Property Rights in Endangered Species

The Wolverine Case

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Abstract

The Scandinavian wolverine is a predator that kills many reindeer belonging to the Sami, the indigenous population of northern Scandinavia. The wolverine is also an endangered species. Hunting is, therefore, illegal. The intended conservation is ineffective, however, due to poaching. In this paper we suggest a property rights regime for the protection of the endangered wolverine. We also want to contribute to a solution to a long-standing conflict between the urban South and the North of Sweden. General conditions essential for an efficient protection of endangered species by property rights are outlined. In the suggested regime Sami villages with reindeer herders as members become the owners of the wolverines. Reindeer breeding and wolverine protection thereby become joint operations. Remuneration for wolverine protection will be received from the Swedish State that pays for wolverines living in the grazing area. The system can presumably be financed by a redistribution of current subsidies to the Sami.

Keywords: Property rights, endangered species, economic crime, Sami, reindeer
1. Introduction

Since the Earth Summit of 1992 in Rio de Janeiro, the conservation of biological diversity has been an officially formulated, international policy goal. The usual way governments try to reach this goal is by enacting legislation that prohibits hunting and trade of the species in question. It is difficult, however, to control poaching. Many attractive rare species are, therefore, in danger. The Scandinavian wolverine is one example. There are 270 wolverines left in Sweden, while 3,000-5,000 are required to guarantee long term genetic diversity. The legal protection of the species dating from 1969 has not improved the situation.

An alternative solution to the depletion problem suggested in the environmental economics literature is to assign property rights to rare species. That is, the right to hunt (e.g. elephants and black rhinos) is assigned to a group taking part in the hunting (the indigenous population). The point is that the ability to earn future income by hunting and sales of hunting permits creates an incentive to protect the property, and thus to fight poaching. Bouckaert and Groosman (1999) argue that “once we are able to link biodiversity conservation with self interest, the fate of animal and plant species will rest on firmer ground than by relying entirely on the good intentions of governments and international institutions”. In fact, McPherson and Nieswiadomy (2000) present empirical evidence that property rights significantly account for a large share of the growth of elephant herds in a number of African States.

Nevertheless, the assignment of property rights to rare, wild species to protect them from depletion is not common policy in most countries. For instance, in the US the Endangered Species Act places, in principle, an infinite value on protected species whereas the

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1 See the edited volume by Swanson and Barbier (1992) for an overview of the basic principles of economics that are relevant to protect wildlife.
2 See also Barbier et al. (1990) for a similar argument in favour of local ownership in the case of African elephants.
compensatory payment to those harmed by the conservation is rather modest. Hence, the costs of conserving endangered species are borne by landowners or hunters, which, in turn, motivates poaching and other criminal actions (Simmons, 1999). As a result, the common policy often fails and many rare animals are in danger. The unsuccessful protection of the Scandinavian wolverine seems to be typical.

Property rights may be a workable solution to the problem of poaching and extinction. However, property rights regimes differ, and there is no straightforward property rights solution for the conservation of all rare species. Rights and duties may be assigned to various involved parties, including individuals, firms, or collectives. An efficient property rights regime must be clearly assigned and enforceable. In addition, involved parties must be able to transfer rights at relatively low cost. A closer examination of the conditions for each particular species is, therefore, needed.

In this paper we present a property rights regime that is arguably superior to the present system in Sweden where the State “owns” the wolverines and pays compensation to those harmed by these predators. Hopefully, our suggestions will benefit the conservation of the wolverine. Moreover, the wolverine case has some characteristics that are of general interest in worldwide efforts to avoid the extinction of mammals.

The rest of the paper is outlined as follows. Section 2 presents the wolverine, while Section 3 describes the current situation. In Section 4 we examine the economic effects of the present system. Our alternative is presented in Section 5. Section 6 outlines conditions of importance for an efficient protection of animals by property rights. Section 7 concludes.

3 For similar evidence, see De Alessi (2000)
2. The Wolverine

The wolverine (lat.: gulo gulo) populates the tundra and mountains of Northern Scandinavia, especially the border area between Norway and Sweden. In Sweden, wolverines live close to Jokkmokk and in Sarek National Park. Wolverines are relatively stationary, which means that they do not wander over large areas. They prey on all manner of game but mainly and most importantly on the reindeer that graze in the area.

