

Property Rights and the Environment

A Law and Economics Approach

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The tragedy of the commons is averted by private property..., but the air and waters ... cannot readily be fenced in, so the tragedy... must be prevented by different means.

*Hardin, G.*²

1 Introduction

Property rights have been an issue throughout history. Many wars have been fought for the right to land; and since the industrial revolution, numerous political struggles have centred on the right to the means of production. Liberal and conservative parties defend private ownership, while socialists argue in favour of collectivisation. In the environmental debate it is often held that profit-seeking owners destroy the environment, e.g. by cutting down forests, using pesticides in agriculture, and polluting water and air. Economists -- and scientists like Hardin in the quotation above -- claim, to the contrary, that private property rights are fundamental to the protection of the environment. Private ownership is also basic to the market economic system.³ Indeed, economists claim that efficient property rights in a well-functioning market economy should be: *universal, exclusive, transferable, and enforced*.⁴ Lawyers, on the other hand, working with the task of clarifying and protecting rights, know that these requirements are never met. Property rights is a vague concept. Indeed,

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² Hardin, G., (1968), *The Tragedy of the Commons*, Science, pp. 1243-1248.

³ More on the so-called Property Rights School can be found in Skogh, G. & Lane, J. E., (1993), *Äganderätten I Sverige*, SNS förlag, and in Ackerman, Bruce A. (ed.)(1975), *Economic Foundations of Property Law*, Little Brown and Company. For a somewhat less complex account, see Posner, R. (1977), *Economic Analysis of Law*, pp. 27-64, Little Brown and Company; or Cooter, R. and Ulen, T. (1997), *Law and Economics*, Addison-Wesley.

⁴ Tietenberg, T., (1992) *Environmental and Natural Resource Economics*, p. 45,47. Harper Collins Publishers.

Scandinavian legal realists, following the philosophy of Axel Hägerström and the “Uppsala School”, claim that the idea of property rights belongs to metaphysics, and thus to unscientific beliefs about Natural Law. Nevertheless, the concept of property rights is used widely in legal practice. In fact, it can hardly be avoided in legal reasoning. The dilemma is solved by focusing on the positivistic legal meaning of rights and duties, that is, “ownership” brings with it a series of *rights*, e.g. use and disposition, and *duties*, e.g. to pay taxes and not infringe on the rights of others. These rights and duties are found in various legal documents. They may also be changed by law. Hence, ownership is a relative concept.⁵

Property rights have been much analysed and discussed in recent economic literature. The meaning of the word and the analysis, however, are different from the legal concept, which has caused much confusion. Nevertheless, the economics of property rights can contribute substantially to legal thinking on this topic. Similarly, a deeper understanding by economists of the legal thinking can improve the economic analysis. In this article we will try to bring some order to the above-mentioned, somewhat contradictory, views on property rights. Our focus is on property rights and the environment. We begin in Section 2 with a brief description of the importance of exclusive control of resources in order to avoid the depletion of national resources or the endangerment of species. In Section 3 we present the general free-rider problem and the “tragedy of the commons”. Biological as well as economic conditions for extinction are presented. The private and public (legal) enforcement of rights are examined in Section 4. Common and collective ownership versus private ownership is studied in Sections 5-8. In Section 9 we note that property rights include a bundle of different types of rights. Further applications to environmental problems are found in Section 10. We discuss the importance of property rights for the environment, as well as limitations and restrictions in property rights that may be used for the protection of the environment. In Section 11 we examine the difference between social rights, human rights, and property rights. Finally, concluding remarks are in Section 12.

2 Exclusion or Extinction?

In the economic analysis of property rights the importance of exclusion is stressed. To give an intuitive understanding of the function of exclusive rights, it may be useful with several examples. The first is taken from a seminal article by Harold Demsetz, where he comments on an anthropological investigation of the economy of hunting of the North American Indians during an earlier age.⁶ At that time the presence of the white man changed the situation for the Indians. The demand for meat and skins increased at the same time hunting methods became more refined. As a consequence, the buffalo that had roamed freely for

⁵ Hägerström, A., (1963), *Rätten och staten*, Natur & Kultur, and Undén, Ö., (1927), *Sakrätt I-II*, Gleerups.

⁶ Demsetz, H., (1967), *Toward a Theory of Property Rights*, American Economic Review, LVII, nr. 2, (May), pp. 347-59.

centuries nearly became extinct. On the other hand, beaver colonies in Canada survived in spite of the great demand and extensive hunting. No detailed explanation of why this occurred had been given in the anthropological study. Demsetz' contribution was to furnish an explanation for this phenomenon: the beaver colonies survived because the Indian tribes in Canada divided the hunting territory among themselves. In this way, their interest was sparked in not exploiting the resource. The "right" to beaver could be upheld because the domain of the beavers was relatively stationary. The Indians also lived stationary lives and provided for themselves within well-defined boundaries, which is how they could control that "outsiders" did not trap their animals. It was a different situation, however, with the buffalo. They roamed over large areas and were hunted by different tribes and settlers. Because none of these groups could exclude others from hunting and thereby gain the fruits of regeneration, it was in each and everyone's interest to hunt the buffalo within reach. Since the buffalo was such an easy prey, its fate was sealed.

