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Clem Tisdell[2]

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Research for ACIAR project 40, *Economic impact and rural adjustments to nature conservation (biodiversity) programmes: A case study of Xishuangbanna Dai Autonomous Prefecture, Yunnan, China* is sponsored by the Australian Centre for International Agricultural Research (ACIAR), GPO Box 1571, Canberra, *ACT,* 2601, Australia. The following is a brief outline of the Project

Rural nature reserves can have negative as well as positive spillovers to the local region and policies need to be implemented to maximise the net economic benefits obtained locally. Thus an 'open' approach to the management and development of nature conservation (biodiversity) programmes is needed. The purpose of this study is to concentrate on these economic interconnections for Xishuangbanna National Nature Reserve and their implications for its management, and for rural economic development in the Xishuangbanna Dai Prefecture but with some comparative analysis for other parts of Yunnan

The Project will involve the following:

1. A relevant review relating to China and developing countries generally.
2. Cost-benefit evaluation of protection of the Reserve and/or assessment by other social evaluation techniques.
3. An examination of the growth and characteristics of tourism in and nearby the Reserve and economic opportunities generated by this will be examined.
4. The economics of pest control involving the Reserve will be considered. This involves the problem of pests straying from and into the Reserve, e.g., elephants.
5. The possibilities for limited commercial or subsistence use of the Reserve will be researched.
6. Financing the management of the Reserve will be examined. This will involve considering current sources of finance and patterns of outlays, by management of the Reserve, economic methods for increasing income from the Reserve and financial problems and issues such as degree of dependence on central funding.
7. Pressure to use the resources of the Reserve comes from nearby populations, and from villagers settled in the Reserve. Ways of coping with this problem will be considered.
8. The political economy of decision-making affecting the Reserve will be outlined.

Commissioned Organization: University of Queensland

Collaborator: Southwest Forestry College, Kunming, Yunnan, China

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DOES THE ECONOMIC USE OF WILDLIFE FAVOUR CONSERVATION AND SUSTAINABILITY?

Economic use of wildlife can be consumptive or non-consumptive, commercial or non-commercial. Given the economic preoccupation of virtually all modern societies, wildlife of economic value or use is favoured for conservation. How ever, does its commercial use favour conservation? This depends largely on whether private property rights exist and are enforceable. If property rights can be economically established and commercial use of a species is profitable, a strong force exists for preservation. On the other hand, if private property rights do not exist and there is open-access to commercially valuable wildlife, the tragedy of the commons is liable to occur a nd species may be driven to extinction by commercialism. Farming of a wildlife species is one form of commercial use, but it does not necessarily favour conservation of biodiversity. Nevertheless, commercial farming of some species may be environmentally more favourable than others, e.g., farming of kangaroos rather than sheep or cattle in parts of Australia. Commercialisation and choice based on economic value has selective impacts on the populations of living things. It changes the composition of species. It therefore alters the natural web of life and is bound to be unacceptable to followers of Aldo Leopold who saw virtue in the land ethic. The general tendency of commercialisation is to reduce biodiversity and thereby sustainability even though it may save some species from early extinction.

1. Introduction

Emphasis in policy formulation on using economic incentives and mechanisms to biodiversity has increased. When the World Conservation Strategy (IUCN, 1980) drawn up in 1980, use of economic incentives as a means of conserving wildlife and biological diversity generally was not stressed, even though the importance of sustainable development for conservation was recognized. When this strategy was revised in 1991 much more emphasis was placed on the use economic mechanisms and incentives (IUCN-UNEP-WWF, 1991; Tisdell, 1993, Ch.16) . More recently the Convention on Biological Diversity (5 June, 1992), agreed to at the United Nations' Conference on Environment and Development held in ·Rio de Janeiro, gave prominence to economic

incentives for conservation. Article 11 states "Each Contracting Party shall, as far as is possible and as appropriate, adopt economically and socially sound measures that act as incentives for the sustainable use of components of biological diversity".

The purpose of this paper is to discuss the extent to which the greater economic use of wildlife favours nature conservation and sustainability. But before doing so, it may be useful to discuss the nature of the economic use of wildlife. Economists distinguish between consumptive and non-consumptive use of wildlife. The former involves the physical consumption of wildlife e.g. kangaroos for meat and hides whereas the latter involves non-physical use e.g. the use of wildlife for viewing or photography. The former normally involves the killing of wildlife and the latter does not. However, both types of economic use of wildlife can reduce wildlife populations e.g. tourists viewing wildlife sometimes disturb wildlife and reduce their rate of reproduction or lead to their capture for display in zoos thereby possibly depleting wild populations.

Economic use of wildlife may be for commercial market-related economic activities or for subsistence purposes. In the modem world, there is considerable emphasis on the commercial aspect of economic activity. Consequently, if economic use is to provide an incentive for the conservation of wildlife or nature, those responsible for its conservation must be able to make a profit or economic gain from it. Whether they can do so will be influenced by their property rights in wildlife. Let us consider this matter.