The wolverine is the largest member of the European weasel family (mustelidae) and it looks like a cross between a badger and the smaller, European marten. It resembles a small, squat, broad bear 65 – 90 cm long, excluding the bushy, 13 – 26 cm tail, shoulder height is 36 – 45 cm, and weight is 9 – 30 kg. Its fur is light to dark brown and it is sometimes called the "hyena of the North" because it also feeds on carrion. Wolverines are very shy. They do not come close to residential areas and they do not attack humans, who are the wolverine’s only enemy.

Wolverines reproduce at rather a slow rate, which makes conservation difficult. The gestation period is about nine months and a litter contains one to five young (mean = 1.8). The threat of extinction is partly due to its behaviour. The animal is a comparatively bad hunter, but in soft snow it has an advantage over the reindeer. Whereas the reindeer sinks deeply into the snow the wolverine with its snow-shoe-like paws can run on the surface of the snow and easily attack its prey.

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4 The biological data is based on information from the Organisation for the Protection of Predators "De 5 Stora" and Encyclopedia Britannica.
Hunting behaviour varies considerably among wolverines. Some kill dozens of reindeer in just a few days, while others kill just one or two reindeer a year. The wolverine often leaves wounded reindeer behind, and it may split a herd causing considerable damage. In 1994/95 it was estimated that wolverines killed 3600 reindeer in Sweden, which is half of the total damage due to all predatory attacks.\(^5\) The wolverine is, therefore, considered the main enemy of the reindeer owners who are exclusively Sami, the indigenous population of Scandinavia.

### 3. The Current Protection

Wolverines used to be hunted for their fur, and their killing of reindeer. This led to a small stock not big enough to avoid extinction in the long run. Since 1969, wolverines have been protected by conservation laws. In cases where a wolverine kills a large number of reindeer, the reindeer owners are allowed – after asking the authorities for permission – to shoot individual wolverines. Since 1969, 32 legal shootings have been registered.

Due to poaching, the number of wolverines has not significantly increased since their legal protection came into force. Today, the population is around 270 animals. Official predator research (SOU 1999:146) found that at least 300 wolverines were required to achieve a sustainable stock with enough biological diversity in the short term. To achieve higher genetic diversity, a population of approximately 3000 to 5000 wolverines would be needed.

The Sami people receive compensation for losses due to predatory attacks. Compensation is paid by the Swedish State. Until 1995, the victim had to prove that his reindeer were attacked by a predator by showing the cadavers to local observers. However, the reindeer graze on

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\(^5\) These figures are based on official predator research. See "Rovdjursutredningen" SOU 1999:146.
wide-open pastures. It is, therefore, difficult to detect a cadaver, to clarify causation and to settle ownership. Hence, incomplete compensation was unavoidable.

A new compensation system was introduced to remedy this shortcoming. The yearly compensation is now based on the estimated killings by predators, and not on damage caused in single cases. The compensation is supposed to reflect loss of income, plus additional damage to the reindeer owners. When a wolverine attacks reindeer, the herd is driven apart, which results in losses for the owners.

Establishing the number of wolverines is done by a head count, which has been completed yearly since 1996. The count costs about 6 Million SEK per year for the most important predators.6 Another way to identify individual wolverines is by analysing DNA-material.7 Hence, quite reliable census statistics for wolverines are available at relatively low cost.

The total amount of compensation is settled by the Swedish Parliament and depends, among other things, on the number of wolverines, the public budget, and on the political willingness to subsidise the Sami and their reindeer breeding. Hence it is arbitrary and rather uncertain. In 1998, the total compensation for predatory damage was 30 million SEK, in 2001 it was 35 million SEK.

The reindeer business is organised in the form of co-operatives. Reindeer owners work together in Sami villages (Samebyar). Each village is allowed to let their reindeer graze in a particular area. The grazing rights in the area are the common property of the breeders in the

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6 1 SEK ≈ € 0.11
7 Nowadays it is possible to identify individual wolverines with the help of DNA analysis. A reliable method of invention would be to collect the excrements of wolverines, e.g., close to their lair, to calculate the exact number of animals living in the area, see SOU (1999:146) p. 266.
village. Nonetheless, the reindeer are owned by individual Sami families. Neither the breeders nor the villages own the land. Their rights are limited to usage and reindeer grazing in the area.