Another interesting study examines Sami village structures from the Middle Ages up to the 18th century.⁷ During the Middle Ages the Sami also lived stationary lives, clustered in circular villages where they fished and hunted within the areas of closest proximity. The wild reindeer were of great significance, but one did not follow the reindeer during their wanderings. In the 17th century, however, conditions changed in several ways. Among other things, North American fur-hunting increased, which sank the price of skins. The Sami, namely, sold skins on international markets to Danes via the North Sea, to Swedes in the south, and to Russians in the east. Moreover, the climate worsened, and the Swedish bailiffs began to collect higher and higher taxes. The increasing scarcity brought with it an intensified quest for reindeer. In order to keep check on the regeneration, the reindeer were marked and followed during their wanderings. As a consequence, the villages of the Sami changed form gradually and took on the appearance of today, i.e. a stretch of habitation from mountain slopes to forest tracts according to the pathways of the reindeer. The reason the reindeer flocks did not die out is, perhaps, in accordance with Demsetz' theory, i.e. the Sami were successful in claiming the reindeer within their own territory where they could be controlled so that over-exploitation did not occur. The Indians never obtained this possibility to follow "their" buffalo over the prairie lands.

3 Tragedy of the Commons

3.1 Free Riders

From the examples above, it should be clear that open access to a common resource may cause extinction of species and the depletion of natural resources. Due to the seriousness of the problem, this state of affairs has been named *the tragedy of the commons*. Yet, the examples above also indicate that it may be

⁷ Lundgren, N. L., (1987), chapter 3, *Kampen om naturresurserna*. SNS förlag, Stockholm.

possible under some circumstances to escape the tragedy through exclusion and control.

Upon closer examination it is easy to see that the tragedy of the commons is due to a more general problem usually named the *free-rider problem*, that is, if individuals in a group glean advantages at the cost of the collective, they become the so-called “free-riders”. The problem with free-riders is sometimes also called a 1/N-problem. Why this is so can be seen in the following example. A collective containing N individuals is in possession of a scarce resource that may generate benefits due to efforts by the members. If benefits are divided within the collective, i.e. if each and everyone receives 1/N of the results, ineffective utilisation will occur, the reason being that the efforts resting on the individual do not stand in proportion to the benefits being divided. If the individual, for example, exerts an effort corresponding to 100 and this generates an intake to the collective of 900, it is in the collective’s interest that the individual’s work be undertaken. However, if the collective is made up of 50 individuals, only $900/50=18$ falls to the one doing the work. Therefore, it does not lie in the interest of the individual to make such an effort. Individual sacrifices result in an income to the collective, but only a fraction of this income falls back to the individual. The same applies to everyone else in the collective. A poor outcome can be expected, provided there is not a steering mechanism to stimulate everyone to work for the collective’s best.⁸

In the example above, the benefits were divided within the group, while the costs were carried by the individual. It may, however, also be the case that the free-rider is the individual, and the collective is harmed. Traffic congestion is one such example. As long as there is no congestion, the private benefit of driving is not in conflict with the collective interest. However, at many cars, the private and the collective interest is in conflict because each additional car causes a cost to everyone else on the road in the form of reduced speed, thus increasing the time everyone must spend en route. Nevertheless, more individuals will drive as long as they expect a private gain. The number of drivers may increase until congestion eliminates all gain from driving. Since all drivers are in the same situation, no one in the collective will gain from driving if there is no collective regulation.⁹

3.2 Over-fishing

Exploitation of the fishing ground has frequently been used as an example of the tragedy of the commons.¹⁰ A renewable resource such as fish can be harvested in

⁸ Olson, M. (1976), *The Logic of Collective Action*, Harvard University Press.

⁹ According to the Economist, 6 December 1997, pp. 22-24, the European Commission calculated the external cost of road transport, including accidents, infrastructure, environmental pollution, and congestion to 250 billion ecus (or \$308 billion) a year, i.e. the equivalent of 4% of the GDP of EU. Half of this cost is due to congested roads.

¹⁰ Gordon, H.S., (1954), *The economic theory of a common-property resource: the fishery*, pp. 124-142, *Journal of Political Economy*, vol. 62.

a steady flow forever. Yet, if too much is caught at one time, the stock may become depleted and there may be no more fish to catch.

In the short run, the size of the stock determines the growth of the stock, which is the flow that may be caught without diminishing stock. In the long run, there is a more complicated relationship between the growth and the size of the stock. The growth depends mainly on two factors: (i) the food supply, and (ii) the density of fish. The food supply is negatively correlated, and the density positively correlated, with growth. If the stock is small, the food supply will be plentiful; however, the low density makes it more difficult for the fish to find a mate. If, on the other hand, the stock is large, there is less food, but it is easier to find a mate.

In sum, the depletion of endangered species depends on the low costs and large-scale production methods of our time, on demand, and on the biological characteristics of the species. Some species are already depleted, while others are not threatened because they cannot easily be caught, and/or they can find food and a mate. Because of the cost of catching, not all fish will be caught, and, thus, over-fishing will usually not be the ultimate cause of depletion. Nevertheless, over-fishing makes the stock vulnerable to external shocks to the system such as a natural variation in the stock or environmental pollution. Yet, the free-rider problem remains as long as the individual catch reduces the catch for other members in society. A prerequisite for an endangered species to be saved is that someone with an interest in the protection of the species controls the harvesting and, thus, the free-riding problem. The most serious environmental problems are related to the high seas and the atmosphere, both of which cannot be efficiently fenced in, and, thus, remain huge commons.

A modern example of how the right to a scarce resource may be introduced can be seen in the expansion of fishing boundaries around Iceland during the 1970s. At that time the codfish stock in the North Atlantic had fallen because of rampant fishing and effective catching methods. There was a risk that the codfish would die out in the same way that the Icelandic herring had become sparse earlier. Instead of waiting for international conventions to regulate the catch, Iceland expanded its fishing territory, in spite of protests from other fishing nations. Over-fishing of codfish could be averted in this case because the realm of the codfish was relatively stationary within the area under Iceland's control. Rögnvaldur Hannesson sees this example of a one-sided declaration of rights as a condition for saving the fishery around Iceland.¹¹ He maintains that in the long run this action was of benefit, not only for Icelanders but also for other nations that buy fish, or the right to fish, within Icelandic territory.

