Bandara and Tisdell, 2003).

In principle, under ideal conditions, it would be possible for landholders to market all the use value of wildlife species. The question can then be posed: in the absence of mobility of wildlife, would there be an economically optimal degree of conservation of wildlife taking account of the total economic value of species of wildlife.[3] The answer is that economic optimality will not be achieved for all species. This can be illustrated by Figure 1. The line ABCDF represents marginal user benefits (private demand) from the stock of a species on a property and curve NRSCF represents the marginal value of total economic value of benefits from the stock of the species on the property. The difference between curve NRSC and line ABC represents the marginal non-use value of the stock of the species.

Figure 1

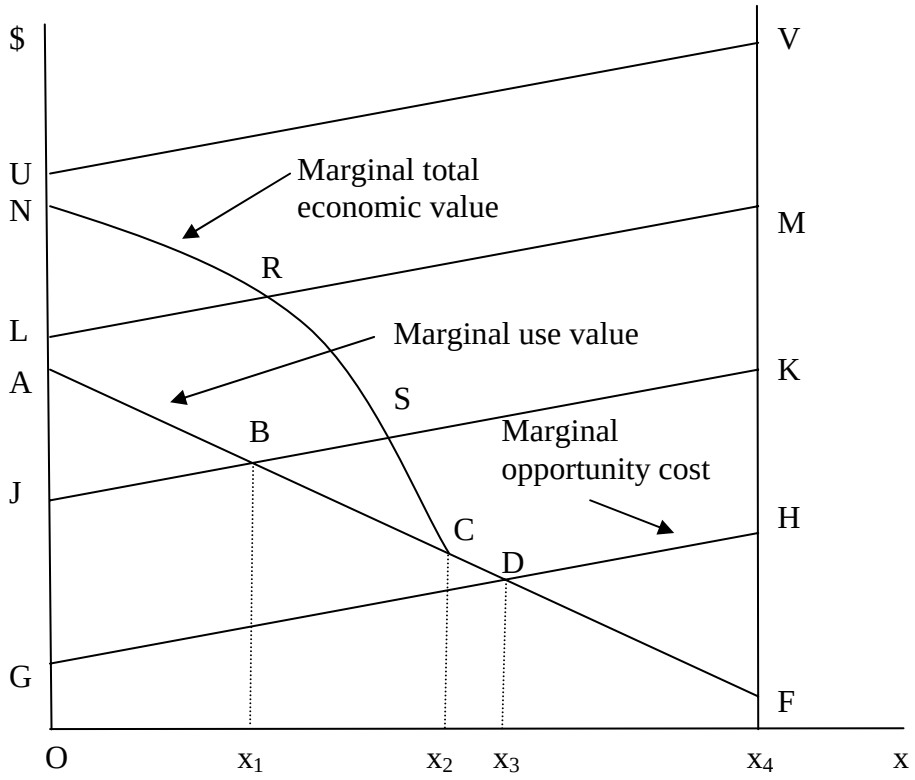

Figure 1: When non-use economic values are important, commercial rights for landholders in wildlife are unlikely to result in the optimal level of conservation of wildlife from an economic point of view. In that respect, one should consider whether non-use values are infra-marginal or not.

In the absence of human use of the land area, assume that the population of the relevant wildlife species is x_4. Suppose that on this land the marginal opportunity cost of maintaining the population of the species is as shown by line GDH. Then given private rights to use this species, profit maximisation would result in a reduction of its stock from x_4 to x_3. This is optimal from a social economic point of view because non-use benefits are infra-marginal (Tisdell, Chs. 2 and 3).

However, if the marginal opportunity cost of conserving the population of the species on this property is higher (say corresponds to JBK), social economic optimality is not achieved. Only x_1 of the population of the species is conserved whereas the population corresponding to S is optimal from a collective viewpoint. Nevertheless, the species survives. If, however, the marginal opportunity cost is as shown by line LRM, the population of the species is

wiped out on the property even though a population corresponding to point R would be Kaldor-Hicks optimal. On the other hand, if the marginal opportunity cost curve is NV, extinction of the species on the property is optimal from a strictly social economic viewpoint.[4]

We can observe from Figure 1 that, other things equal, the lower is marginal use value relative to marginal non-use value of the species, the greater the likelihood of market failure.

