

Economic Incentives and Wildlife Conservation

Erwin H. Bulte
Department of Economics
Tilburg University, The Netherlands

G. Cornelis van Kooten
Department of Economics
University of Victoria, Canada

Timothy Swanson
Department of Economics
University of London, United Kingdom

Draft: October 27, 2003

Wildlife exploitation and conservation involves various costs and benefits, which should all be taken into account to achieve an optimal outcome. For this to occur, it will be necessary to develop appropriate economic instruments and incentives. Examining the scope for this is the topic of the current study. The time and funds available to complete this paper were extremely limited, which effectively made it impossible to complete a thorough and detailed analysis. As a result, in the paper we focus on what can be learned from standard economics. The paper lacks the level of detail and data to provide guidance in many operational issues.

Wildlife management poses a particular challenge to the global community because wildlife has an impact not only on people living in areas where wildlife is found, but also on people located considerable distances away. The problem is that the costs and benefits of wildlife exploitation facing “source” states differ substantially from those faced by other countries. From an economist’s perspective, the main wildlife problem is that all too often many of the costs of harvesting wildlife are not appropriately taken into account. In particular, the values that wildlife such as elephants, tigers and rhinoceros have for people who may someday view them in the wild and the values that such fauna have for people who are simply delighted to know that such wildlife exist (having no intention of ever viewing them) are ignored in most harvesting decisions. Further, when property rights are insecure, those who harvest wildlife do not take into account the cost of their actions on the future availability of the resource because they do not have a stake in wildlife beyond those accessible to them today. This cost is referred to as the “user cost” and it is typically ignored in harvest decisions unless property rights are clearly stated, and protected. As a result, *in situ* wildlife is undervalued leading to their possible overexploitation (see below).

In essence, there is a divergence between what is optimal from a regional, community or individual perspective, and what is optimal from the perspective of a country or even global society. To address this divergence, a variety of economic instruments can be employed. The term “economic instrument” is used to describe any device/method used by government to achieve an outcome contrary to (other than) the one that occurs in the absence of any government intervention. The government essentially has three categories of economic instruments available to it: (1) common values and norms (threats or moral suasion in economic terms), (2) command and control, and (3) market incentives, which are also referred to as economic incentives (EIs). Moral suasion refers to the ability of the state to convince economic agents (individuals or firms) to act in a fashion that is socially desirable. Voluntary instruments (e.g., product certification/labeling by an industry association), perhaps accompanied by threats, are one aspect, but there also exist opportunities to “convince” citizens to report poachers, protect wildlife habitat and so on. Economic or market incentives and command and control (i.e., regulation) are generally used in combination, often out of necessity.

The objective of this study is to examine the scope of economic incentives in the conservation of wildlife. The focus of the study is on developing countries as these host most of the biodiversity and wildlife. The main results are as follows: While economists often believe that, in general, the best way to conserve wildlife and their habitat is to encourage efficient and sustainable use of these resources, the scope of EIs in such conservation efforts as an ‘extra measure’ to regulate harvesting pressure may in some cases be limited. Specifically, we argue that there are cases where the usual gains of EIs may be of secondary importance. Whether or not such gains materialize depends on the specific characteristics of a species and the parties involved in its harvesting. This should be assessed on a case-by-case basis. If both the habitat and the harvesters are “homogenous” (in the sense that there is little variation in the area in which the species is harvested and the skills/technologies of those harvesting the species), then the gains from EIs are small. These conditions may hold for (low-tech) open-access harvesting of certain species in Africa, but not for fisheries where “firms” of various sizes from individuals to large corporately-sponsored vessels are engaged in harvesting.

Two important qualifications are in order. First, while the role of EIs in regulation of *harvesting* may (but need not) be modest, we argue that international EIs may be of great importance when it comes to *habitat* conservation (indirectly contributing to wildlife conservation). In this respect we mainly think of means to capture and channel non-use values associated with conservation to affected parties living with (or owning) wildlife in developing countries – an example of international transfers or subsidies. Second, establishing property rights (or secure use rights for extended periods – that is establishing property rights in legal or physical space) is consistently encouraged by economists as a first step towards efficient management of resources – both of land and the wildlife it supports. Whether this first step must be complemented by additional EIs (tax, tradable quota) to arrive at a truly global optimum, however, is not certain. Sometimes additional command and control measures are to be preferred, and sometimes no additional measures are necessary (for example when external effects are small – see the next section).

welfare is maximized at the price and quantity where demand intersects supply – where marginal benefit (demand price) equals marginal cost (supply price). The area between a falling demand function and a rising supply func

1. **Private property** In this case, the private owner has the right to utilize and benefit from the exploitation, conservation or sale of wildlife, as long as no (socially unacceptable) externalities are imposed on others (e.g., when shooting wildlife endangers the lives of others). Private ownership does not imply absence of state regulation (control), as private property cannot exist without state sanction and protection.
2. **State property** The state owns the wildlife and individuals may be allowed to harvest them, but only according to rules imposed by the state or the CITES Management Authority.
3. **Common property** In this case, a group owns and manages the wildlife resource, and the group excludes those who are not members. Members of the group have specified rights and duties, while non-members must accept exclusion. Coordination (regulation) of management may or may not be forthcoming, depending on local circumstances.
4. **No property rights (*res nullius*)** When a property right is not assigned, open or free access is the result. Under open-access, each potential user of the resource has complete autonomy to utilize wildlife since none has the legal right to keep another potential user out.

