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Should common property resources be privatized ?

A re-examination of the Tragedy of the Commons

May 1994

by

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Abstract : To many observers, environmental resources nowadays are said to be patently over-exploited owing to an inappropriate property regime, which leads to a Tragedy of the Commons. In this perspective, privatization is often recommended as the best efficiency-improving measure. In the present paper however, we contend that there are in fact numerous conditions for this proposition to hold true and that they are not likely to be met in reality. Moreover, we argue that even if we stick to the standard efficiency criterion, it may be essential to lend attention to equity considerations.

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THE TRAGEDY OF THE COMMONS

Though it is well-known that high rates of resource exploitation may be part of a welfare maximizing programme, it is often claimed that the rates currently observed in many countries, and particularly in LDCs, are exceedingly high and that the resulting pattern of management of natural resources is patently inefficient. This observation is the starting point of an abundant literature which identifies the main source of inefficiency in the management of natural resources with the absence of well-defined property rights and the regime of open access which characterizes them. As early as 1833, William Foster Lloyd (who was concerned with the check on population growth imposed by limited employment opportunities) identified the problem which later on came to be known as 'the tragedy of the commons':

> **" Why are the cattle in a common so puny and stunted ? Why is the common itself so bare-worn and cropped differently from the adjoining enclosures ? No inequality, in respect of natural or acquired fertility, will account for the phenomenon. The difference depends on the difference of the way in which an increase of stock in the two cases affects the circumstances of the author of the increase. If a person puts more cattle into his own field, the amount of subsistence which they consume will be deducted from that which was at the command of his original stock ; and, if, before, there was no more than a sufficiency of pasture, he reaps no benefits from the additional cattle, what is gained in one way being lost in another. But if he puts more cattle on a common, the food which they consume forms a deduction which is shared between all the cattle, as well as that of others as his own, in proportion to their number, and only a small part of it is taken from his own cattle. In an enclosed pasture, there is a point of saturation, if I may so call it, (by which, I mean a barrier depending on considerations of interest), beyond which no prudent man will add to his stock. In a common, also, there is in like manner a point of saturation. But the position of the point in the two cases is obviously different. Were a number of adjoining pastures, already fully stocked, to be at once thrown open, and converted into one vast common, the position of the point of saturation would immediately be changed. The stock would be increased, and would be made to press much more forcibly against the means of subsistence." [Lloyd, 1833, in Hardin and Baden, 1977: 11]**

The Tragedy of the Commons' therefore follows from the fact that, under a situation of so-called *open access,* the agents do not take into account the costs which their own decisions impose on the others : anybody has a right of access to the resource (think of international maritime waters or pure air) and, in the absence of any rule constraining

individual behaviour, the rents that might have been generated by an efficient use of the resource are totally dissipated. This outcome arises because the agents use the variable factor required for exploiting the resource up to the point where its average productivity becomes equal to its opportunity cost in the overall economy. Note that the same disastrous result obtains, though in a smaller degree, when there are no rules to regulate the use of the resource but only a finite number of agents have the right to exploit it (this regime can be characterized as an *unregulated common property).*

In the light of the above, a reform of the property rights appears unavoidable to achieve a greater effiency in the use of the resource. In actual fact, privatization of natural resources is the solution recommended by many economists (particularly those belonging to the so-called property rights school), and quite a number of international agencies. In this paper, we would like to argue that, in spite of what has been said, the private property is not as obvious a solution as it seems at first sight. There are two points worth making here. First, if information is perfect and there are no transaction costs, private property ensures the efficiency of the resource use, yet, under the same conditions, a regulated common property can achieve the same objective. By regulated common property, we understand a regime in which resource users can make binding agreements among themselves, or an authority can lay down and enforce a system of taxes and quotas in order to regulate the use of the resource. Second, the privatization program is grounded in a number of crucial implicit assumptions that actually condition its effectiveness as a Pareto-improving measure. In the following, we would like to focus our attention on the fact that most of these assumptions are likely to be violated in reality.