2. Property Rights, Economics and Wildlife Conservation

The owner of private property has the right to exclude others from its use, to exclude others from using its product, yield or output and to transfer its ownership. Thus exclusivity and transferability are features of private property (cf. Tietenberg, 1992, Ch.3). This means that any use of such property by non-owners can be made subject to a payment and payment may be obtained for conservation, investment or improvement of property (an asset) when it is transferred. Thus private property provides a mechanism for economic reward.

However, the fact that private property legally exists does make it possible or economic to enforce private property rights. The economic costs of exclusion may for example exceed

the economic benefits. For instance, in a remote national park with several access routes, the cost of enforcing ·entrance fees may exceed the cost of employing rangers to enforce these. The creation of property rights is largely an economic question (Demsetz, 1967; North, 1981). As techniques or methods of exclusion improve or as the profitability of exclusion rises, economic incentives to create private property rights rise. The extension for example of the exclusive fishing zone from 3 miles to 200 kilometres is partly a consequence of improved methods for enforcing exclusion.

In relation to the conservation and utilisation of wildlife, although private property rights sometimes exist· they are often too partial to encourage conservation. This is the case where there is open-access to harvesting of wildlife but the harvest becomes the private property of the harvester on capture. No individual has an incentive to conserve wildlife in this case "because he/she cannot appropriate the benefit from it because all others· are free as a result of open access (common access) to reap the rewards of the individual's conservation effort (Tisdell, 1991, Ch.6). Furthermore, under open-access, the rising economic value of a wildlife species results in its increased rate of exploitation and may result in its being extinguished. So in this case the market system with limited property rights results in a perverse economic reaction and has the opposite result to that when a more complete system of private· property rights exists. This is an example of the y. of the tragedy of the commons.

This tragedy may, however, occur not only because there is common (open) access to the 'output' of an ecological system but also if there is open access to its 'inputs'. Open access for example to habitat valuable for sustaining wildlife, may result in its destruction if components of the habitat have economic value or marketability.

The answer to the problem of nature conservation may appear to be one of extending private property rights. However, it is sometimes very costly to enforce such rights and the private property solution is then uneconomic. Thus control of resources as communal or state property may then be the most viable economic solution or sometimes there may be no viable economic alternative to tolerating open-access. This implies that no single type of property right (such as private property) is the best for all situations.

Even when a relatively comprehensive system of private property rights exists, there may still be difficulties in appropriating all benefits from conserving wildlife because of the

existence of environmental externalities or spillovers (Tisdell, 1991, Ch.3). Those for example conserving suitable habitats for migrating or mobile birds may confer benefits on bird-lovers beyond the confines of the habitats preserved. There may be no economic mechanisms for the conservationists to be fully compensated for their preservation of habitats and some political intervention may be necessary to support such conservation.

It should be noted that even when complete private property rights can be established in a species, they do not ensure its conservation. Even if the species has market value, it may pay to eliminate it, e.g., when the rate of growth of the biomass of a species is slow and its economic value is not expected to rise substantially: For instance, suppose that by the optimal conservation and utilisation of a species, a maximum return of 2 percent can be obtained but that by replacing the species by another species a maximum return of 8 percent can be achieved. The owner of the former species has an economic incentive to eliminate it and replace it by the latter species. For example, owners of properties containing slower growing species of trees often harvest these and replace them by faster growing species. Alternatively, if the going rate of interest on capital in excess of 2 percent, it may pay to harvest the stock of the slow growing species completely, sell the harvest and invest the capital sum obtained at the going rate of interest. In either case, one species is eliminated. Hence, full private property rights even in economically valuable species do not ensure their conservation or survival. They must be sufficiently valuable otherwise alternatives to their conservation will be chosen if economics determines the decision.

This is not to say that private property rights and marketing of wildlife cannot assist conservation of particular species or natural areas. However, they are not a panacea ensuring nature conservation.

3. The User or Beneficiary Pays for Wildlife

In line with the greater emphasis on an economic means to support wildlife conservation, the user pays or beneficiary pays principles have been promoted (McNeely, l988; Young, 1992Ch.3). It is possible for the user or beneficiary to be forced .to pay for use of wildlife if exclusion is possible. Then. use of the wildlife or access to wildlife resources can be made dependent on a payment. However, one needs to consider the economics

of collecting the charge, that is the cost of policing and enforcing payment. If this is too costly, collection of fees will not be economic.