In 1976 there was an agreement extending the economic aspects of national jurisdiction from 12 to 200 nautical miles offshore, thus creating the so-called "exclusive economic zones". With this agreement most commercially attractive fish were brought under the control of some country. Ninety percent of all fish are caught within an exclusive economic zone, and only ten percent in

¹¹ Hannesson, R. (1974), *Economics of Fisheries. Some Problems of Efficiency*, Lund Economic Studies.

international waters. Before this international agreement, most fish stocks were open to everyone.

4 Legal Rights

The examples show how groups of people occupy areas with desirable resources. They create their own exclusive “rights” to beaver, reindeer, and fishing grounds. Later on, the exclusiveness may be incorporated into the legal system and, thus, assigned as a legal right. For instance, the formation of the Sami villages and reindeer grassing rights are today included in Scandinavian law¹², and the Icelandic extension of the fishing limit has come to be accepted in international conventions and, indeed, has become common practice all over the world.

In the economic literature publicly enforced rights have two important functions: first, to end the conflict and struggle among the parties, which is a prime function also according to legal literature; second, to stop the depletion scenarios described above.

Legal rights and duties are often said to exist if they are found in existing laws, and if they are sanctioned by the public judicial system. However, the fact that a legal right is included in existing law and is under the auspices of the public judicial system does not mean that owners do not protect their rights themselves. Indeed, most protection is undertaken by the holders of the rights. It is, for instance, up to an owner to guard buildings, fence in pastureland, and so on. It is mainly the use of force and the levying of sanctions, and thus the definition and ultimate protection of rights, that is monopolised by the public judicial system.

There are reasons for the protection of rights being apportioned in this fashion. The holder of a right normally has an incentive to protect it. Obviously, it would be inefficient if the public had the responsibility of fencing in and controlling private property.¹³ Yet, there may be an under-investment when it comes to punishment. If a private good is stolen, the owner has an interest in getting it back, but not in deterring thefts in general. That may explain why criminal punishment usually is a public matter.¹⁴ Privately undertaken “justice” may also be arbitrary and cruel, furnishing yet another rationale for the public enforcement of laws.

Because the protection of property rights is costly, protection will normally be partial and incomplete. Hence, there is no complete protection of rights by the state, or by the individual. The owner of a right has an incentive to protect the right as long as the benefit exceeds the cost of protection. Rights of low value will, thus, be less protected than valuable rights, and easily protected rights will be more protected than others. Terry Anderson and Peter Hill give good

¹² Bengtsson, B., (1987), *Statsmakten och äganderätten*, SNS förlag.

¹³ Skogh, G. & Stuart, C., (1982), *A Contractarian Theory of Property Rights and Crime*, The Scandinavian Journal of Economics, nr. 2.

¹⁴ Buchanan, J., (1975), *Limits of Liberty. Between Anarchy and Leviathan*. University of Chicago Press.

examples from the American West.¹⁵ Barbed wire came into frequent use in the mid 1800s. Yet, the fencing varied according to the accessibility of grazing land. Therefore, fencing started in the East and came into later use in the West as land became more scarce.

The word “right” is often used by the public and in economics, even if the right is not included in existing law. If, for example, a father promises his children to go to the cinema with them but does not keep his promise, they will maintain that they have a right and the father a duty. The promise from his side constitutes the right. The significance of the right, in turn, is determined if the breaking of the promise is attached to consequences, or not. If the children can, by nagging or with the support of the housewife, compel the father to take them to the cinema, the promise, and therewith the right, is of practical significance and value. Promises and rights, thus, exist among individuals without attaining legal status. Social controls and punitive consequences can be just as compelling as those of legal rights. For example, employees expect certain rights such as wages or promotion, corresponding to their efforts and achieved results. At the same time, the employer has certain expectations placed upon his employees. The type of rights and duties is partly a question of law, and partly a question of agreements made at the work place and with respect to customs reigning in industry. These rights and duties are often informal, unspecified, and understood. The punitive actions, likewise, can be of shifting character.

For lawyers it is, of course, important to distinguish between those rights that are legally binding and those that are not. In economic analyses on the other hand, a difference is seldom made between rights in a judicial sense and “rights” and “duties” maintained through social control peripheral to the formal legal system. The reason for this reluctance on the part of economists is that they are interested in the economic consequences of rights, and this interest is independent of how the rule or right is upheld. The terms “right” and “contract” are used, even when a written or verbal agreement does not exist in the judicial sense. *Implicit contracts* and *implicit rights* are a composite designation for informal, more or less clear expectations and conventions that influence the behaviour in the economy in much the same way as legal rights.

5 Common Ownership

Open access to commons such as the high seas, the atmosphere, outer space, and grasslands in ancient times may prevail without problems as long as the common resource is unlimited. However, scarcity causes rivalry, free riders, and, perhaps, a tragedy of the commons as illustrated above. How may such a disaster be avoided?

It should be noted, first of all, that there is no simple solution to the tragedy. There are many historical examples of deserts and the extinction of valuable resources. However, there are also examples of the opposite outcome.

¹⁵ Anderson, T. L. and Hill, P.J., (1975), *The Evolution of Property Rights: A Study of the American West*, Journal of Law and Economics, 18, pp. 163-179.