Therefore, whether privatization is the best solution to the tragedy of the commons becomes a complex question to which no definite answer can be provided on a priori grounds. In this perspective, assessment of the precise context in which such tragedies occur is a necessary step towards deciding which property regime —open access, regulated common property, unregulated common property, private property— is the more appropriate. For reasons that will be made evident in the analysis, equity considerations have to receive considerable attention in the kind of problems analyzed here. This is not only because they are

important for their own sake but also because they can bear upon efficiency, a point largely ignored in the literature.

THE POSITION OF THE PROPERTY RIGHTS 'SCHOOL

The property rights school argues that private property is the most appropriate way to make individuals internalize the externalities. In the words of Demsetz, "A primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities." [Demsetz, 1967 : 348]. The incentive effect of a private property regime has long been recognized, as is attested by the following excerpt from Lloyd : "The common reasons for the establishment of private property in land are deduced from the necessity of offering to individuals sufficient motives for cultivating the ground, and of preventing the wasteful destruction of the immature products of the earth." [Lloyd, 1833 : 14]. Or, in the pathetic style adopted by Garett Hardin, "An alternative to the commons need not be perfectly just to be preferable. With real estate and other material goods, the alternative we have chosen is the institution of private property coupled with legal inheritance. (...) we are not convinced, at the moment, that anyone has invented a better system. The alternative of the commons is too horrifying to contemplate. Injustice is preferable to total ruin." [Hardin, 1968 : 27-8].

Finally, the ultimate superiority of private property rights has been expressed by R. Posner as follows :

> **"The proper incentives [for economic efficiency] are created by the parceling out among the members of society of mutually exclusive rights to the exclusive use of particular resources. If every piece of land is owned by someone, in the sense that there is always an individual who can exclude all others from access to any given area, then individuals will endeavor by cultivation or other improvements to maximize the value of land... The foregoing discussion suggests three criteria of an efficient system of property rights. The first is universality. Ideally, all resources should be owned or ownable, by someone, except resources so plentiful that everybody can consume as much of them as he wants without reducing consumption by everyone else... The second criterion is exclusivity... The third criterion of an efficient system of property rights is transferability. If a property right cannot be transferred, there is no way of shifting a resource from a less productive to a more productive use through voluntary exchange." [Posner, 1977: 10-3, as quoted in Bromley, 1989: 13].**

In short, private property rights should be established. The property rights school does not however limit itself to bringing out the static gains in efficiency which may be engendered by private property. It also makes the contention that the institution of private property, in a typically evolutionary way, spontaneously emerges in reality whenever a cost-benefit comparison makes it appear as more desirable than aletrnative system.

> **"If the main allocative function of property rights is the internalization of beneficial and harmful effects, then the emergence of property rights can be understood best by the association with the emergence of new or different beneficial or harmful effects.**
> **Changes in knowledge result in changes in production functions, market values, and aspirations. New techniques, new ways of doing the same thing, and doing new things — all invoke harmful and beneficial effects to which society has not been accustomed. It is my thesis in this part of the paper that the emergence of new property rights takes place in response to the desires of interacting persons for adjustment to new benefit-cost possibilities.**
> **The thesis can be restated in a slightly different fashion : property rights develop to internalize externalities when the gains of internalization become larger that the cost of internalization. Increased internalization, in the main, results from changes in economic values, changes which stem from the development of new technology and the opening of new markets, changes to which old property rights are poorly attuned." [Demsetz, 1967:350].**

THE EFFICIENCY OF THE PRIVATIZATION PROGRAM

A major result of standard economic theory is that if private property rights can be defined and enforced costlessly over a resource in an open access or unregulated common property regime, and if the markets are perfect, then a competitive equilibrium is efficient. This proposition thus rests upon four distinct central assumptions :

(1°) enforcement costs are nil,
(2°) property rights are well defined,
(3°) markets are competitive, and,
(4°) markets are perfect,

each of which we shall now examine in detail.