When resources are able to earn income, administrators and government officials generally take a more favourable view towards conserving them than when their management is a drain on the public purse. Thus if national parks and protected areas are able to earn income this is likely to be considered a positive feature by governments. They may for example be able to earn income by entrance fees, camping fees and the sale of concessions to businesses such as shops. and providers of accommodation within the park. However, to set user changes so as to maximise profit or net returns is not socially optimal as a rule. Because national parks or protected areas have some uniqueness, the demand curve for visits is likely to be downward sloping and a partial monopoly exists (Tisdell, 1972). According to economists the exploitation of a monopoly situation by 'charging what the traffic will bear' is usually not in the public interest. Sometimes, charges may also be influenced by conservational considerations – a high fee may be charged to reduce visitor numbers so as to reduce their load on the environment.

A modest fee has ·been introduced for visits to the Great Barrier Reef Marine Park (GBRMP) to defray some of the costs of operating the GBRMP Authority. The fee is so low as not to be a significant deterrent to visits or to constitute a monopoly price.

4. Examples of Economic Use Assisting Conservation

In South Africa, national parks and protected areas are largely self-financing. For example, Kruger National Park obtains finances (1) from the culling of wildlife (mainly elephant and cape buffalo) and operates a processing plant for this purpose, (2) from fees paid by visitors to the Park, and (3) from income from accommodation and within the Park. Culling of some species of large animals is considered necessary because their seasonal movement has been restricted by the Park and their numbers tend to increase beyond the carrying capacity of the Park unless they are called.

It is interesting to note that both South Africa and Zimbabwe opposed the ban on international trade in ivory introduced in October 1989 under CITES (The/Convention on International Trade in Endangered Species) (Barbier, 1991, p.407). Both countries

engage in harvesting of elephants within their national parks and sell the produce. Furthermore, elephant populations are not endangered in either country (Barbier, 1991, p.407). There is, however, often debate about whether the elephant cull is too greatly influenced by commercial rather than biological considerations.

Selective culling of wildlife or habitat modification may be undertaken in protected areas to adjust the composition of species in the area more suitably to relative tourist demands for viewing different species. This increases tourist demand to visit such areas. Although this culling is economically motivated, there is room for debate about whether the influence is positive from a conservation viewpoint.

An interesting case of nature conservation and economic use occurs in the Otago Peninsula, located near Dunedin in New Zealand. The royal albatross, *Diomedea epomophora* nests on Taiaroa Headland which is only accessible to humans by a narrow neck of land. In the past, this nesting ground was threatened by human disturbance and introduced pests. It is now under the protection of the Otago Peninsula Trust which earns its income from visitors' fees paid for viewing the albatross colony from a viewing station. The colony is maintaining its own. Commercial conditions for conservation of the royal colony are good for the following reasons which I have mentioned elsewhere:

1. "The amount of land that has had to be set aside for conservation is relatively small. The opportunity cost of keeping the colony is small.

2. Exclusion from the site is relatively easy, so the service of conserving species on the site for viewing can be sold to the public via entry fees. The service can be marketed, as is done with most private goods. Nevertheless, some individuals may see flying albatross from boats from outside the enclosure without paying.

3. Since the Otago Peninsula Trust, as authorized by the Department of Conservation, has a monopoly (is the only operator able to sell rights to see royal albatross colonies in the area), it can charge a monopoly price for entry.

4. Because a high proportion of young albatrosses born in the colony return to the colony to breed on reaching adulthood, there is a close connection between attempts to conserve young in the colony and future populations of royal albatross at the colony.

5. The site is easily accessible in virtually all weather conditions.

6. Not only albatross but also breeding colonies of shags can be seen as a rule, and there is a magnificent view across the harbor, including Aramoana spit. So there is varied interest." (Tisdell, 1990, p.89).

Another example, to consider is one of animal conservation *ex situ*. Lone Pine a Sanctuary in Brisbane claims to have the largest population of koalas in the world operates as a commercial enterprise. It is reliant on income from visitors fees and appears to be a profitable undertaking. Does it assist the conservation of koalas? By making the public more aware of koalas, it may make them more supportive of such conservation. Displays at the·Sanctuary indicate that it has supported research into koalas and this may indirectly assist their conservation. Furthermore, eucalypt plantations have been commenced to provide food for the koalas in the Sanctuary rather than continuing to rely on collection of leaves from trees occurring naturally.

The keeping of wild animals in commercial zoos has often been controversial from a conservation point of view. One fear is that zoos may provide an economic incentive for the capture of rare animals from the wild and endanger their populations. On the other hand, there have been occasions when zoos have been instrumental in saving species from extinction which have become extinct in the wild. On occasions zoos have become the source for the re-introduction of wildlife species to the wild.

5. Farming as a Means of 'Wildlife' Conservation

Biologists have sometimes seen farming of particular species as a practical way of saving them from extinction. This has been suggested for example for turtles, giant clams and crocodiles. In Africa a number of private wildlife farms have been established to rear wildlife for sale for hunting and for the meat and for trade. For farming to be practical, it must be economical to confine the animals concerned and for the owner to be able to exclude others from making use of them except on his/her terms.