A summary is provided in Table 1. In practice, resources are often held in overlapping combinations of these regimes, and it is possible to shift from one (dominant) regime to another when conditions change. Failure to enforce or manage properly a state or common property resource (which is frequent) leads to open-access, which is the case for some endangered large-game species. The switch from common and state regimes to open-access as a result of population growth is well documented (Murty 1994; Bromley 1999).

Table 1: Classification and Characteristics of Property Rights

Type	Characteristics	Implications for economic incentives
Private property	Exclusive rights assigned to individuals	Strong incentives for conservation of resources and for investment as well
State property	Rights held in collectivity with control exercised by CITES authority or designated agency	Creating opportunities for attenuation of rights; managers have incentives for personal gains
Common property	Exclusive rights assigned to all members of a community; approaching private property when coordination arises.	Creating free-riders problem and low incentives for conservation
Open access	Rights unassigned; lack of exclusivity	Lack of incentives to conserve; often resulting in resource degradation

Property rights do not really exist under open access, and if there is no cooperation under communal ownership (or no enforcement under state and private ownership), then property rights are insecure. The absence of secure property rights (or even open-access) has resulted in excessive depletion of resources and biological assets for the following reason. The true cost of exploiting a resource consists of two distinct components: the private extraction costs

the wild stock, but recent research suggests that there may also be *direct disutility* following from uses that are harmful to individual animals. For example, people may care about the fact that individual whales are shot, rather than care about the fact that the whale population becomes a bit smaller as a result. When direct disutility is sufficiently large, global welfare is maximized by refraining from use altogether. Swanson and Kontoleon (2003) have established that this condition holds for the black rhino, where intrusive uses include trophy hunting and seducing rhinos to remove their horn. However, the earlier statement about benefits sharing still applies in this context: If non-use values are large, they should be captured (through transfer payments from the North, say) and channeled to those who bear the burden of living with the wildlife. In the absence of such transfers, advocating zero use may simply be non-sustainable.

1.5 Summary

Economics prescribes that wildlife should be harvested as long as the marginal social benefits of so doing exceed the marginal social costs. Included in (marginal) benefits are values of wildlife products (e.g., caviar, medicinal plants, ivory, bush meat, hides) or the live specimen (if sold to a zoo or herbarium). In addition, (marginal) social costs include (i) the loss *in situ* (existence, viewing) value that wildlife provide citizens who may be located in countries other than the source country, (ii) the opportunity cost from harvesting the wildlife today rather than waiting for a more opportune time in the future when the specimen(s) may fetch a higher price, (iii) the lost future value of offspring that might result from leaving the specimen(s) in place, and (iv) the opportunity cost of the resources employed in the harvest activity. This is illustrated in Figure 2, where failure to include all costs and benefits leads to suboptimal levels

2. WILDLIFE AND ECONOMIC INSTRUMENTS

In this section, we examine the various economic instruments that are available to countries, and discuss their advantages and disadvantages. As noted in the introductory section, economists generally identify three economic instruments for addressing market failure due to environmental externalities (or spillovers): (1) command and control (hereafter C&C), (2) common values and norms (or more cryptically moral suasion), and (3) market incentives. Conceptually, common values and norms are intermediary between the “extremes” of the market and C&C (Loasby 1990; Stavins 2002). Common values and norms develop more easily in a homogeneous society, while markets are more appropriate in a heterogeneous society (CPB 1997, pp.42-44). However, there is much confusion about the different instruments that are available and which are preferred (see, e.g., Richards 2000).

One way to classify economic instruments for resolving environmental spillovers and user cost is illustrated in Table 2, where instruments are classified according to two dimensions – whether control of the means used to address the externality resides with the private party or with the state, and who bears the costs. Market incentives include subsidies, contracts, taxes and rights trading. (Rights are defined as an entitlement, whether to a harvest quota of a wildlife species or fish stock, or the ability to develop or conduct other activities on land, such as plowing or harvesting before a certain date.) These give private parties complete discretion over the actions taken.

In contrast, C&C regulations generally provide much less discretion. As will become clear below, this will lead to inefficiencies in the context of asymmetric information between agent and regulator. At one extreme, regulations may specify technology-based standards that regulated firms must use or, in the case of wildlife perhaps, prescribe management standards – the “party-on-the-ground” (individual, firm, wildlife management agency) has no degrees of freedom in decision-making. Alternatively, regulations could provide the party-on-the-ground some degree of freedom on how to proceed, as would be the case if the regulation only specified the number of specimens that can be harvested each period (a quota of h^* in Figure 2, say). The regulator or CITES authority could then employ a market instrument (e.g., tradable quota) to allocate the harvest in an efficient manner. In either case, the cost is borne by the private party.

Table 2: Classification of Instruments for Addressing Wildlife Conservation

Who Bears the Costs?	<i>Private Party Control</i>		<i>Government Control</i>
	Price Based	Quantity Based	
<i>Government/Society</i>	Subsidies, transfers	Grandfathered (tradable) quota Contracts	Public provision
<i>Private Party</i>	Taxes, fees, charges, tariffs	Auctioned (tradable) quota	C&C regulation Harvest quota

The instruments included in Table 2 do not exhaust the full range of instruments for environmental protection. For example, the literature contains discussions of liability systems, and bond-and-deposit systems. However, neither of these types is likely to be important for the case of wildlife conservation, and they will therefore be ignored in what follows. We will focus on the most important economic instruments in the context of the protection of wildlife – taxes/charges and tradable quota or rights. In addition, we consider physical property rights, since tradable quota constitutes a legal right. Before we turn to a discussion of these EIs, however, we will briefly evaluate the subsidy instrument.