If a species has substantial non-use value, market failure will occur unless private use of results in a level of population for which its non-use value is infra-marginal. It is clear that species with little or no use value, have little chance of survival on private land even when they may have a very high non-use value.

3. The Nature of the Mobility of Wildlife and Economic Consequences of this Mobility

The geographical mobility of wildlife can take different forms and patterns, and some species are more mobile than others. The pattern of mobility can influence the commercial utilisation of wildlife on private land.

Some natural biota are sedentary in some stages of their life and display spread or movement geographically only in part of their life. This is true for many plants. For example, only their seeds may be spread by wind, water or other means. Otherwise, they remain fixed where they grow. A similar pattern exists for some molluscs such as oysters; they are only mobile at one stage in their life cycle.

Most wild species are, however, relatively mobile during their whole lifetime. This is true for example, of most mammals. Nevertheless, mammals differ significantly in the range of their movements and the pattern of these. The smaller the range of movement of a group of animals in relation to the size of a property, the more likely are their costs and economic benefits to be internal to the property. In turn, one might expect in such cases that the landholder would be more likely to take account of the full range of user cost involved in utilising or husbanding the group of wild animals, if granted commercial property rights in these.

Some wild species also have the characteristics of returning to the locality where they were born. This is true of sea turtles, for example. Thus a turtle rookery that ensured a greater chance of more turtle hatchlings entering the ocean from its site might expect more turtles to nest there in the future, other things equal (cf. Tisdell and Wilson, 2002). If the rookery is involved in an ecotouristic enterprise, its long term profitability could increase as a result.[5]

Patterns of movement of biota vary considerably. Geographical variation in this movement and differences in its time-patterns can have different economic consequences for the private utilisation of wildlife.

4. Non-Consumptive Use Rights in Wildlife

Many landholders are able to obtain de facto non-consumptive use rights to non-captive wildlife. In some cases, this is used to support tourism and recreational enterprises.

Examples from Australia include use by O'Reilly's of wild birds as a tourist attraction. O'Reilly's is a private resort located within Lamington National Park on freehold land. Birds visit from the nearby Park and are viewed and fed by visitors with food purchased usually from an outlet in O'Reilly's resort centre.[6]

Whether this results in greater conservation of wild birds is not known. It probably favours the populations of parrots that come for feeding. The process most likely adds to political support for conservation of this national park.

In an urban setting, on the Gold Coast of Queensland, Currumbin Wildlife Sanctuary feeds rainbow lorikeets. They are attracted to the site at feeding time in considerable numbers. A similar feeding programme has started at Lone Pine Koala Sanctuary in Brisbane. This tends to favour rainbow lorikeet populations relative to competing species of other birds in the nearby areas.

At Lone Pine Koala Sanctuary, catfish in the nearby Brisbane River are also fed on bread at regular times, and on Moreton Island near Brisbane, hand-feeding of porpoises is a tourist attraction as it is also at Monkey Mia in Western Australia.

While these activities are non-consumptive of the wildlife involved, some environmentalists object to those practices on the grounds that the animals become dependent on humans and in

some cases the local composition of species may alter. Furthermore, hand fed animals may also become aggressive towards humans.

The farm-holiday sector may also benefit from the presence of non-captive wildlife. Depending upon how important seeing wildlife is as an attraction for farm visitors, this can have positive consequences for wildlife conservation. It may, for example, encourage landholders to leave habitat intact that will attract wildlife of interest to those visiting for farm holidays. But, of course, landholders will take no account of non-use values in their conservation decisions.