Reindeer farming is perceived as the cultural and economic basis of the Sami culture. The Swedish State subsidises the activity in acknowledgement of this. The compensation for losses due to predatory attacks is a substantial part of the support. However, the compensation is not received by the reindeer owners, but by the Sameting. The Sameting is a political and administrative body that represents all 20,000 Sami of whom only 2,000 are active in reindeer breeding. The Sameting may keep the compensation for wolverine damage and use it for collective purposes, or distribute it further to the villages and to specific reindeer breeders.

4. Economics of Poaching

Given these facts it is easy to understand why poaching continues. A reindeer owner who manages to kill a wolverine increases the number of surviving reindeer, and reduces trouble caused by the wolverine splitting the herd. The benefit of killing a wolverine would be eliminated if damage caused by wolverines were compensated for. However, compensation for damage by individual wolverines is, as already noted, not practical because causation cannot usually be proven.

In fact, the killing of a wolverine in the present system is beneficial not only to the single reindeer owner but to the Sami village that is harmed by the wolverines in the area. One could argue that this would have limited impact on the poaching because of free rider behaviour on

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8 A study by Johanson and Lundgren (1998) shows that the reindeer business is highly unprofitable.
the local level. On the other hand, social control will presumably support hunting in the public interest of the village. The Sami villages are characterized by long history, strong family ties and strong internal social control.

The current system based on compensation distributed via the Sameting does not reach the hunter or the village suffering loss. The compensation is settled politically by the Swedish Parliament and based on the expected damage from all predators in the country, and on an actual willingness to support the Sami in general. The Sameting that receives the money is not obliged to distribute the money to the reindeer owner suffering loss. Hence, the support of the Sami people is almost completely independent of the killing of a specific wolverine. The marginal cost in terms of lost compensation for the poacher (and the Sami village) is thus practically zero. Thus, poaching will continue.

The benefit of killing the wolverine should also be compared to the expected punishment. This is presumably insignificant, even if the potential punishment is severe, because of the small probability of detection. One reason for this is the vast area involved. Another reason why poaching is not detected by the police is that reports of poaching are rare. Strong internal social control in the Sami village that collectively gain by the poaching is a plausible explanation.

In sum, this “Economics of Crime” approach indicates that wolverines are close to extinction because the Sami consider them harmful to their main asset, the reindeer. The international value of biodiversity is not part of their economic calculations. Moreover, the expected cost of punishment is small. According to Swanson (1994, p 75), the basic roots of all species extinction are the perceived (dis)incentives for investment in biodiversity.
5. An Alternative Regime

In the literature on property rights it is well established that well-defined and stable property rights are important for the economy. Once property rights are assigned the owner gets an incentive to protect the property. Owners may also exchange rights and duties efficiently, given that the transaction costs are relatively small. If transaction costs are the obstacle the normative Coasian rule states that property rights should be assigned in a way that simplifies trade, and/or places the rights and duties in a way that mimics the outcome of efficient trade. In other words, property rights should be assigned and protected so that an efficient use of resources, including transaction costs, is encouraged (Cooter & Ulen 2000).

The Swedish State can, from a property rights perspective, be regarded as the owner of the wolverines. The State ownership includes a duty (political rather than legal) to compensate for damage caused by wolverines. However, damage cannot be accurately measured. That was the main reason for abandoning the earlier system with compensation paid directly to injured reindeer owners. The current compensation system is, on the other hand, more of a general subsidy to the Sami community, including non-farming Sami, represented by the Sameting. There is practically no compensation paid to the reindeer owners for reindeer killed by a specific wolverine.

In sum, the current regime is unclear. Compensation for damage when another owner’s rights are violated is incomplete and uncertain. Criminal sanctions are in force for the control of poaching, but the problem here is that the detection rate is low. The practical outcome is over-exploitation and a threat of extinction.

\footnote{See Bouckaert and Groosman (1999) for a similar argument.}
The alternative property rights regime that we propose should cover the following points:

1. The property rights in the wolverine are transformed from the Swedish State to the Sami villages. The Sami reindeer breeding collectives will hereby own the wolverines in their grazing areas, including the right to hunt wolverines, as well as to trade hunting permits and fur. That is to say, the right to use the grazing land is extended with the property rights to the wolverine.