Economists are typically critical about the use of subsidies to achieve conservation. Consider the case where harvesters are subsidized to *lower* their harvest rate (this is the logical counterpart of the literature on subsidies and pollution, where firms are paid to lower their emissions). Assuming such agreements can be enforced, subsidies would “work” in the sense that they tend to lower the optimal harvesting level of individual harvesters. But there is a large potential problem with such subsidies when property rights to the resource are imperfect: they can encourage entry into the harvesting sector that the government aims to control. That is, even though harvesting per harvester goes down, the number of harvesters will likely go up, compromising conservation objectives. Unless the number of harvesters is somehow fixed such that new entry does not occur (e.g., when property rights are secure), subsidies are a poor instrument to regulate harvesting. But, importantly, there is another issue to consider in this context. In addition to suffering from excess harvesting, many wildlife species are threatened by habitat conversion. Subsidies can be an efficient, effective and equitable instrument to deal with habitat conversion. By basing transfer flows on habitat made available by landowners, habitat conversion (and, thus, indirectly also wildlife conservation) will be promoted. The fact that “entry” in the habitat sector is promoted by subsidies is, of course, no problem – quite to the contrary; this is the main intention. We return to this in section 3.3.

Following Panayotou (1994), we distinguish between property rights in *physical* space (land ownership, ownership of wild fauna and flora on one’s land) and property rights in *legal* space (e.g., a right to hunt or collect one or more specimens, trade live specimens or parts or derivatives of them). The latter right specifies a narrower “bundle of rights” to the resource than the former. Many species are migratory, so it is not possible to establish full property rights (i.e., rights in physical space) as access will be shared with others. But rights can still be established in legal space by defining an

accomplished via EIs is debatable, but it may also be the case that the “effort” required to go from from h_1 to h^* is not worth making: By appropriate specification of property rights in physical space, most of the spillover problem may be overcome and the species spared from potential extinction. Property rights depend on cultural conditions, so it may be better in some sense to allocate them to a well-defined group or community rather than private individuals/firms (see Table 1 and the excellent book by Baland and Platteau 1996).

The existence of property rights and the associated ‘right’ to exclude others from using the resource implies that the user cost will no longer be ignored by those with access to the resource. When property rights are secure, owners know that the fruits of their ‘investments’ (such as refraining from current harvesting, or postponing the decision to convert habitat) will accrue to them. This means that they are more inclined to make such investments. Addressing this institutional failure therefore enhances efficiency, and comprises an important first step in enhancing efficiency and sustainability of resource management. This is illustrated in the following case study, which illustrates the benefits of defining property rights in legal space, and of benefits sharing.

2.1 Establishing secure property or use rights – The CAMPFIRE case study

In Southern Africa there was a widespread problem of poaching in designated parks and reserves until government officials began to institute benefit-sharing programs. These programs have taken many different forms. Sometimes they simply allow the local community to set up tourist related facilities within the park (Natal’s Good Neighbour Policy), other times they give the local community a share in the value of wildlife that wanders onto their neighbouring lands (Zimbabwe’s CAMPFIRE program), and sometimes the community is allotted a share of the receipts from wildlife management on reserve lands (Wildlife Management Trusts). It is important to note how these community funds were channeled back to the community in a manner that is widely visible throughout the community. Sometimes this can be accomplished by means of purchasing community goods such as schools etc. Other times it is best to send the benefits back to the individuals in the form of jobs or money.

Zimbabwe's approach of sustainable wildlife utilization has now been extended to all of the communal areas by the CAMPFIRE program. Communities have been granted the rights to manage as well as the means to capture the benefits from wildlife use. Since its introduction, CAMPFIRE has managed to promote cooperation among village members and has enhanced the institutional capacity of other community programs.

During the colonial times and up to 1978, legislation in Zimbabwe prohibiteJ-6.275 -2.15 Tfteimh

conventional agriculture induced a shift from livestock to natural ecosystems accommodating a wide range of species. While cattle could only be sold for meat, wildlife could be photographed, sold as hunting trophies, as well as being sold as meat. At present, some 75 percent of Zimbabwe's commercial ranches now participate in the wildlife industry.

The first attempt to extend this system to communal areas was a program called WINDFALL. The program involved allocating revenues from wildlife culling in National Park and from safari hunting to district councils, but overall wildlife management remained with the State. The results of this program were disappointing since the councils kept all the money and local people saw few benefits. In 1975, a further step was taken which granted councils the same rights as private landholders to appropriate the value from wildlife. In order to increase the acco

communities have rapidly learnt the necessary skills for natural resource management despite the limited capacity of the state to provide technical assistance. In fact, districts with donor support tended to be slower to develop and have suffered from excessive overhead costs.