One option is that strong parties occupy a certain portion of the resource and control its use as described above. Another possibility is central regulation based on some form of common ownership of the scarce resource. Central regulation, however, has certain shortcomings. For illustrative purposes, we use as an example an ancient village. Initially, the surrounding forest is a large tract of common land. The access to lumber for construction and fuel is in sufficient quantity for all. The forest, in other words, is a free good with open access. It is collectively "owned", but the question of ownership is uninteresting because there is no scarcity. However, because of changing conditions, for example, deterioration in the weather or an increase in population, the demand for wood increases. Especially near the village, the felling of trees takes place at such a pace that regrowth is hindered. The villagers need to travel an ever greater distance in order to find a wood supply. Scarcity brings with itself conflict among the villagers. How shall disputes among the villagers, the plundering of the forest, and last of all the depletion of the population be avoided? We assume that there is a central power in the village strong enough to organise the utilisation of the land. The deciding organ chooses to solve the problem centrally by deciding how much forest may be felled, how clearance and thinning out shall be undertaken, who shall do the work, and how the results of the efforts are to be distributed. All of this may be possible to achieve, but the problem becomes more involved in that efficient utilisation of the forest requires knowledge about forestry and about the productivity and appropriateness of the manpower. Decisions must be made on how the work shall be undertaken and who shall work with forestry, maintenance, childcare, etc.

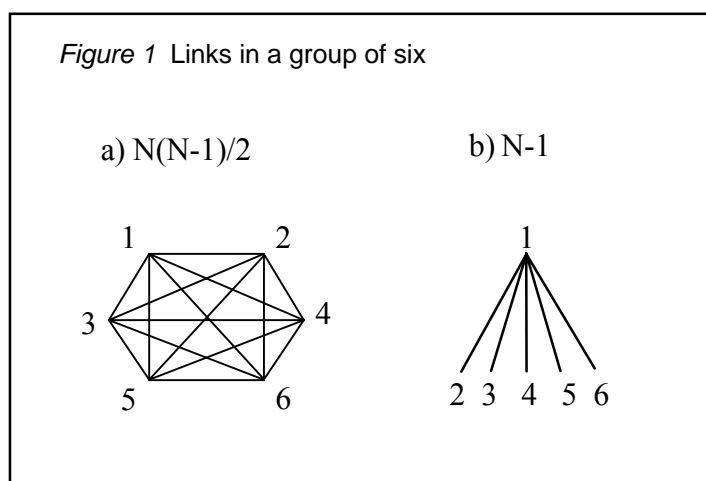
In reality, one must not overlook considerable problems of control, especially in the case where individual achievements and results are not positively related to one another. Free-rider problems arise if apportionment to members of the collective do not directly correspond to disadvantages. If the results are divided, for example, among everyone regardless of performance, there is an individual interest to flaunt, or circumvent, directives. Hence, behaviour must be controlled and force must be used through such administrative systems that have come to be called *command and control* systems.

Because the information about production processes, resources, and individuals is limited, central planning requires an administrative apparatus to collect information and co-ordinate activities. The political process that proceeds decision-making about the use of resources and the apportionment of results is also costly. The same applies to the control apparatus. Characteristic for administrative steering systems is that they tend to swell and become bureaucratic.

A general problem is that the costs for information and communication increase significantly as the number of members increases. In an organisation with N members, there are

$$\frac{N(N-1)}{2}$$

paths of communication between each pair. Thus, an increase in the number of members brings with it a more than proportional (quadratic) increase in the number of two-way channels for communication, information, and decision-making. For instance, if $N = 6$, there are $6 \cdot 5 / 2 = 15$ links as in *Figure 1a*.



If there are 100 members, the number of links is $100 \cdot 99 / 2 = 4950$. Hence, the internal co-ordination becomes very complicated.

On the other hand, the co-ordinator may choose a hierarchical organisation with central planning, management, and steering of activities. In such a case, the number of communication- and information channels is limited to $N-1$, i.e. from the management to each and every one of the members, see *Figure 1b*. With a leader who is specialised in overseeing and evaluating the efforts of the members, the conditions for creating free-riders are reduced. However, the control problem remains if many are to be co-ordinated, i.e. if N is a large number. Moreover, information and control may be diluted as there is no direct relation between the members 2-6.

6 Private Ownership

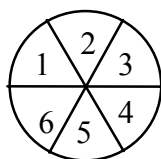
When a scarcity arises, the co-ordination may not be solved through central planning. A reason may be that the central powers are not well-informed and strong enough to undertake control and command measures. Indeed, there may exist no central power. Instead, private control may evolve more or less spontaneously through the occupation and control of the resources by certain parties, after which subdividing eventually comes to be accepted by neighbours and public authorities.

Another possible development is that the members of the society agree by a *social contract* to introduce and protect private property rights. Assume that the central steering organ in the ancient village above is, hereby, substituted with private ownership. We can visualise a system like the Swedish “sun enclosure” from the Middle Ages. This meant that farms of the village were given rights to pieces of land of different types and quality. In order for the farm to be able to

provide for its members, it was important that apportioned land could be utilised for the various needs of the household in question.¹⁶

Assume, therefore, that the property is divided into N lots, as in *Figure 2*, where each farmer has the exclusive right to use the property. By these means, the costs and benefits are borne by the same party, which solves the free-rider problem, that is, efforts and results are related to one another, which is why the owner is motivated toward long-term protection of the property.

Figure 2 Sharing



The owner's right to enjoy the benefits of investments creates incentives toward the effective utilisation of resources. Ownership decentralises the decision-making down to the individual farm level. The landowner determines how earth plots and forest tracts shall be used and how the work and results shall be divided and controlled. The functions that were incumbent on the central planner are now transferred to the farmer. The same type of administrative problems relevant to the society on the whole are now transferred to within the individual household -- however, on a much reduced scale because of the smaller number of members.

Note that the right to ownership limits the central powers' role considerably compared to the case of control and command. The introduction of the right to ownership means, in effect, decentralisation. Because the decision-making and economic responsibility lie with the same party, incentive is created for the effective use of resources. The main function of the state powers, accordingly, is to uphold the right of ownership. Disputes and conflicts among the citizens are controlled by legal measures with respect to property crimes and by damages when infringements occur.¹⁷

7 Transferability

A remaining problem in the village may be that the slices of land remain small and inappropriate to ownership. Another problem may be that the work is still heavily interrelated, e.g. when sowing and harvesting. If the right exists for property owners to exchange (alternately rent or lease) lots among themselves,

¹⁶ Inger, P., (1980), *Svensk Rättshistoria*, Liber, p. 35.