2. The Swedish State pays the owners of the wolverines a price for wolverines living in their area. What is necessary for a decisive incentive for the Sami villages to protect the wolverines is that compensation is significant in relation to the value of reindeer breeding.

3. An independent body is responsible for measuring the wolverine stock and location. This body also makes sure that the payment is in accordance with the rules.

The reason for suggesting the Sami villages as exclusive owners is that damage caused by wolverines harms the Sami village collectively. Given a reasonable income from the wolverines living in the area, breeding reindeers and conserving wolverines become a joint production. In other words, there will be a collective interest within the villages to weighing reindeer breeding against wolverine protection. Consequently, each Sami village is provided with an incentive to control poaching. Over all, Sami villagers appear to be the most able and informed parties for controlling hunting and reporting poaching.

An alternative owner of the wolverines could be the individual reindeer farmer. However, the consequences of protecting or killing wolverines are only partly borne by the farmer. The joint production and teamwork requires renegotiations of rights in favour of the villages. Such negotiations are not necessary if the rights are given directly to the villages.
In total there are 51 Sami villages. Some villages are small and wolverines are unevenly spread. In some cases it may be economical to jointly rear wolverines in two or more villages. If so, the production can presumably be organised by mutual agreement. Trespassing wolverines may be a similar problem that presumably can be solved by agreements between villages. The farmers and their villages have already built up long term co-operation in farming. It is, therefore, reasonable to expect low contracting and enforcement costs for agreements among reindeer farmers and their villages.

Crucial for a joint production of reindeer and protection of wolverines is the price paid for living wolverines. The conservation of the wolverine is of global interest, and a duty accepted by the Swedish State through international conventions. Given that extinction should be avoided in the “global interest” the willingness to pay in order to avoid this should be considerable. The willingness to pay for an increase in the numbers of wolverine from 270 today to several thousand, enough for minimal sustainable genetic diversity, appears sufficiently strong. Indeed, we believe that the conservation can be fully financed within the current budget. Today, the compensation for damage by all predators is around 35 million SEK a year, which implies that the implicit price of a wolverine is about 58,000 SEK.\(^\text{10}\) If this amount were paid for each living wolverine, the Sami villages would have a strong incentive to conserve them. Indeed, we would expect the Sami to feed them during cold winters. Feeding bitches with cubs would presumably also take place. Only wolverines that are known to be killers of large numbers of reindeer would be hunted. Poaching would be fought and reported to the police.

\(^{10}\) Official predator research (SOU 1999:146) assumes that 45% of the total predatory damage caused by wolverines results in an average of 58,000 SEK per wolverine.
The price of a live wolverine must, of course, not be the current average compensation for killings by predators. In fact, the present compensation to the Sameting is partly a general subsidy to the Sami people, including those that are not reindeer breeders. If the whole amount were paid to the Sami villages for preserving wolverines, subsidies to non-breeders would disappear.

A sufficient price for a growing stock of wolverines depends on the value of reindeer, as compared to wolverines, in the joint production of the two animals. To establish this price more detailed information on breeding conditions and conservation is required.

Independent of the level, it is important to note the price for living wolverines should be set for relatively long periods, e.g. five to ten years ahead. If the conservation is successful, and thus the stock of wolverines increases, the cost to the State, as well as the incomes of the reindeer owners, will increase. And as the stock increases the willingness to pay for marginal wolverines will decline. Decreasing prices may, therefore, be expected in the long run. Since the wolverine reproduces slowly, however, it will take more than a decade before a decrease in the price for live wolverines is motivated.