The philosophy of CAMPFIRE has been to set initially the conditions right for sustainable wildlife management by local communities. The communities have started to cooperate and build institutions for management of resources. A key insight is that allowing use by well-defined groups (akin to establishing property rights) may go a long way towards achieving efficiency. However, to arrive at the optimal outcome property or use rights will generally have to be complemented with additional policies. As will become clear below,

control extraction by potential 'cheaters' in the case of a community-owned resource, the costs associated with such enforcement will now to a large extent be borne by the owner rather than the regulator. Since the resource owner likely has better knowledge about local enforcement issues than a regulator, costs may also be lower. To some extent similar devolution of enforcement is expected

capture spillover benefits (if any) the regulator can choose either *additional* economic instruments, or command and control. It has been documented in other sectors such as commercial fisheries that adopting EIs may result in substantial efficiency gains. In this section we argue that the scope for such additional efficiency gains may be modest in the case of wildlife harvesting. Whether no additional regulation is preferable, or intervention through C&C or EIs instead, should be determined at the case study level. The costs and benefits of the various options will vary greatly, depending on characteristics of the species, the habitat and the parties involved in harvesting.

3. ECONOMIC INSTRUMENTS: WILDLIFE HARVESTING AND HABITAT

The main threats to wildlife are introduction of exotic species (invasives), overexploitation and habitat conversion. Trade arguably affects all three threats, for example, by shipping species from one location to another or by changing relative prices of factors and commodities. For trade in threatened species and/or wildlife, that is CITES, the most important threats are overexploitation and habitat conversion. Economic incentives may affect both the incentive to harvest species, and the incentive to convert natural habitat for some competing purpose. We will return to these two threats in this section.

3.1 Regulating harvesting

Under open-access no individual harvester has an economic incentive to conserve the wildlife, and none can efficiently conserve the wildlife by delaying harvest. Doing so will only enhance the harvest opportunities of competitors. New harvesters will be attracted to the activity, or existing ones will expand their efforts so long as they earn more than the (opportunity) cost of their effort. The consequence of ignoring user costs by individuals is that all rents are dissipated, and eventually total cost equals total revenue. Excessive hunting effort and too small resource stocks represent the fundamental problem of open access. Various management instruments can be used to combat rent dissipation and protect wild stocks. It will become clear that while most instruments are theoretically able to protect stocks, only some will actually be able to maximize resource rents.

Most textbooks on resource economics (e.g. Conrad and Clark, 1987) demonstrate that management agencies or the CITES management authority can force harvesters to recognize user costs by either imposing th

products and biological processes. Taxing harvesting effort can be difficult because fishers have an incentive to substitute types of effort that are not taxed for types that are taxed. Finally, enforcement of a harvest tax and its collection may be difficult.

Much more common than tax schemes in actual renewable resource management policies are quota schemes. In the case of wildlife, an annual harvest quota can be determined from information about the species' population dynamics and minimum viable population, and other (economic) factors, and then allocated in some fashion. At the national level, quota can be distributed amongst individual hunters or communities, or hunting can remain open until the national quota is reached. While a quota system may result in conservation of the stock and op

The allocation of quota can be used as a policy tool. Quota can be auctioned each year to the highest bidders, thereby earning rents that the government can use to monitor and enforce the scheme and fund wildlife management and habitat protection programs. Revenue can also be used to reduce tax distortions elsewhere, or finance the provision of other public goods. Quota can also be allocated to local communities that can then sell the quota, harvest specimens themselves or protect them from harvest (perhaps to enhance tourism). In this case, the local communities have a greater interest in wildlife

be used to carry loads. A more complex sociopolitical system emerged and the hunting of vicuña was banned for religious reasons. Wool was still obtained, although this was done through a management system imposed from political authorities. A live capture technique called chaku was used because it allowed the shearing and release of the animal with little impact on the population. These practices were clearly directed to the conservation and sustainable use of resources, where the vicuña wool was only used for special robes for the nobles and royals (Hurtado 1987).

The system, however, was affected by the European invasion, giving way to a third phase where the planned chaku was gradually dismantled and hunting of vicuñas increased, coupled with a regional land struggle between native communities and the Europeans. The few attempts to regulate the use of vicuñas failed (Hurtado 1987) and uncontrolled hunting

of wildlife. In this section, we consider wildlife habitat and land use. Of course, property rights to wildlife, regulations concerning take and incentives to ensure that wildlife are not over harvested affect the value of land. That is, any harvest and wildlife protection policies that increase the value of wildlife might increase the value of land in habitat.

Economists usually consider distributional issues of secondary importance. The focus is generally on maximizing social surplus, and whether that surplus accrues to the regulator or private agents typically matters less. In this section, however, we argue that distribution may be of the utmost importance for the case of wildlife conservation. The reason is as follows. In any economy, there are agents (private or public) that decide about land use. Supposedly such agents compare the present values of net returns from alternative land uses – they compare the returns of habitat conservation and sustainable resource management to those of agricultural conversion. When intervention lowers the decision maker's returns to habitat conservation and resource harvesting, it becomes more likely that habitat will make place for other uses of the land.

Above we established that taxing, auctioned quota, subsidies and grandfathered quota are equally efficient in restricting harvest effort. However, as mentioned, there is a distributional difference. Taxing and auctions imply resource rents for the regulator, whereas subsidies and grandfathered quota imply rents for the harvester. This translates into different incentives to conserve habitat. nes

Often landowners have little incentive to protect wildlife habitat because the value of land in habitat for agricultural producers and foresters may be very small or non-existent. As noted earlier, wildlife and wildlife habitat are a public good and private landowners have little if any incentive to protect wildlife habitat on their land. Indeed, as the enactment of the Endangered Species Act in the United States has demonstrated and as we argue further below, landowners may have every incentive to do the opposite – convert habitat to crops. Therefore, economic instruments are required to 'encourage' landowners to protect wildlife habitat.