(1) Enforcement costs are nil

First, in most instances, defining and enforcing private property

rights entail the physical costs of defining a 'territory'. For some resources, property rights simply cannot be established because the costs involved are prohibitive (or, even, infinite) : migratory fish species or clean air provide well-known examples. For instance, in the case of lobster fishing territories in Maine, "it would be very difficult or impossible to divide the entire coast into small territories owned by single individuals. If a person is going to fish year-round or even most of the year, he needs access to a large and diverse area. The costs of defending such a territory would be prohibitive." [Acheson, 1987 : 61]. However, some groups of fishermen were able to secure an exclusive access to some fishing territories where the topological conditions significantly lower the costs of defending them. Such a situation characterize the "islands that have been in the hands of one or more of the old established families for generations." [Acheson, 1989 : 367].

We are told that private property in land in the American Great Plains did not develop fully before the 1870s because the cost of fencing was too high, making it impossible to prevent livestock from crossing range boundaries. "The introduction of barbed wire greatly reduced the cost of enclosing one's land. To the homesteader whose land was invaded by cowboys and their herds which trampled down crops, barbed wire defined the prairie farmer's private property (...). In 1882, the Frying Pan Ranch, in the Panhandle, spent $39,000 erecting a four-wire fence around a pasture of 250,000 acres"' [Anderson and Hill, 1977 : 207-8]. Among the Indians of the American southwestern plains, property rights on hunting grounds were absent : "animals of the plain are primarily grazing species whose habit is to wander over wide tracts of land. The value of establishing boundaries to private hunting territories is thus reduced by the relatively high cost of preventing the animals from moving to adjacent parcels." [Demsetz, 1967 : 353].

In general, the costs of enforcing private property rights are iikely to be smaller when the resource is concentrated. For instance, in the tropical forests of East Kalimatan (Borneo), the great diversity of species of trees, of which only some are economically valuable, and the fact that they are largerly dispersed troughout the forest prohibited their privatization. However, birds' nest caves which are concentrated and therefore more easily watched and guarded, are "often controlled as private property by individuals and families" [Jessup and Peluso, 1986 : 510]. "In Tripolitania, for example, potentially lucrative almond trees are reported to have been forsaken for cattle raising owing to the 'common ownership' of land. This can be explained by the fact that the costs of policing investment in a tree, perenially 'attached' to the common land, is high, whereas cattle are driven home at night" [Cheung, 1970 : 53].

Enforcement costs are also likely to be high where the new distribution of property rights tends to hurt the former users. In most historical cases, indeed, privatization initially took the form of expropriation and was achieved through violence. The Far West conquest and the consecutive expropriation of the native Indians in North America provide an interesting example. The genocide which accompanied the appropriation movement has had such a traumatic impact on the North American society that it needed to mythify the events and buid up distorted stories to be widely diffused through modern communication channels, particularly cinema, in some ritual of exorcism. The enclosure movement in the Plains of North America and in England were also accomplished by force. In the latter case, according to one of the best specialists, "early enclosures, especially those before the mid-sixteenth century, frequently involved the destruction of villages and the expulsion of their inhabitants as lords seized peasant land.(...) Before 1450 and 1525, about one tenth of the villages in the midlands were destroyed" [Allen, 1992: 14]. The current privatization process of the Amazonian forest in Brazil gives rise to many armed conflicts which will ultimately lead to the genocide of the native Indians. In India, the nationalization of forests led to violent reactions and, in some instances, to the complete destruction of the commons by dispossessed former users [see Guha, 1983 : 1947].

In other words, the costs of enforcing exclusive property rights partly depend on the way distribution of wealth is affected and also on the perceived legitimacy of the new legal system and authorities by the dispossessed users. Violence is likely to be resorted to when perceived legitimacy is low. One might apparently argue that transfers can be made from the new owner to the former users to compensate the latter for the loss incurred, *as though they were voluntarily selling their informal right of use.* We analyze this issue in detail at the end of this chapter. At this stage, let us just note that, *historically, such transfers rarely took place, and the rights of the former users were seldom recognized.* Thus, in the case of English enclosures, we are told that, "during the parliamentary enclosures less than seven percent of enclosed land went to peasants

holding a total of 25 acres of land or less. In the earlier enclosures, not regulated by parliamentary acts, the allotment was presumably even more disproportionate. (...) If a tenant was able to demonstrate to the satisfaction of a court that he had good title to land (if his family has worked it for time out of mind), his tenure was secure, although this didn't necessarily mean that he ended up 'owning it'. If he was unable to do this, he was at the mercy of the enclosing lord. For the most part, good title to the land was difficult to establish for a copy-holder and insecurity was widespread where enclosures were extensive" [Cohen and Weitzman, 1975 : 324; see also Allen, 1992]. In some cases, the appropriation is made by a minority of traditional users at the expense of the remaining ones. For instance, Karanth reports that in the case of a village in Karnataka (South India):