¹⁷ The state may, of course, also invest in public utilities and redistribute income through taxation.

the involved parties may set up more purposeful units. Moreover, freedom of contract means that a comprehensive division of work is made possible. The one who, for example, would like to increase his forest tract can buy or rent land, buy felling rights, etc., and the one who would like to specialise in handicrafts can exchange his products or services for other goods and services.

All systems require rules for the transfer of rights, for instance, by gift, contract, or inheritance. The transfers can be to a greater or lesser extent centrally regulated and organised. A highly decentralised form prevails when the individual members of society have the sovereign freedom to contract with each other. If it is permissible to freely contract and associate, then the basis for a market economy is laid. The most important function of markets is to co-ordinate the activities in the economy in a highly standardised way. The activities of many actors are co-ordinated via demand, supply, and prices.

8 Collective or Private Ownership?

Private ownership has, as we have noted, certain advantages over collective ownership. One may ask, then, why all activities are not organised privately? We are not going to delve into the controversial political questions on collectivism versus free-market liberalism. We can, however, note that collective ownership has advantages as well, which explains why collective ownership has, indeed, been most common in ancient times as well as in capitalistic societies.

Above, we described the medieval “sun-enclosure“ as a creation of private property rights. This illustration may lead to the erroneous conclusion that Swedish villages were mainly founded on tradable private ownership. On the contrary, collective ownership systems with very limited specialisation and trade survived until the enclosures of the 19th century. One reason is presumably that the societies were small, and thus the co-ordination problem limited. They also afforded efficient social control. Moreover, the societies were stable for centuries. Hence, production methods were publicly known. The modernisation of production methods, including the restructuring of society in favour of private property rights, began with the industrial revolution. It was then that a market opened for the products of farmers, which required specialisation and trade.¹⁸

In the typical, early capitalistic, privately owned enterprise, it is the entrepreneur who owns the company. He contributes with his work and capital and is the *residual claimant* who may gain profits or make losses. Moreover, he is the decision-maker leading and apportioning work. This may be an efficient organisation, but only on a small scale.¹⁹

Large enterprises have apparent advantages due to economies of scale and scope, but obviously require more capital and management capacity than that of the individual entrepreneur. Additional capital may be supplied by the stock market, but stockowners require power to control management and shares of the

¹⁸ Dahlman, C., (1980), *The Open Field System and Beyond: A Property Rights Analysis of an Economic Institution*, Cambridge University Press.

¹⁹ Alchian, A. & Demsetz H., (1972), *Production, Information Costs and Economic Organization*, American Economic Review, 62 (December), pp. 777-795.

profit. Note that the element of sharing turns the corporate company into a collective form of ownership. Indeed, the modern large corporation has many co-ordination problems in common with other large administrative systems. A difference, however, between public administrations and widely-held corporations is that the shares, and thus the ownership, are traded on financial markets. Mismanaged companies can be bought up, a manoeuvre that brings with it the control and corporate governance lacking in many public bodies and collective organisations.

Nevertheless, private and collective ownership forms coexist in capitalistic economies. Collective organisations develop and survive in capitalistic economies because they are advantageous. Examples are mutual insurance firms, consumer and producer co-operatives, joint ventures, and partnerships. Much effort is spent on utilising the advantages of large organisations, and at the same time maintaining efficiency through decentralised decision-making units, and more or less self-controlling groups. An important question in most organisations is how to share responsibility and results to mitigate the internal free-rider problem.

There are also political reasons for limitations in private ownership in favour of centralised collective command and control systems. Here, we shall only note that an important reason for limited private ownership is redistributive, that is, once the private property rights structure is fixed, room is given to the growth of wealth according to one's own ability. In the long term, this may cause a wide spread of welfare, which may be viewed as being politically unacceptable. The politicians may, then, make adjustments through measures such as income and property taxes.

9 Bundles of Rights

In the political debate and in the environmental discussion on exclusiveness, private property is often presented as a more or less unlimited, publicly enforced freedom. We have, however, already concluded that property rights are not absolute and enforcement is imperfect. An owner's rights of property are, in fact, bundles of complex sets of rights, duties, and freedoms.²⁰ One way of classifying rights and duties is as follows:

freedom to dispose and use,
residual right,
right to compensation,
freedom of contract.

The *freedom to disposal and use* of the property includes all kinds of activities that are not outlawed. Restrictions and limitations of the freedom are, however, common. Zoning laws limit the use of land to certain activities such as farming or industry, and a business may be restricted by e.g. emission rights. Part of the

²⁰ For a more advanced study in various meanings of rights, see Hohfeld W. N. (1923). *Fundamental Legal Conceptions as Applied in Judicial Reasoning, and other Legal Essays*. New Haven.

right to use may also be collective. For instance, a landowner may be required to permit trespassing by the public. As in Sweden private property may be freely accessible for walking around and picking flowers and mushrooms. Similarly, military activities on private land may also be allowed. Moreover, some resources on a property may be, *de facto*, of common accessibility. An example is groundwater which cannot be limited by the fences of the property.

The freedom to use property may be transferred by rent or lease contracts. In such contracts the *residual right* is maintained by the initial owner. A transfer of ownership requires that the right to the residual value of the property be transferred to the new owner. In other words, the residual right is the essence of ownership. The residual right is the right of profit and the duty to cover losses.²¹ The owner is thereby a risk-taker and has an incentive to maximise the utility or profit of the property.