In many political jurisdictions, rural land continues to be largely publicly owned, or, if not owned outright, agricultural and other users of rural land have ill-defined or weak property rights. Peasants lack property rights to wildlife and often gain the right to land only by actively farming it. Even productive forestland might be sacrificed and wildlife habitat lost because peasants cannot demonstrate ownership of land unless they

activities cannot compete with cropping, even supposing that the ‘correct’ institutions were in place to enable landowners the rights to all the products produced on their land. When the social benefits of habitat conversion exceed the social benefits of conservation (including international positive external effects), economists recommend conversion of natural lands into alternative uses.

The most interesting case exists where habitat conservation “does not pay” from a private perspective, but would be optimal from a social (global) perspective. In other words, when the positive external effects associated with conservation of habitat and wildlife are sufficiently great to topple the balance from conversion to conservation. In this case economic instruments can be used to encourage private landowners or land users to take into account the negative external effects of their land-use decisions on wildlife. What instruments might be employed that directly affect land management?

Regulation

Regulations specify what landowners can and cannot do on their land. The Endangered Species Act is an example of regulation in that it prohibits destruction of the habitat of wildlife on private land. Regulatory approaches often entail expensive monitoring and enforcement, and can still be ineffective if social norms and formal rules do not coincide (Ostrom 1990; Nielson 2003). In fact, it is possible that regulations may lead to perverse incentives that discourage conservation (‘shoot, shovel, and shut up’) if restrictions on established property right owners are onerous (Polasky 2001).

Taxes and subsidies

Tax incentives can be designed to give farmers an incentive to protect wildlife habitat on farmland. However, evidence from developing countries indicates that tax policies are not, by themselves, capable of compensating rural landowners for providing a public good (wildlife habitat) at private expense. As evidence has accumulated that preferential tax assessments do more to subsidize farmland owners than to conserve farmland, governments have increasingly initiated programs to purchase development rights and conservation easements (Wiebe et al. 1996). These programs involve separating and purchasing some but not all of an owner’s rights to a property: separated rights might include, for example, the right to build residential or commercial buildings, to drain sloughs, to burn associated uplands, or to remove endangered species of trees. In the United States, most purchases have been in the form of agricultural conservation easements that restrict residential, commercial or industrial uses, but that allow active farming (Hardie et al. 2004).

Subsidies are perhaps better than tax incentives for protecting nature on agricultural lands. In developed countries, subsidies are used to take land out of production, keep extant wetlands or other critical wildlife habitat from being converted to agriculture, or establish wildlife habitat through tree planting, plant of dense nesting cover for migratory waterfowl, et cetera. Similar programs can be used in developing

countries, although financing such programs will pose a greater challenge and likely prevent them from being implemented.

The subsidy approach most-often mentioned in the literature is that of compensating farmers for losses from wildlife depredation. While not providing incentives to prevent legal and illegal taking of wildlife, compensation may at least reduce the incentives of local peasants to go out and destroy wildlife to prevent the agricultural damage that they may cause. On the other hand, wildlife damage programs may encourage additional conversion of habitat into cropland as they essentially amount to a subsidy to agriculture (Rondeau and Bulte 2003).

Finally, one way to arrive at a globally optimal level of habitat conversion is through subsidies at the international level. Fair compensation for positive external effects of conservation implies a transfer flow from North to South. While some of this could presumably be arranged through NGO involvement (see below) and current opportunities provided by the Global Environmental Facility (GEF), it is an open question whether this is enough to safeguard sufficiently large areas of nature in the long run. The public good characteristics of nature conservation, and the implied incentives to free ride on other's efforts, could mean additional, cooperative efforts, should be undertaken. One can think of large-scale programs to finance the provision of ecological services (such as now pioneered in Costa Rica), funded through taxation in the North.

Transfer of development rights

Transferable development rights and wildlife habitat banking constitute cases where separation of development rights can be integrated with land use planning. Wildlife habitat banking (WHB) allows landowners to develop wildlife habitat on their property if they have sufficient credits from investment in the completed rehabilitation of a WHB site. Land use planning enters this program through the designation of the WHB sites (see Fernandez and Karp 1998). Sites can be chosen that provide large high-quality habitats with superior potential to sustain desired ecosystems. Given good choices, the investments in the WHB can provide greater community-wide environmental benefits than equivalent investments in the maintenance of habitat on sites that are being developed. Good planning is crucial to obtain higher benefits, because WHB is a 'no net loss' program that links area restored to wildlife habitat area removed by conversion of habitat to agriculture (Hardie et al. 2004).

An important difference between preferential tax assessments and purchase of development rights is the potential role of planning. Preferential tax assessments are typically extended to all eligible landowners regardless of the location of their property. However, purchases can be targeted to sites where the social or environmental benefits are deemed to be particularly high, such as along a wildlife corridor or within a region under particular agricultural pressure. While the potential for targeting exists, it generally is not realized (see Hardie et al. 2004). Zoning-based transferable development right (TDR) programs are initiated by dividing an area that is being opened for agricultural conversion, or one that has already been converted, into a zone where agricultural development is permitted and one where agriculture is limited or prohibited entirely,

thereby protecting crucial habitat. The government partially takes private property rights in 'down-zoned' area in order to protect an environmental amenity – wildlife habitat (see Johnston and Madison 1997; Hardie et al. 2004). When the down-zoning occurs, landowners in the affected (source) areas are granted the option to sell the separated development rights to landowners in designated agricultural development ('up-zoned') areas or sinks. It is the owners of property in the up-zoned or target areas that must purchase the transferable development rights in order to be able to farm their land. Landowners who lose property rights are compensated in a development rights market, but at rates driven by the opportunity costs created by zoning instead of by willingness to pay for cropland. Of course, governments incur costs of planning and administration of such a TDR program, and the TDR system is only meant to make the separated zoning politically palatable. It is unlikely that this type of instrument will work to protect wildlife habitat in developing countries unless property rights of all kinds are made stronger (see section 4).