> **"From the point of view of some elders in the village, such greed for land resulted in the poor maintenance of the village tank, garden, manure pit and what remained of the pastures. Those owning land around a pasture began to encroach it with a hope that sooner or later they would regularise the unauthorized occupation. Likewise the dry bed of the tank, the garden and the manure pit were also being encroached. Given the increased politicization of village factions, there had been several signed and anonymous complaints of encroachment. Officials of the revenue department had made several visits to the village for a 'spot' inspection and after a customary meal in the houses of leading families reports were made to state that the complaints were not found to be true. The consequence was that the village garden, the extent of which was 1.13 acres has now been reduced to less than 0.40 acres. Although the index of land states that there were several varieties of fruit-bearing trees, there are hardly any left now." [Karanth, 1992: 1685].**

Equally important to emphasize are the two following problems : (1°) *private information problems may render compensation of the former users infeasible,* and (2°) *the private value attached by former users to their access to the resource* (a plot of land, a hunting ground or a fishing territory) *may be very high* and far exceeds the economic value of the resource on the market[2]. This is particularly evident when their ancestors have been buried on or near the land to be privatized and when magical beliefs or historical considerations impart a highly emotional value to the same. For instance, in Sub-Saharan Africa, we are told that "Land was held communally by clan or lineage. A *sacred* trust, it was essentially in the holding of the ancestors. It was the only area from which rituals to the ancestors could be effectively performed and hence

For this argument to be really relevant, we should add that traditional users are not able to pay for the full economic value of the resource generally because they are denied access to the capital market (see below) and in some instances because their use of the resource is not identical to the one which the market would dictate to a profit-maximizing land owner.

where one should be buried." [Caldwell and Caldwell, 1987 :422]. One may also think of the "sacred islands" among aborigene fishing and hunting communities such as the Bijagos in Guinea Bissau.

The importance of this last point should not be underemphasized : indeed, many conflicts accompanying a privatization process develop because the new arrivants and the legal authorities do not recognize the symbolic value attached to the resource by the former users. For example, a recent CIDA (Canadian International Development Agency)-supported project of establishing seven 4,000 hectares highly mechanized wheat farms in Northern Tanzania is strongly opposed by the Barabaig herders. About 30,000 Barabaig live in that area and have since more than 100 years moved their livestock on a rotational basis around the territory. Five Barabaig elders, supported by Charles Lane, a British anthropologist of the Institute of Development Studies (Sussex), have sent a letter to the Canadian authorities, where they claim that 40,000 hectares of land, some of their best grazing land, were taken with *inadequate compensation* and *without their consent.* They also claim that they have been personally beaten and robbed by farm employees, that their houses and possessions have been burned out, and their access to traditional water sources and pastures prohibited. "Many of the *graves of our elders* have been ploughed up and are no longer recognizable", says the letter. "These sacred sites are very important to us as places of worship. It is there that we make offerings and call on God's blessings through the medium of our ancestors" (as quoted by the Globe and Mail, 8 May 1989). By 1987, already 57 Barbaraig burial sites had been destroyed and others were either surrounded by cultivated fields or rendered inaccessible because of threats from new settlers or project staff. Similar situations can be observed in many other places in Africa and they largely account for the severe tensions and violent contests between pastoralists and farmers that make up a disquieting feature of many African societies today.