When farming of a species is profitable, it will undoubtedly provide a strong incentive for conservation of this particular species. However, it does not necessarily follow that

fanning is favourable to the maintenance of biological diversity.

When the farming of a species is profitable, there is a tendency to select only the most economic varieties of it for farming. Varieties and breeds other than those found to be most economic are liable to be allowed to die out or are extinguished. Hence, natural genetic diversity is reduced. While this may be compensated for to some extent by artificial breeding programs, general evidence is that agriculture and the livestock industries are relying on an ever diminishing genetic base as a·result of private economic selection.

There is a second way in which farming is liable to reduce genetic diversity. Where a species is farmed, habitat favoured by wild populations may be appropriated for farming and wild populations may be extinguished in this geographical range. This is also likely to lead to reduced genetic diversity.

Furthermore, farming, generally leads to habitat modification and destruction of wild animals liable. to compete with farmed animals. Farming if widespread results in greater uniformity of environments. Both of these elements can reduce genetic diversity. Sometimes it is even claimed that farming lead to greater demand for remaining wild members of population of species and actually increases the harvesting of them (Tisdell, 1991, Sec. 6.4).

Thus (even ignoring the last mentioned possibility) in the longer-term farming is liable to lead to reduced genetic diversity. Indeed, it could reduce gene banks of significance for sustaining agricultural productivity to low levels which may make it difficult or impossible to sustain some types of farming in the long-term. Efforts to sustain genetic diversity outside the farming sector could therefore be important for the sustainability of farming.

The above does not imply that previously unfarmed species should not be farmed. Farming is bound to continue as an economic activity. It may well be that some existing wild species are environmentally more suitable for farming purpose than those animals currently farmed. For example, kangaroo farming in parts of Australia may be environmentally more suitable than sheep or cattle grazing. Currently one of the impediments to such farming is the difficulty of confining kangaroos to an individual property.

6. Discussion and Conclusion

Economic use of wildlife, particularly commercial use of a species, may be favourable to survival of wildlife but need not be. This depends upon the nature of property rights and the economic profit that can .be obtained from using a species commercially. Under open-access, economic ·use of a species is not favourable to its conservation and. measures to control its utilization are usually required. While the creation of private property rights in wildlife may lead to its conservation sometimes this is insufficient to ensure the survival of a commercially valuable species because· alternative economic options to conserving the species are more profitable. Furthermore, it was not always economic to establish private property rights in wildlife species.

Economic use of species, in a system designed to reflect economic values fully, is selective. It favours survival species and varieties of greatest economic value to the detriment of those of smaller or no apparent economic value. Interference in natural systems is designed solely with economic ends in mind. Such an approach to nature conservation is likely to be at odds with the land ethic, the ethical responsibility of humankind to conserve ecosystems as a whole (Leopold, 1966). One would expect followers of Leopold (1966) to reject conservation solely for economic or utilitarian ends and to be increasingly alarmed by policy reforms which fostered this approach.

Even those taking a less ecocentric view may feel that the appropriate course of action is a middle course, namely that some but definitely not all wildlife conservation should be determined by economic use or values. They may do so because: (1) They are favourably disposed to the land ethic to some extent. They are neither completely anthropocentric or ecocentric in their value system. (2) Considerable uncertainty exists about future values, including economic values, of particular species and ecosystems and conservation of nature is a rational means of allowing for such uncertainties. This is an application of the precautionary principle (Young, 1992, p.67). (3) The economic costs of conserving many remaining natural ecosystems may be low on average and the economic benefit of transforming them to their currently most economically valuable state may be slight. There may therefore be no case for the latter economic action when it is possible that such transformation could result in a significant economic loss in the more distant e.g. due to extinction of species of possible future economic value (Ciriacy-Wantrup, 1968; Bishop, 1978). This view suggests that the only wise course

of action is to allow current (or currently perceived) economic values to determine conservation of wildlife in a restricted spatial area reserving other areas for holistic conservation or with this as the prime aim. Of course, this leaves open the question of the size of areas or the area to be reserved for holistic conservation of nature. However, it involves rejection of a completely economic approach to conservation.

At the opposite extreme to the ecocentric view is the view that ideally all wildlife conservation should be determined by economic values and that systems should be developed so that the conservers of economically valuable wildlife can be fully rewarded. Ethically, I prefer the middle path to either of the extremes. Nevertheless, it is accepted that sometimes greater realisation of economic values will foster nature conservation and support the cause of conservationists. Nature conservationists are not necessarily inconsistent when on some occasions they support and on other occasions they oppose greater reliance on commercial or economic use as a means of supporting wildlife conservation. Conservationists need to be selective in their support of economic incentives and values for wildlife conservation if their main goal is to support biodiversity. This is the. main message of this paper.

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