One variant that might work in areas where forest concessionaires are active is to require the forest companies to purchase TDRs from landowners who have been down zoned. That is, a forest concessionaire would be required to purchase a certain number of TDRs that protect wildlife habitat in exchange for the right to harvest a certain volume of timber.

Direct purchase of conservation easements to protect wildlife habitat also constitutes a form of property rights purchase. In this case, the state simply purchases the right to develop land for agriculture from the landowner. Since this might be too costly for many developing countries, one alternative is to permit NGOs (or even foreign governments) to purchase these rights, as indicated above. Like the case of TDRs, this option requires that economic institutions exist so that development rights can be separated from ownership of land (and that ownership of land is well defined and protected by the courts – see

environmental benefits (such as wildlife habitat) and seek to protect land slated for urban development. Purchased land may be turned over to state and/or local governments, but might be managed by the NGOs in order to guarantee that contributors in developed countries receive the non-market amenity values purchased in developing countries where the record of government management of public lands is perhaps not as good. Of course, for this option to work, it is important that property rights are clearly delineated and protected by the courts in the developing countries. NGOs are unlikely to purchase property or wildlife easements on land if these property rights are non-enforceable.

Kontoleon and Swanson (2003) have shown that, in the context of giant panda preservation (in the Wolong reserve, China), the non-use values associated with panda conservation in the “wild” are sufficiently large to warrant setting aside extensive stretches of land as a reserve – such that not only the flagship ‘panda’, but many other species as well can be supported. However, when such elusive non-use values are not backed up by true transfer flows, it will be in the interest of local people to allocate the land to other uses. Capturing and channeling non-use values through international transfer payments, perhaps actual purchase or lease of land by environmental NGOs, may be one good means to protect species.

3.4 Summary

In this section we, again, demonstrate that defining property rights and benefit-sharing programs are vital in promoting conservation of wildlife. We show that EIs are in theory capable of maximizing resource rents, but argue that their main role could be in promoting habitat conservation. There are various EIs that can be used to make sure that habitat conservation occurs at the lowest cost (tradable development rights, habitat conversion taxes). Equally important, to our opinion, will be the use of international EIs that capture and channel nonuse values from North to South, and to promote habitat conservation through transfers and subsidies.

4. IMPLEMENTING ECONOMIC INSTRUMENTS TO PROTECT WILDLIFE

What is the scope for adopting EIs in developing countries to promote conservation of wildlife and enable a transition towards sustainable development? We argue that the perspective is mixed. EIs are not a panacea, and it is an open question whether they can be effectively employed in all contexts. Institutions and social capital are important if economic incentives are to be used to manage and protect wildlife populations. For example, in their review of emissions trading, Tietenberg et al. (1998) indicate that it is impossible to institute any system of emissions trading unless the requisite legal and other institutions are in place for monitoring, measuring, certifying and enforcing trades, and that lack of appropriate institutions is probably the most important obstacle to the use of market incentives for addressing climate change. For a democratic market economy to function properly, or for market-oriented economic policies to have effect, three criteria or factors other than markets and private property are

required (Fukuyama 2002). These criteria relate to economic institutions, the role of the state, and culture.

While a full-fledged analysis of these issues is far beyond the scope of the current study, we would like to note that it is by no means guaranteed that the current state of economic institutions (be it formal or informal) and governments in many resource-rich countries is sufficient to exploit the gains from employing EIs. This can be illustrated for the case of elephant harvesting and ivory trade. In Table 3 we summarize key institutional indicators for (i) OECD countries, (ii) Asian consuming states, and (iii) main ivory producers. An examination of the Table suggests that the prospects of implementing EIs in producer states are not promising. By all measures, range states are the least capable of preventing illegal harvests and sales of ivory. They lack the required economic institutions (courts, rule of law, government effectiveness) and social capital (control of corruption) for enforcing and policing ivory trade. Establishing the infrastructure to guide successful implementation of EIs comes at a cost that is unknown.

Table 3: Measures of the Effectiveness of Economic Institutions and Levels of Social Capital in Industrial Countries, Ivory Importing States and Elephant Range States, 2000-2001

Measure	Eight Industrialized Countries	Five Major Asian Buyer States	30 Range States (Africa & Asia)
Voice & Accountability	1.453	0.106	-0.563
Political Stability	1.275	0.971	-0.801
Government Effectiveness	1.586	1.048	-0.625
Regulatory Quality	1.165	0.899	-0.337
Rule of Law	1.628	1.073	-0.516
Control of Corruption	1.878	0.946	-0.524

Source: World Bank (2002) and calculation

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

Economic instruments have great potential to address spillovers associated with wildlife management. Economic incentives appear particularly useful for the following reasons. First, they are theoretically able to achieve

level of resource harvesting and conservation. While inferior to the socially optimal level of harvesting and conservation, it arguably represents a significant improvement over the unregulated open access outcome that eventuates when property rights do not exist. To complement the management scheme, other instruments can be applied after property rights have been established. This would internalize any external effects. However, whether making this additional step is warranted from a cost-benefit perspective is something that has to be assessed on a case-by case level.