Another type of non-consumptive use of wildlife is tourism based on 'headstart' programmes designed to increase the stock of targeted wildlife. In Sri Lanka, 'private' sea turtle nurseries are operated for this purpose. These nurseries have de facto rights in their collected turtle eggs and the hatchlings before the hatchlings are released to the ocean. Their financial viability depends on the willingness of tourists to pay to visit their hatcheries, on donations by tourists and sales of souvenirs at those hatcheries. How effective such nurseries are likely to be in increasing populations of sea turtles in the wild is discussed by Tisdell and Wilson (2003b).

A related issue is the effectiveness of stock enhancement programmes for recreational fishing. However, the end purpose of these is to increase the consumptive use of the species involved rather than its non-consumptive use.

5. Consumptive Use Rights in Non-Captive Wildlife

Most economic theory of the utilisation of open-access resources has been developed on the assumption that consumptive use is the sole purpose of management and utilisation of resources (cf. Tisdell, 1972). This is particularly evident in the early literature on fisheries economics (eg. Gordon, 1954; Smith, 1969). Although for some species, consumptive use value may constitute most or all of their economic value; for many, this is not so.

Nevertheless, suppose that use value is the only relevant economic value of a non-captive wildlife species. Then let us consider the extent to which the economics of exploitation of a fugitive wildlife 'visiting' private land differs from the open-access case.

Suppose that private (exclusive) rights in the wildlife are only held by the landholder while it is on his/her property. Consequently, open access to the wildlife does not exist. If harvest of the wildlife is profitable, the landholder would harvest it (if a single or composite factor is used to harvest it) by employing the factor up to the point where its marginal factor cost equals the value of the marginal product of the wildlife harvested. This condition differs from open-access because in that case employment (effort) for harvesting occurs up to the level where marginal factor cost equals the value of the factor's average product. Rent dissipation occurs in the latter case.

Nevertheless, in the fugitive wildlife case, as in the open-access case, less attention is given to user costs than is desirable. However, the two situations can differ in the extent to which account is taken of user costs. Under open-access, no consideration is given to user costs whereas in the fugitive wildlife case, consideration may occur.

In the fugitive wildlife case, future population of a species on a property, and consequently future benefits of the species to the property-holder, may be influenced by the landholders current levels of harvesting of the wildlife and his/her other land-use practices. Whether or not an influence is present on future economic benefits to the landholder, as a consequence of his/her present actions depends on the mobility pattern of the wildlife concerned and their ecological requirements. Thus a difference can emerge between the economic theory of exploitation of open-access resources and that for the exploitation of fugitive resources.

This can be illustrated by Figure 2. There x represents the magnitude of an action taken by a landholder in harvesting or otherwise varying the population of a wildlife species on his or her property in a current period of time. The current marginal economic benefit from harvesting is shown by line DF and the marginal current cost to the landholder is indicated by line AC. If user costs are ignored, this will result in exploitation of the wildlife on the scale x_3, a level of exploitation that is socially too high but less than that to be expected under open access. This is because under open-access average current returns rather than marginal current returns from harvesting would be equated to the marginal current private costs of harvesting.