Another example of the same discrepancy between the private and the economic value one (an individual or in this case a society) can attribute to a resource is given implicitly in the following judgment rendered in 1493 by an English Court. This judgment actually condemned Henry Smith, a landlord, for having seized a domain traditionally used as cultivated land by eighty customary tenants in order

to convert it into pastures for his sheep. The persons who were formerly "occupied in the same cultivation (...) were compelled to depart tearfully against their will. Since then, they have remained idle and thus lead a miserable existence, and indeed they die wretched. What is more to be lamented is (that) the church of Stretton on that occasion fell into ruin and decay, so that the Christian congregation, which used to gather there to hear the divine offices, is no longer held there and the worship of God is almost at an end. In the church animals are sheltered from the storms of the air and brute animals feed among the tombs of Christian bodies in the churchyard. In all things *the church and burial places are profaned to the evil example of others* inclined to act in such a manner" [Leadam, 1897 : 432, our emphasis].

What the above analysis tends to show is that, due to the coming into play of equity considerations, costs of enforcing private property may be much higher than usually thought, so high that one cannot any more be sure that establishing this new system of rights will actually reduce transaction costs (including litigation costs) as predicted by the property rights school. This is all the more so if allowance is made not only for transaction costs resulting from land market imperfections, but also for those attendant to labour market imperfections as well. As a matter of fact, moral hazard problems on the labour market (absenteism, labour-shirking, input pilfering, asset mismanagement, etc.) may increase owing to the resistance or vengefulness of dispossessed resource users (for a more elaborate analysis on these and related points, see Platteau, 1992).

Property rights are well defined

The second point we would like to draw attention to is the following : to generate all its expected benefits, *the privatization process must be perfect,* in the sense that it has to eliminate all the externalities involved in the exploitation of the resource. First, it must lead to 'the internalization of the good externality". In his analysis of fur trade in Labrador, Demsetz notes that private property rights on land developed with the development of the commercial fur trade [Demsetz, 1967 : 351-3]. This is a typical illustration of imperfect privatization. Since exclusive property rights could not be enforced at a reasonable cost in the game

itself, they were created around hunting territories with the consequence that externalities were not all removed. The importance of remaining externalities obviously depended upon the mobility of the game and the size of the territories. Exclusive fishing rights in well-defined territories provide another well-known illustration. In many cases, the resource itself (migratory species of fish) can hardly be privatized so that exclusive rights bear upon the (fishing) area where the resource is living. The importance of the residual externality should not be underemphasized.

Second, *privatization must be complete :* exclusive rights have to be defined on the whole resource. Otherwise, perverse effects are bound to develop and to lead to a worsening of the situation. For example, Gilles and Jamtgaard report that "the decline of the English commons may have resulted from the exclusion of animals from agricultural lands. In the English open field system, animals grazed on the commons during the summer months and fed on stubble and hay during the rest of the year. As fields became privately owned, animals had to spend longer periods on the commons. The result was over-grazing." [Gilles and Jamtgaard, 1981 : 138]. Migration of workers from newly enclosed to unenclosed areas also contributed to the degradation of the commons system. "The (...) effect was to be seen in the so far unenclosed towns and villages where some of the dispossessed tenants moved. The overcrowded squatter settlements set up on the border of these towns were a direct result of enclosures. Chambers notes that Nottingham, by its decision not to enclose, left itself no choice but to grow within its ancient manorial boudaries, and before the end of the 18th century, there were complaints of severe overcrowding. 'By turning its face against enclosures, it had condemned itself to a period of unparallelled overcrowding and squalor...'" [Cohen and Weitzman, 1975 : 326]. In a village of Karnataka state (South India) analyzed by Karanth, "the consequences of privatization of CPRs in land was that there was a gradual depletion of village pasture. Farmers became increasingly dependent upon the forests for grazing, which in turn led to depletion of forest resources too." [Karanth, 1992, 1687].

Also worth stressing is the fact that reforming customary property rights' arrangements is likely to create serious uncertainties about the future rights of former resource users. For instance, not infrequently,

enforcement costs are either so high that the state is unable to establish the new property rights, or of such a nature that the change can only be carried out at a slow pace, thus lengthening the transitory phase. This is bound to lead to conflicting claims over these ill-specified rights and there is no assurance that the new arrangement will be superior in efficiency terms to the former one. In the worst case, a genuine open access situation might arise as a result of the complete breakdown of traditional norms and codes of behaviour.