We believe, but have not analyzed, that the scope for using complementary EIs in regulating harvest levels may be modest (but there clearly will be cases where this is not true and where the gains from implementing EIs to regulate harvesting are large). The efficiency gains from EIs may be modest, for example, because harvesting technologies are sometimes fairly homogenous, suggesting little scope for gains from trade. The greatest perspective for implementing EIs, we believe, is with respect to land use and habitat conversion. Specifically, it seems advisable to closely consider the scope of implementing an international transfer system from North to South to compensate for

scope for capturing such benefits to promote habitat conservation in the South, and how should this be organized?

6. Operational issues: how can one define and allocate property rights, and how can one implement a tax or tradable quota scheme? How high should the tax be (or how large the total allowable catch) in light of many real-life uncertainties? Are there many parallels with ITQ experiences in fisheries in developed countries, and if so: how can we exploit them? How much income should be allocated to wildlife management? Is there a role for eco-labeling?

6. REFERENCES

- Anderson, L.G. 1995. Privatizing Open-access Fisheries: Individual Transferable Quotas. Chap. 20 in *The Handbook of Environmental Economics* (pp. 453–74) edited by D. W. Bromley. Cambridge MA: Basil Blackwell.
- Barichello, R.R., R.M. Porter and G.C. van Kooten. 1995. Institutions, Economic Incentives and Sustainable Rural Land Use in British Columbia. *Managing Natural Resources in British Columbia*. A. Scott, J. Robinson and D. Cohen, eds., pp.7-53. Vancouver: UBC Press.
- Bernstein, Steven, 2001. *The Compromise of Liberal Environmentalism*. New York: Columbia University Press.
- Borregaard, Nicola, Beatriz Bustos and Matthew Stilwell, 2003. The Role of Economic Instruments in the Context of Biodiversity Related Multilateral Environmental Agreements. Discussion paper commissioned by UNEP. September. 97pp.
- Bovenberg, A.L. and L.H. Goulder, 1996. Optimal Environmental Taxation in the Presence of Other Taxes: General-Equilibrium Analysis, *American Economic Review* 86(4): 985-1000.
- Bromley, D.W. 1999. *Sustaining development: Environmental resources in developing countries*. Cheltenham, UK: Edward Elgar.
- Brown, G.M., 2000. Renewable Natural Resource Management and Use Without Markets, *Journal of Economic Literature*

- Conrad, Jon M. and Colin W. Clark. 1987. *Natural Resource Economics: Notes and Problems*. Cambridge: Cambridge University Press.
- CPB (Netherlands Bureau for Economic Policy Analysis), 1997. *Challenging Neighbours. Rethinking German and Dutch Economic Institutions*. Berlin: Springer.
- Dasgupta, Partha. 2000. Economic Progress and the Idea of Social Capital. *Social Capital. A Multifaceted Perspective*. P. Dasgupta and I. Serageldin, eds., pp. 325-424. Washington: The World Bank.
- Dasgupta, P. and I. Serageldin (Eds.), 2000. *Social Capital. A Multifaceted Perspective*. Washington, DC: The World Bank.
- Easterly, William. 2001. *The Elusive Quest for Growth*. Cambridge, MA: The MIT Press.
- Ekins, P. and T. Barker, 2001. Carbon Taxes and Carbon Emissions Trading, *Journal of Economic Surveys* 15(3): 325-52.
- Fernandez, Linda and Larry Karp, 1998. Restoring Wetlands Through Wetlands Mitigation Banks, *Environmental and Resource Economics* 12(October): 323-344.
- Field, Barry and Nancy Olewiler, 2002. *Environmental Economics. 2nd Canadian Edition*. Toronto: McGraw-Hill Ryerson.
- Fisher, Anthony C., 1981. *Resource and Environmental Economics*. Cambridge, UK: Cambridge University Press.
- Fukuyama, Francis, 1995. *Trust. The Social Virtues and the Creation of Prosperity*. New York: The Free Press.
- Fukuyama, Francis, 1999. *The Great Disruption. Human Nature and the Reconstitution of Social Order*. New York: The Free Press.
- Fukuyama, Francis, 2002. Social Capital and Development: The Coming Agenda, *SAIS Review* 22(Winter-Spring): 23-37.
- Gelauff, G.M.M. 2003. Sociaal kapitaal in de economie, *Economisch Statistische Berichten* Vol. 88, Nr. 4398, March 27, pp.3-5.
- Hardie, I.W., P.J. Parks and G.C. van Kooten, 2004. The Economics of Land Use at the Intensive and Extensive Margins. In *International Yearbook of Environmental & Resource Economics, 2003/2004* edited by H. Folmer and T. Tietenberg. Cheltenham, UK: Edward Elgar. In press.