Figure 2

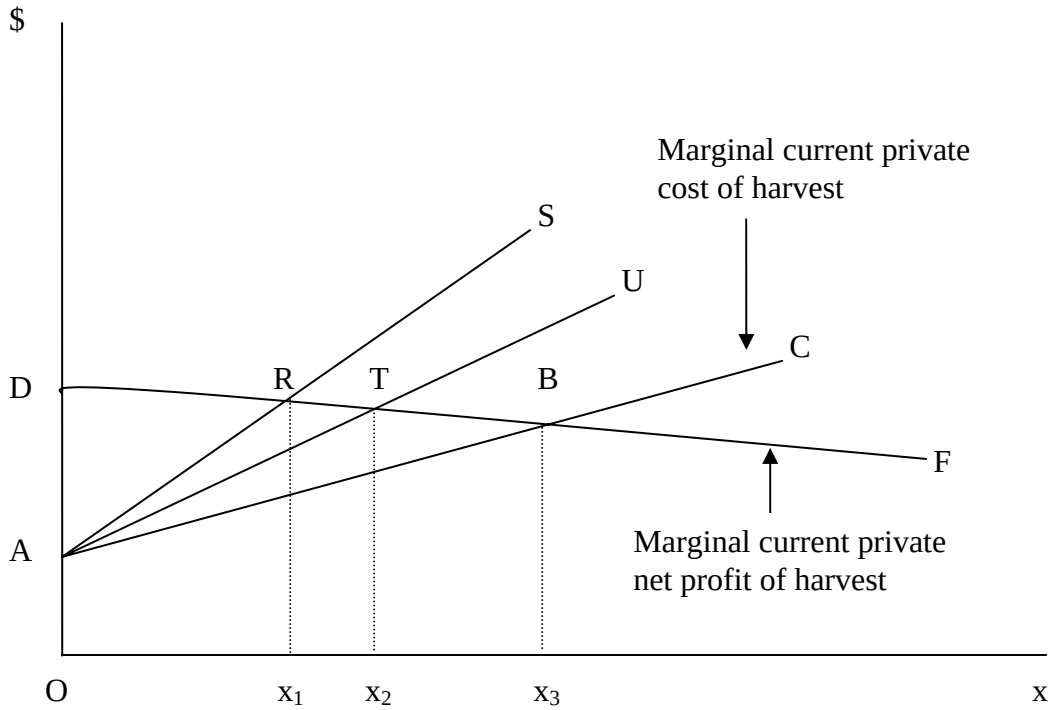

Figure 2 While under open-access user costs to the individual are zero, private user cost may be positive for fugitive wildlife in which the individual has property rights when these are on his or her land. But usually it will be less than social user cost.

However, depending upon the nature of the mobility of the wildlife involved, a private landholder may experience some user costs (a reduction in his/her future private benefits) as a result of his/her current harvesting or other activities affecting the wildlife's future population. For example, the landholders' private marginal user costs may be equal to the difference between line AU and AC in Figure 1. This would result in activity on a scale x_2 rather than x_3, the outcome if user costs are treated privately as if they are zero. This level of harvesting or other activity is still likely to be excessive from a social point of view because in the case of most fugitive wildlife, the landholder does not gain all future benefits from his/her conservation action. For instance, marginal social user cost in Figure 2 might be as shown by line AS. This indicates that the socially optimal level of the activity is x_1. The closer ATU is to AS, the less serious is economic failure as a consequence of the fugitive nature of the wildlife.

6. Significant Contemporary Articles on Commercial Rights to Wildlife on Private Land

Possibly the contemporary articles most relevant to the above discussion are those by Swanson (1994) and by Skonhoft (1999). Both emphasise that open-access models developed mainly for the captive fisheries call for modification in the case of the use of and conservation of terrestrial wildlife. Swanson (1994) emphasises that land conversion for alternative commercial uses in preference to wildlife maintenance is always an important option in terrestrial land use. It results in destruction of habitat and loss of wildlife species. Skonhoft (1999) comes to a similar conclusion. Both authors suggest that such possibilities of conservation are uncommon in marine areas. However, with the growth in mariculture, it should also be observed that conversion of marine habitats is also becoming more common.

As in the open-access case, Swanson (1994) treats wildlife as a private good and considers only its consumptive value. In any case his analysis leads him to the conclusion that it is only "the high-value high-growth resources that will ultimately survive" and that policies that restrict economic growth gain of landholders from such species can only ultimately accelerate their extinction (Swanson, 1994, pp. 818-819). Skonhoft extends Swanson's model. However, both models formally treat wildlife as being no-fugitive, even though, as can be seen from Equation (3) of Skonhoft (1999, p.47), non-consumptive benefits of wildlife from tourism are included in his analysis. It is uncertain, however, whether he intended to include non-use values in Equation (3). He mentioned these on p.48 but clearly because of their public good nature they do not enter the profit function of an individual landholder. The nuisance value of a species is also allowed for in Skonhoft's Equation (3) but the nuisance value recorded is only that internal to a landholding, not entered damages caused by movement of animals.