An owner may influence certain risks, but not others, and individuals are more or less disinclined to take risks. These facts are of great significance in the economic analysis of rights and duties. Here is an example: a person can choose between owning or renting an apartment. As a tenant, the person pays in advance and does not need to incur any debts. The tenant does not assume any risk as far as the value of the apartment is concerned, the day the contract is cancelled. On the other hand, the owner has the right to profits (or losses), the day the apartment is sold. Consequently, the choice between ownership and rent in its turn influences the quality and extent of maintenance of the apartment.

The *right to compensation* is closely related to the use and residual rights. In order for the right of ownership to remain in force, it is necessary that the owner be able to assert his rights upon infringement, for example, when the property is damaged. Hence, the right of the owner is affixed with the duty of others not to infringe upon that right. With ownership belongs not only the possibility of excluding others and enjoying the profit; with ownership also belongs the obligation of bearing the costs that are attached to the property, including compensation to other owners who have been harmed. In sum, the owner has the right to enjoy profits but he also bears the economic responsibility for the property and the decisions to be made.

The *freedom of contract* includes the right to transfer rights by contract, gift, and inheritance. Note, however, that ownership does not necessarily encompass freedom to contract. The word "ownership" often refers to situations where the ability to contract is strictly limited. For example, ancient farmers with very limited rights to sell the property may be seen as owners. Similarly, we may talk about ownership in a feudal, mercantile, or guild society, where the master and worker have well-defined personal rights, but lack the freedom to contract or establish competing firms. Moreover, children may be owners although they do not have the freedom of contract.

For these reasons there is cause to define a *narrow concept of ownership* that encompasses use, compensation, and residual rights, but not the freedom to contract. Private ownership is often said to be necessary in the market economic

²¹ As for use rights, there are also limitations in the right to the residual. Taxes on income, property, and added value reduce the benefit of ownership.

system, which is certainly true. However, ownership in the narrow sense is not sufficient for a market economy. What differentiates a market economy from other economic systems is the far-reaching and decentralised freedom of contract, i.e. the individual owner's right through voluntary agreement to determine the transfer of rights.

Under freedom of contract we also include the legal competence to establish companies, as well as the qualifications to transfer rights to another party through the power of attorney. Central to a market economy is also free competition, which is guaranteed through the freedom of association and through anti-trust laws.

So far, we have said that the decision-making power can either be centralised with a central planner, or decentralised with consumers and producers via the freedom of contract. Central planning versus completely decentralised market economy are extremes, however. In reality, it is a question of degree -- a dictator cannot control everything, but must decentralise some rights, and the sovereignty of consumers and producers is limited in many ways, also in a most liberal economy. For instance, the under-aged and mentally retarded are usually under guardianship. Consumers may not be free to trade drugs, weapons, and sex. Many businesses, e.g. the legal and medical profession, transports, and hazardous industries, need a license to trade, and so on. Hence, the criteria for decision-makers and, thus, indirectly the number of economic agents are settled by laws furnishing the legal right to contract.

Because "property rights" is a bundle with a broad variation of rights, it is usually not easy to identify what the rights are. Indeed, in order to identify an owner's rights and duties, it may be necessary to investigate a succession of different laws and statutes. Moreover, the rights may change repeatedly. An owner of a car has many rights and duties. By changing the tax rules and traffic laws, the content of ownership is changed. Similarly, the owner of a co-operative flat possesses a share in an association, which in its turn gives the right to live in the apartment and eventually the right to rent it out, but also the duty, for example, to pay property taxes and electricity bills, to maintain the common entrance and stairways, and the implicit obligation to behave respectfully toward neighbours. When rented out, only certain rights and obligations such as the right to disposition and the freedom to use are transferred, together with the obligation to maintain the stairways and behave respectfully toward neighbours.

The examples show that rights are complex bundles determined by laws, as well as customs in society. Moreover, the enforcement of laws are imperfect. In other words – there is no absolute, given right to property. In this respect there is no principal difference between the Scandinavian legal realism and economics. Nevertheless, the assumption of exclusive and well defined rights is a reasonable simplification in the analysis of demand and supply of various services and goods such as bread, butter, wine, and guns.

10 Property Rights and the Environment

We have demonstrated through several examples how exclusive use and legally protected property rights may improve the environment. Indeed, the lack of

private property rights may result in disaster. Even the occupation of land may save the environment as in the examples in Section 2. Yet it is, of course, better if rights are assigned and enforced within a legal system — the avoidance of conflicts and wars are urgent both for man and the environment.

Within a jurisdiction there is a continuous assignment of rights that is of great importance both to the economy and the environment. Here follows a hypothetical example: an owner, A, of industrial property bordering a water source possesses in his capacity as owner many rights, including the believed right of usage to discharge waste into the bordering stream. These impurities bring with them an environmental problem for owner, B. Downstream. B sues A, claiming that she has the “right to fresh water”. However, the law is unclear on this point. Hence, the court, or the legislator, must assign the right to A or B. A classic Law and Economics problem is what the economic effects are if “the right of ownership to the water” is assigned to A or B. Here, we may conclude that the assignment of the right to *either A or B* is important. The conflict inherent in unspecified rights is hereby dissolved. Assignments of rights are, as noted above, also a prerequisite for further bargaining by the parties.²²

10.1 Oyster Beds

There are many examples of how private property rights may improve both the economy and the environment. For instance, the advantage of property rights relative to common ownership and command and control systems has been studied in the US oyster fishing industry.²³ The legal systems of the different states provide mixtures of ownership, both common and private property, of oyster beds. According to the theory of property rights, one would expect the common ownership, or open access regime, of oyster beds to be less productive. First, oyster beds benefit by proper preparations that obviously are not going to take place if the individual investing effort in such preparations does not have an exclusive right to harvest the oysters. The harvesting process involves the removal of parts of the shell and rock deposits from the bottom. Not replacing this residue is destructive, but since it involves a cost to the individual to carry out the replacement, this will not take place at common ownership -- unless the law forces the actor to do so. Second, harvesting immature oysters is profitable to the individual in an open access regime since the individual cannot expect to catch the oyster again if it is thrown back into the ocean. The contrary is true in a system of private ownership. If the oyster is thrown back into the ocean, it will be found again later by the same fisherman when it has a higher value. Third, in particularly rich oyster areas there will, with common ownership, be a

²² This is an example of the Coase Theorem, see Coase, R., (1960), *The Distinction between Private and Social Benefits and Costs*, Journal of Law and Economics, October, pp. 1-44.