Third, *privatization may create new externalities*. For example, in her analysis of the Green Revolution in Gujarat (India), B. Bhatia (1990) shows in a much detailed manner how the privatization of the irrigation system through the development of private tubewells led to such an overexploitation of underground waters that tubewell irrigation is doomed to come to an end in the coming decades. Note carefully however that the problem here largely results from the fact that private property rights in underground water are too costly to define. In the open access situation, by contrast, such overexploitatioin of water resources was less likely to occur simply because users were not incited to carry out any investment and, in particular, to adopt capital-intensive pumping technologies (bear in mind that we do not consider here the case of regulated common property where collective investment decisions would be possible). To take another example, the privatization of forests in Scotland may cause"the siltation of salmon streams caused by logging" [Hardin, 1977 : 223]; in semi-arid areas, it may induce users of firewood to overexploit a close substitute (young trees from adjacent bushes,...); in Belgium, it has actually fostered the extension of pine forests with the result that soils became increasingly acid and that bio-diversity and game stock were drastically curtailed.

Markets are competitive

The third point we would like to make is closely related to the second. In many cases, such as when the resource can be detained by only one owner or when there are increasing returns to scale, the correct internalization of the externality implies the creation of a local monopoly, a classical cause of inefficiency.

In a static framework, an oligopolistic producer tends to exploit too little, and unregulated common property too much of the resource. Therefore, unregulated common property with respect to a resource for which the community considered is the only seller on the corresponding goods market may be the most efficient (Pareto optimal) pattern of resource management. Indeed, Cornes, Mason and Sandler (1986) have shown in a recent paper that, when the n agents who exploit collectively a resource under an unregulated common property regime are the only sellers of that resource on the market, there exists an optimal number n* for these agents, with n*>1, such that the non-cooperative pattern of resource exploitation (the 'tragedy of the commons') is Pareto-efficient.

There are actually many instances where privatization of the resource involves the creation of a monopoly. For example, we are told by Bromley that, in Switzerland, "If the summer pastures were owned in severalty, it might then be possible for one strategically located owner to prevent all others from gaining access to water —a potentially serious issue for the welfare of the group". Under the existing situation, by contrast, "the several farmers who jointly own a summer pasture are able to share the cost of a single herder to move the animals around to water, and to select those areas for grazing where the vegetation is particularly lush." [Bromley, 1989 : 16]. Protection of underground water against overexploitation, of the Sahelian area against desertification, or of a lake against overfishing may therefore require that the whole underground water, the Sahelian pastures, or the lake be owned by a single agent. The inefficiencies which are likely to exist in such schemes, if at all they are feasible, may render them unacceptable to many. It must also be stressed that, in many cases, it is the former users of the resource who will bear the whole burden of the inefficiency thus created[3] : here is another reason why enforcement costs of privatization may turn out to be eventually unbearable.

[3] **This monopoly can indeed be moreover coumpounded by a monopsony on the labour market to the extent that all former users of the resource are likely to offer their labour services to the new resource owner.**

Markets are perfect

A basic assumption underlying the proposition following which development of private property rights in a resource will lead to efficiency is that all other markets are perfect and competitive. If other markets are either absent or imperfect, the reform of traditional property arrangements may cause inefficiencies and paradoxically lead in some instances to the overexploitation of the resource. For instance, "roughly 75 percent of the publicly held rangeland and 60 percent of the privately held ranges in the United States are in fair to poor conditions as a result of over-grazing." [Gilles and Jamtgaard, 1981 : 129][4].What are the reasons which lead us to surmise that 'market failures' are an important source of concern when it comes to privatizing natural resources ?