Basically Skonhoft models this aspect in this way because he does not give specific attention in his modelling to the movement of animals between properties. This he does despite his observation that "the motivation for including those nuisance costs can be found from African wildlife where large mammals frequently destroy agricultural production of agro-pastoralists living in the proximity of wildlife habitats" (Skonhoft, 1999, p.48).

In my view, this involves an externality as a result of movements of wildlife and is not captured by Equation (3) in Skonhoft's article.

I conclude that the current state of economic analysis of this subject is unsatisfactory because it fails to explicitly model and allow for movements of wildlife between properties. Current analysis seems only useful for species with zero mobility or very low mobility between landholdings.

7. Further Discussion and Conclusion

It has been shown that economic conditions that would theoretically be satisfied in exploiting fugitive wildlife resources (and wildlife generally) can be expected to differ from those for open-access if landholders are given commercial property rights in wildlife on their property. Those property rights prevent rent dissipation from entry, as would occur with open-access. Furthermore, while private user cost is zero under open-access, it can be positive in the case of fugitive wildlife resources. This depends upon the mobility patterns of the wildlife concerned and their general ecological requirements.

By granting commercial property rights in wildlife, some species that would disappear in the absence of such rights (given existing land rights,) may be saved from extinction. However, this is not so for all species. Some will still disappear, including some spcies that it would be socially optimal to save if account is taken of their non-use value. Some will disappear that have considerable use value but are highly mobile and possess unfavourable movement patterns from a landholder's point of view. This is because in such cases the landholder's user cost approaches zero. Finally, even if landholders can appropriate all economic benefits from a wildlife species, eg. for its use value, it may be uneconomic to conserve it because competing alternatives provide a higher economic return.

Hence, we can conclude that while the provision of commercial property rights in non-captive wildlife species can lead to the conservation of some species that would otherwise disappear, this policy is incapable of saving from extinction some species that from a strictly economic perspective should be saved from extinction. Furthermore, it is likely to hasten the extinction of species that are uneconomic. Consequently, it seems that this policy can only be effective in conserving some (a few?) species that otherwise would disappear. In relation to the conservation of biodiversity, this policy is best considered to be a supplement to state provision of protected areas and their supply by NGOs, rather than an alternative. It is also necessary to be aware that while some wildlife species using private lands stand a better

chance of being conserved if they are commercial private property, others will stand a better chance (if not a perfect one) of survival if they remain protected as state or crown property. While errors have been made in the past by retaining most wildlife on private land as protected state or crown property, it would also be an error to believe that all wildlife on private property will stand a better chance of being conserved if it is made private commercial property.

Notes

[1] Clark demonstrates that if a landholder aims to maximise his/her present discounted worth, extinction of a species can occur if price exceeds the per unit cost of harvest for all stock levels of a wild species and the rate of interest is sufficiently large. Net present value of the business can be increased by realising all the farm stock of the species and investing the realised economic gain in the capital market.

[2] In other words, opportunity costs (alternative levels of return) forgone by a landholder as a result of conserving a wildlife species need to be considered by a landholder intent on wealth maximisation.

[3] The Kaldor-Hicks approach to social economic optimality is accepted for the purpose of this analysis.

[4] This is based on the assumption that economic willingness to pay or economic benefit of species as judged by humans should be the arbiter of the continuing existence of species. This ethic is not acceptable to everyone.

[5] The Royal Albatross Rookery of Taiaroa Heads in New Zealand provides another example. As discussed in Tisdell (1990, Ch. 6), various features of this site allow successful commercial use of this rookery for tourism. However, its operation relies in part on assistance from volunteers. It might be observed that breeding colonies or rookeries of wild species often allow fees to be charged to visitors.

[6] Of course, if feeding wild birds attracts more tourists to the site, commercial benefits to O'Reilly's are not so much a consequence of sales of grain to feed the birds but extra business generated in their nearby tourist shops as well as sales of extra accommodation.

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