²³ Agnello, R. J. and Donnelley L. P., (1975), *Property Rights and Efficiency in the Oyster Industry*, Journal of Law and Economics, pp. 521-533; and Agnello, R. J. and Donnelley L. P., (1975), *Property Rights in the Fisheries*, Southern Economic Journal, vol. 42, pp. 253-261.

congestion of fishing boats. The private owner of an equally rich area will employ the effort that maximises the yield.

To counter the tendency of harvesting until a resource is depleted, the states have instituted a number of command and control measures. It is usually stipulated that some proportion of shells should be saved on commonly owned oyster grounds. States also subsidise rehabilitation programs. To avoid the catching of very small oysters, minimum size restrictions have been set. The use of new and efficient technologies may also be restricted.

Over all, one can expect economic efficiency to be higher in areas of private property. Empirical findings support this theory. Labour productivity and, consequently, the wages of oyster fishermen have been compared between the years 1950 - 1969. Wages in Virginia with respect to predominantly private property were on average \$2453, and in Maryland with a common property system \$1606. Similarly, Louisiana fishermen earned \$3207, while their counterparts in Mississippi, fishing on common grounds, earned \$870. Moreover, data for the years 1945 - 1970 show that Maryland fishermen harvested earlier in the season than did the fishermen in Virginia.²⁴

10.2 *The African Elephant*²⁵

Poaching and destruction of the elephant habitats in Africa have reduced the elephant population from 1,3 million to 600,000 between 1979 and 1989. Basically, two strategies have been developed for the protection of elephants. The first command and control, or protective, strategy (applied in Kenya) has been to forbid hunting and all sale of elephant parts or products. Through the second property-rights-oriented active management strategy (applied in Zimbabwe), the government and private investors actively seek revenue from the hunting and sale of elephant products for profit.

The protective strategy holds that the only permitted source of revenue from elephants should come from viewing, thus all hunting is banned. Since the tusks and other parts still have a considerable value on the world market, the elephants must be protected and poachers controlled and punished. A problem, here, is corruption of rangers and officials protecting the elephants. Another problem is that without hunting, there are no adequate funds for the detection of poaching and for compensation to farmers for damages caused by elephants. Farmers are hereby harmed, and may, thus, wish to see elephants eliminated, at least within the immediate vicinity. Hence, the command strategy without efficient control will presumably fail.

In contrast, the active management strategy establishes an incentive to reinvest in the protection of the elephants for future hunting and selling. Support and protection by the local population are gained by sharing the profit with farmers and tribesmen. The shared residual right provides an incentive to participate in

²⁴ Agnello, R. J. and Donnelly L. P., (1975), *Property Rights in the Fisheries*, Southern Economic Journal, vol. 42, pp. 259, 260-261.

²⁵ Heimert, A.J., (1995), *How the Elephant Lost His Tusks*, The Yale Law Journal, pp. 1473-1506.

the protection of the elephants. In Zimbabwe the local council in the Nyaminyami district was given a number of elephants that could provide a long-term income of \$125.000 a year if fully utilised, approximately the same sum the area had received in foreign aid for nutrition and primary education programs. Some ranchers have fenced in their land and set up anti-poaching patrols and wildlife management programs because they have found it to be more profitable to use their land for hunting than the raising of livestock. This has given rise to a number of private natural reserves.

The property rights approach is supported by some empirical facts. In Kenya, the population of elephants dropped during the 1980s from 65.000 to 19.000 (with a similar drop in other countries using the same strategy). The elephant population in Zimbabwe grew during the same period from 30.000 to 43.000 (and in Botswana, also using an active management strategy, the elephants have increased to 56.000).

10.3 Regulations for Protection of the Environment

Nevertheless, there are many regulations and limitations of property rights that are used for the protection of the environment. First, the right to the use of e.g. land is restricted by national, regional, and local planning and zoning laws. Hunting, farming, emissions, and waste treatment are also regulated areas that limit the rights of landowners. Second, the right to the residual is reduced by taxes. Taxes are necessary for financing e.g. the legal system and are, thus, at least to some extent necessary for the protection of property rights, as well as the environment. Third, the right to trade is commonly restricted for the protection of rare species and ancient cultures. For instance, the Sami people in Scandinavia have the right to use the grazing land for their reindeer, and the right to fish and hunt for their own needs, although they do not own the land. They are not allowed to let or sell this right to others for the use or non-use of the grazing land. If the right were tradable, it would presumably have been sold to landowners disturbed by reindeer, or to farmers using other methods and possessing cattle. In both cases the unique Sami traditions and culture would have disappeared.²⁶

²⁶ Rose-Ackerman, S., (1985), *Efficiency, Equity and Inalienability, in Law and Economics and the Economics of Legal Regulation*, Skogh, G. (ed.) and Schulenburg M. (ed.), Martinus Nijhoff Publishers.

11 Different rights

11.1 Social Rights

The Rio declaration of 1992 starts with following two principles:

1. Human beings are ... entitled to a healthy and productive life in harmony with nature.
2. States have the sovereign right to exploit their own resources...and the responsibility to ...not cause damage to the environment of other States...