A long-term settlement of the price for live wolverines is also important for the avoidance of collective actions by all reindeer owners. The owners may anticipate that the willingness to pay is infinite if the number of wolverines becomes small, while the willingness to pay is small when the stock is large. In other words, the owners may hold the numbers artificially low to get a high price. On the other hand, if the price is fixed for a long time the gains from collusion are far ahead and uncertain. In reality, it seems unfeasible for villages owning wolverines to form cartels.
The property rights regime suggested may, for some unforeseen reason fail. For instance, it has been said that the reindeer breeders hate predators so much that nothing can stop them from killing as many wolverines as possible, and this attitude cannot be changed simply by legal reforms. Due to the risk of a failure, for whatever reason, it may be motivated to introduce the system stepwise. The regime can be introduced first in some villages where wolverines live. The hunting of wolverines may remain prohibited with the exception of known mass-killers. Later on, when the system has been shown to work, it may be motivated to include the right to trade hunting permits. Empirical studies show that there is a considerable willingness to pay for hunting wild animals in Sweden. Mattson (1990) calculated the total value of hunting of small game (moose excluded) in Northern Sweden for the year 1986/87 to be about 130 million SEK. This amount consists of the meat value (20 million SEK) and the recreation value (110 million SEK). Thus, in the future when the stock of wolverines has reached a certain minimum size, the sales of hunting rights to trophy hunters may possibly replace government subsidies.

6. Conditions for Efficient Property Rights in Endangered Species

The reason why the suggested property rights in wolverines appear financially interesting is that certain basic conditions are fulfilled. These conditions are also of general interest in the search for effective conservation of other endangered animals.

(i) It must be possible to count the number of animals owned with sufficient precision. Modern technology fulfils this condition for most rare mammals such as elephants, black rhinos, wolverines and wolves.
(ii) The animals need to be relatively stationary. Seals along the Swedish coast and wolverines are examples. Other species like, wolves, bears and lynx may roam over vast areas, which can complicate the assignment of enforceable property rights.

(iii) Decentralised information and control are major arguments for efficient property rights. Property rights should, therefore, be assigned to individuals, firms, societies or collectives that have information and control of hunting and competing activities. The Sami villages are such collectives. Indeed, local poachers seem to be the owners concerned in several cases.

(iv) A profit from conservation is necessary. Enough income from trophy hunting may be possible for elephants, tigers, bears and black rhinos. However, that is not the case for Swedish wolverines or seals with little trophy or fur value, when compared with damage to reindeer breeding or fishing. The Swedish public authorities, therefore, have to pay a price for conservation. The willingness to pay for the global good of conservation appears to be ready enough. Public funding may, on the other hand, not be politically feasible in poor countries. Some form of international contribution seems thus to be required for endangered predators in poor countries.

(v) The exchange of rights and duties between involved parties is an additional condition for efficient property rights. The legal assignment of property rights will never be fully adequate. Rights and duties must, therefore, be renegotiated. Parties potentially involved in the conservation must thus be able to obtain contacts, trade and enforce agreements at reasonable cost. The Sami have long-term relations, a common culture and language that favour trust and trade. Distrust may, however, be a serious obstacle for an efficient trade of rights and duties, especially in international conservation where several cultures and national interests are involved.
7. Summary

States prohibit the hunting and trading of endangered animals. Poaching may, however, seriously threaten conservation efforts. Another approach to the problem, suggested in economics literature, is to assign property rights in rare animals. In this paper we suggest a property rights regime for the endangered Swedish wolverine. Under our regime the Sami reindeer herding villages would own the endangered predator. Reindeer breeding and wolverine protection would accordingly constitute a joint production and income for wolverine protection would be paid by the Swedish State. The regime could probably be funded by changing the current recipients of the Sami subsidies.

Certain conditions need to be fulfilled for the efficient conservation of endangered animals. First, it must be possible to count the numbers of animals. Second, the animals need to be relatively stationary. Third, property rights need to be assigned to parties that have information and control of hunting and competing activities, and it is essential that the owners profit from this conservation. Fourth, income from trophy hunting may be possible for some animals, but not for animals that are hunted because of their damage to farming. The public authorities, therefore, have to pay a price for the conservation. Public funding may be necessary. International support will certainly be required for predators in poor countries. Fifth, legal assignment of property right will never be fully adequate. Rights and duties must, therefore, be renegotiated. Parties involved in conservation must thus be able to develop contacts and enforce the trade at low transaction cost.

Finally, note that our suggested regime with compensation for live wolverines to the reindeer owning Sami, and its concurrent reduction in poaching, would not only save the wolverine but would also reduce long-standing social conflicts between the South and the North of Sweden.
The people in the urban areas in the South are strongly in favour of the conservation of the predators, however, the reindeer owners have to bear the cost. Nonetheless, poaching is regarded as brutal, immoral and bad for the environment. More severe punishments for criminals (implicitly the Sami) are required.
References


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