ABSENT MARKETS

Standard economic arguments show that a necessary condition for the efficient private exploitation of an *exhaustible resource* is the existence of *a complete (infinite) set of forward markets.* In fact, a sequence of momentary equilibria such that, at each period, the market for the flow of the resource clears and the rate of return to holding the resource stock is equal to the rate of interest (the Hptelling rule) is not sufficient to guarantee that the resource will be exhausted on an infinite horizon. This is due to the fact that complete forward markets do not exist to determine the correct initial price of the resource so as to ensure that the stock will be just depleted in infinite time. Given the absence of these markets, such a price may be either too high or too low. If too high, although competitive momentary markets always equilibrate, some portion of the resource stock will never be extracted. If too low, the stock will be exhausted in finite time (prematurely), assuming again that the agents cling to their myopic rule (i.e., the Hotelling rule). Presumably, however, the latter process will not persist, and traders will realize that the resource, at the current rates of exploitation, will be exhausted in finite time : they will buy up stocks and the spot price of the

4 One may argue that such overgrazing may be the efficient path of exploitation of the resource. However, considering the extent of the phenomenon, the validity of such an argument appears doubtful.

resource will jump. This argument can be generalized to exclude the possibility that any path for which the initial resource price is lower than the optimal price will be followed up to the point of exhaustion of the resource in finite time. This however does not remove inefficiency in resource use : indeed, exploitation goes too fast initially and too slow thereafter when compared to the optimal path. The following conclusion emerges : in the absence of a complete set of forward markets or, under uncertainty, in the absence of a complete set of forward contingent markets, a competitive private economy will be inefficient[5].

The problem is that, in real economic life, there do not exist many complete sets of forward markets for a resource (not to speak of contingent markets) and one does not see clearly how to establish them. Therefore, as pointed out by Dasgupta and Heal, for *exhaustible resources,* "the problems associated with the non-existence of a suitable set of forward markets may well be more important and less tractable than those arising from externalities." [Dasgupta and Heal, 1979 : 472].

The second point we would like to make is that many environmental resources exhibit characteristics for which no market exists. In other words, part of the social valuation of such a resource cannot be reflected in competitive market prices. This is so because some of the features displayed by environmental resources, such as the recycling of CO_2 by the forests or the beauty of a natural site, are *public goods,* a well-known source of market failure[6]. It implies that, though

5 It has been suggested [see Dasgupta and Heal, 1979 : 163] that a planning board announcing 'notional' prices may help in removing the inefficiencies by providing traders with reliable signals. Though this may be right in principle, it is hard to see why a state agency should necessarily have access to better information than private traders, particularly for that type of commodities.

6 Of course, to say that there are characteristics of the environmental resources whose value is not correctly reflected in market prices is formally identical to saying that the privatization process has been incomplete by not achieving the internalization of these residual externalities. The reason why we think it nevertheless constitutes a separate point is that the characteristics of the resource we are now concerned with cannot be privatized : they are public goods, and it is to this last aspect that we want to draw attention here.

everybody enjoys clean air or the beauties of an unspoilt Antartica, if asked to, nobody would be ready to pay for it. Therefore, by ignoring some important roles played by environmental resources, the market fails to give the correct signals to private traders in the absence of state intervention. This argument is important, and has been repeatedly used by conservationists to support their claim for a better protection of environmental resources, notably under the form of state-protected areas. For instance, it is very unlikely that the world market for forestry products correctly reflects their role in recycling C02, and that current deforestations in Amazonia, Sub-Saharian Africa, South-East Asia (Sarawak forests are currently being irreversibly destroyed) or Siberia (the forests of which represent 25% of the world total resources, but are currently being destroyed at the rate of 4 millions hectares per year) correspond to an optimal utilization of forest resources.

IMPERFECT MARKETS

Another kind of reasons why one may suspect that private property does not necessarily increase efficiency is that some markets, and particularly the *capital market,* are imperfect. First, due to informational asymmetries (and the resulting problem of moral hazard), access to credit may be restricted to those having sufficient collateral. If the resource is sold by the state, those having a privileged access to capital are more likely to become private owners of it. Therefore, in the absence of state support, traditional users of the resource are likely to be denied access to it in the course of privatization. Though this is basically a distributive issue, it may also be detrimental to efficiency for at least three reasons : (1) if the legitimate interests of the former users are hurt, their passive or active resistance may cause enforcement costs to increase; (2) traditional users of the resource are likely to have developed particular skills and acquired a detailed knowledge of the resource which renders them more efficient to exploit the resource than outsiders (and markets for those skills and knowledge are bound to fail due to informational asymmetries), and (3) the market for private rights in the resource may become too thin and oligopsonistic practices, such as collusive arrangements, are likely to distort it. For instance, from a detailed study of the rope-making industry in the Himalaya foothills [Johri and