We shall not deal with the legal status of declarations of this type. We are, however, interested in their similarities and differences with respect to property rights. The second principle appears to be a declaration of property rights at the state level. The first declaration is different. It belongs to a class of rights that may be named social rights or politically active rights. The statement points out what the state and future politicians ought to do for its citizens, in this case provide a healthy and productive life in harmony with nature. For instance, the Swedish constitution (RF 1:2) includes similar rights regarding education, healthcare, and a good environment.

The state's political responsibilities and the citizens' rights to social services are usually weaker and less binding than property rights. Social rights in constitutions or international declarations may be regarded, first of all, as ambitions and general recommendations for the future. Consequently, if education, healthcare, or the environment are poor, the citizen can usually not sue the government successfully. Indeed, through political decisions social rights may be withdrawn or neglected without the right to compensation. Further, social rights are not transferable. For instance, a right to public schooling or pension cannot be sold or used as collateral.

11.2 Human Rights

While social rights are active in that they place demands on the state, human rights such as freedom of speech, freedom of religion, and freedom to meet and associate are politically passive rights in the sense that the state, or other citizens, shall not interfere with these rights. Indeed, human rights differ from social rights in that they, in some respects, limit the sphere of politics. The purpose is to protect the political immunity and privacy of individuals. Such rights have been included in the UN Declaration on Human Rights of 1948 and sometimes in national constitutions.

Human rights are of great importance for the protection of humanity against cruelty and political mischief. The enforcement of human rights has been proven to be weak, however, even when the rights are included in national and international constitutions. One reason is that minorities are poorly represented in politics. Human rights must, therefore, be continuously defended and upheld through moral and ethical arguments.

One such moral defence is to claim that human rights are natural rights, that is, rights given to humanity by God or by Nature, over and beyond political decision, perhaps even imbedded in the human gene. The idea of a binding to a hypothetical social contract may also be seen as a natural right.

11.3 Property Rights

Some political philosophers and legal thinkers claim that property rights are also natural rights. We will not argue against this stand. It should be noted, however, that property rights differ considerably from human rights. First, property rights to land, for example, contain a complex bundle that changes continuously through various forms of legislation and political reforms. Property rights are, thus, more complex and stretchable than, e.g. the right to freedom of religion or speech. Second, changes in property rights cause windfall gains and losses to property owners that not always are, or can be, compensated. In addition, incomes must be generated to the state. Hence, if the political system has the purpose of financing, e.g. public goods and the redistribution of wealth, limitations in property rights by taxation and regulation must be accepted.

Note that human rights have the purpose of protecting the private sphere from politics, while the sphere of freedom of contract regulates that which should be allocated via the market and not by the collective (political) system. Similarly, limitations in the freedom of contract indicate that which should be handled in the political or private sphere. For instance, a market for the adoption of children may be outlawed, and adoptions, instead, handled by a public agency together with parents.

11.4 Environmental Rights

A part of the environmental movement is the idea of environmental rights. We do not include property rights here, although property rights may save the environment. The reason for this is that property rights focus on the owner rather than on the environment *per se*. Environmental rights include both politically active rights, that is responsibilities of the politicians to protect the environment, and politically passive duties to leave certain species, eco-systems, or cultures protected from politics as well as markets. Ideas of some form of natural harmony or sustainability, as well as a social contract including a commitment to care for future generations are typical for Natural Law. Economics can analyse the economic consequences of such beliefs, but not explain their appearance.

12 Concluding Remarks

The importance of fencing off scarce resources is demonstrated above through examples, and by the presentation of the “tragedy of the commons”. Resources may initially be protected through the occupation of territory, which may be against prevailing laws. Although occupation may save the environment, it is, of course, better if rights are assigned legally. The avoidance of conflicts and wars is, indeed, an urgent issue.

Within a jurisdiction there is a continuously peaceful assignment of rights that is of vital importance to the economy as well as to the environment. It is interesting to note that the establishment of property rights follows a certain pattern. First, there may be open access to a resource. Second, problems arise when the resource becomes scarce. The free-rider problem and rivalry cause a conflict. Third, the conflict may be resolved through the establishment of rights. Forth, given assigned rights, it may be possible to trade, that is, the preconditions for contracts and markets are established.

We have also pointed at that the fundamental role of property rights for the market economic system. The “free” market is based on a set of institutions and regulations. That is not to say that a liberal market economy based on private property rights is the best political solution for most problems. In fact, the free market economy includes many forms of collective ownership that apparently have comparative advantages.

Yet, property rights is a complex and politically controversial concept. Communists as well as conservative and liberal thinkers have treated property rights as a more or less absolute concept. The relative nature of property rights has been understood mainly by legal scholars, but also by socialists advocating parliamentary reforms of sticks in the bundle of rights, with the purpose of a functional watering down of the powers of the private owners.²⁷

In Scandinavia legal positivists have limited the study of law to *de lege lata*, i.e. to the description and systematisation of the actual law. The function of the law, *de lege ferenda*, has, on the other hand, been left to other social sciences like sociology, political science, and economics.²⁸ A problem, however, is that the existing laws are often unclear or not specified. The courts must, therefore, make judgements about fairness and reason, and balance interests against each other. Without knowledge of contemporary social science, these judgements, by necessity, become amateurish. Lawyers cannot, on the other hand, be expected to have double competence. Nevertheless, basic knowledge of the economic functioning of property rights as described above should be most useful for the legal scholar as well as for the practising lawyer.

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²⁸ Scandinavian legal realists like Wilhelm Lundstedt argued in favour of a utilitarian study of the impact of law on society but the theory was never developed. The new Law and Economics can fill this vacuum, see Ryssdal, A. C., (1995), *Legal Realism and Economics as Behavior*, Juridisk § Forlag, Oslo.

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