- Harrison, David Jr., 2002. Tradable Permits for Air Quality and Climate Change. In *International Yearbook of Environmental & Resource Economics, 2002/2003* edited by T. Tietenberg and H. Folmer. Cheltenham, UK: Edward Elgar: 311-372.
- Hutton, J., P. Ross and G. Webb, 2001. Using the Market to Create Incentives for the Conservation of Crocodilians: A Review, Report for the IUCN/SSC Crocodile Specialist Group
- Johnston, Robert A. and Mary E. Madison, 1997. From Landmarks to Landscapes: A Review of Current practices in Transfer of Development Rights, *Journal of the American Planning Association* 63(3): 365-378.
- Kinyua, Patrick I.D., 1998. Game Ranching in Machakos District, Kenya: An Application of Mathematical Programming to the Study of Wildlife Policy. Unpublished Ph.D. Dissertation, Department of Forest Resources Management, University of British Columbia, Vancouver, Canada.
- Knack, Stephen and Philip Keefer, 1997. Does Social Capital have an Economic Payoff? A Cross-Country Investigation, *Quarterly Journal of Economics* 112: 1251-1288.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny. 1997. Trust in Large Organizations, *American Economic Review* 87(May): 333-38.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny. 1999. The Quality of the Government, *Journal of Law, Economics & Organization* 15(April): 222 –279.
- Loasby, B.J., 1999. *Knowledge, Institutions and Evolution in Economics*. London, UK: Routledge.
- McKittrick, Ross and Randall M. Wigle, 2002. The Kyoto Protocol: Canada's Risky Rush to Judgment. C.D. Howe Institute Commentary No. 169. Toronto: C.D. Howe Institute. October.
- Menon, Vivek, 2002. *Tusker. The Story of the Asian Elephant*. New Delhi: Penguin Books India.
- Ménard, C. 1995. Markets as Institutions versus Organizations as Markets? Disentangling Some Fundamental Concepts, *Journal of Economic Behavior & Organization* 28(October): 161-182.
- Murty, M.N., 1994. Management of Common Property Resources: Limits to Voluntary Action, *Environmental and Resource Economics* 4: 581-94.
- Neher, Philip A., 1990. *Natural Resource Economics: Conservation and Exploitation*. Cambridge UK: Cambridge University Press.
- Nielsen, J.R. 2003. An analytical framework for studying compliance and legitimacy in fisheries management, *Marine Policy* 27: 425-432.

Newell, Richard G. and William A. Pizer

- Segerson, K. and N.Li, 1999. Voluntary Approaches to Environmental Protection. Chapter 7 in *The International Yearbook of Environmental and Resource Economics 1999/2000* (pp.273-306) edited by H. Folmer and T. Tietenberg. Cheltenham, UK: Edward Elgar.
- Shleifer, A. and R.W. Vishny. 1998. *The Grabbing Hand: Government Pathologies and their Cures*. Cambridge, MA: Harvard University Press.
- Stavins, Robert N., 2002. Lessons from the American Experience with Market-Based Environmental Policies. In *Harnessing the Hurricane: The Challenge of Market-Based Governance* edited by J.D. Donahue and J.S. Nye Jr. New York: Brookings Institution Press.
- Stavins, Robert N. and Scott Barrett, 2002. Increasing Participation and Compliance in International Climate Change Agreements. FEEM Working Paper No. 94.2002/Kennedy School of Government Working Paper No. RWP02-031. http://www.feem.it/web/activ/_wp.html 35pp.
- Tahvonen, O. and J. Kuuluvainen. 1995. The Economics of Natural Resource Utilization. In *Principles of Environmental and Resource Economics: A Guide for Students and Decision Makers* edited by H. Folmer, H. L. Gabel and H. Opschoor. Aldershot: Edward Elgar.
- Tietenberg, Tom, Michael Grubb, Axel Michaelowa, Byron Swift and ZhongXiang Zhang, 1998. International Rules for Greenhouse Gas Emissions Trading: Defining the Principles, Modalities, Rules and Guidelines for Verification, Reporting and Accountability. United Nations Publication UNCTAD/GDS/GFSB/Misc.6. As viewed on July 10, 2003 at: http://r0.unctad.org/ghg/publications/intl_rules.pdf. 123pp. No original date or city of publication provided.
- van Kooten, G.C., 2002. Economic Analysis of the Canada-United States Softwood Lumber Dispute: Playing the Quota Game, *Forest Science* 48: 712-721.
- van Kooten, G.C, 1993. *Land Resource Economics and Sustainable Development: Economic Policies and the Common Good*. Vancouver: UBC Press.
- van Kooten, G.C. and E.H. Bulte, 2000. *The Economics of Nature*. Oxford, UK: Blackwell.
- Wiebe, K., A. Tegene and B. Kuhn, 1996. Partial Interests in Land: Policy Tools for Resource Use and Conservation. Agricultural Economic Report Number 744, Economic Research Service, United States Department of Agriculture, Washington DC. 58pp.
- Weitzman, M.L., 1974. Prices vs Quantities, *The Review of Economic Studies* 41(October): 477-91.

- Weitzman, M.L., 2002. Land Fees vs Harvest Quotas with Uncertain Fish Stocks, *Journal of Environmental Economics and Management* 43: 325-38.
- Williamson, O.E. 1996. *The Mechanisms of Governance*. New York: Oxford University Press.
- Williamson, O.E. 1998. Transaction Cost Economics: How it Works; Where it is Headed *De Economist* 146: 23-58.
- Woerdman, Edwin., 2002. Implementing the Kyoto Mechanisms: Political Barriers and Path Dependency. Ph.D. Dissertation, University of Groningen, The Netherlands. 620pp. As viewed on 30 July at: [http:](http://)