Krishnamukar, 1991], we learn that raw material for making ropes is a wild grass, locally known as *bhabhar,* which grows on the Shivalite hills. It was a common property resource until under the British rule. Nowadays, the state has established state property over the grass which it sells during summer in an auction. Access of poor rope-makers to capital is so restricted that, in effect, "the auction is attended by a handful of local traders who collude to keep their price hovering around the price first quoted" {ibidem : 2898], and secure a net rate of return of about 50 percent per year by selling the grass to the rope-makers. In recent years, credit cooperatives have started to appear to allow rope-makers to directly buy *bhabhar* at the auctions and circumvent the traders.

Furthermore, when access to sources of credit is imperfect, the extreme poverty of the agent who exploits the resource (be it a traditional user or a private owner) may have deleterious consequences since "poverty may be expected to drive up their rate of time preference to the point where all that matters is consumption today."[Perrings, 1989]. In the case of U.S. rangeland referred to at the beginning of this section, poor people are led to "stock their pastures at higher rates than do their larger more conservative neighbors. A result of this strategy can be overgrazing and environmental degradation." [Gilles and Jamtgaard, 1981 : 132]. It is increasingly being acknowledged today —even by those who favour maximum privatization of natural ressources— that the problem of resource degradation in developing countries cannot be solved through reforms in property rights alone. If new income-earning opportunities are not created to tackle the problem at its root, institutional change will be of no avail.

The general line of the argument above is also applicable at a world-wide level. Given difficult access to international credit to pay off past debts and/or finance economic development, governments of capital-hungry developing countries may not resist the temptation to sell or to lease national resources. This may give rise to at least two kinds of serious problems. First, being under stress, governments may easily be led to sell their natural assets or rights of exploitation at abnormally low prices (as is evidenced in the case of fishing rights conceded to foreign fleets by governments of poor coastal African countries). Second, the new owners or users of the resources may be induced to overexploit them because they strongly doubt the ability of governments to make credible

commitments in such touchy matters as those pertaining to the nation's natural patrimony. Their fear is actually that the agreements concluded might well be soon rescinded if the economic situation of the host country improves or if political change brings to power a new government with a more nationalistic outlook[7].

The second reason why imperfect capital markets may lead to an inefficient exploitation of the privatized resource is that, in the presence of those imperfections, the interest rate fails to correctly represent the social rate of discount |see also Fisher, 1981 : 68-71J. It is often suggested that the *market rate of interest* is too high. It may result in the excessive exploitation of the natural resources and even in their destruction in those cases where the natural rate of growth of a renewable resource remains below the market rate of interest when it stock approaches zero.

THE DISTRIBUTIVE IMPACT OF PRIVATIZATION

We have argued so far that the privatization program advocated by the property rights school does not necessarily promote efficiency. We would like at this point to evaluate the impact of such a program on income distribution. Let us assume that it can be achieved costlessly, and that the markets are perfect and competitive. Since, under these conditions, the unregulated common property equilibrium is Pareto-dominated by the competitive (private property) equilibrium (see supra), we know that, through an appropriate set of transfers, everybody can be made better off under the competitive equilibrium : *everybody can gain from privatization.* The above statement holds true only in those situations where the former users of the resource succeed in having their rights recognized and in receiving a due compensation for the income loss resulting from privatization. (Bear in mind that, owing to private information problems, transfers may simply be impossible). This is clearly the case when traditional users of a resource are made private

' This argument can also be invoked as an objection against the solution of debt-nature swaps.

owners, or when the proceeds from the sale of property rights in the resource are remitted to the former users. In many circumstances, unfortunately, traditional communities do not get their user rights recognized and are simply excluded from the use of the resource with no compensation. In those situations, an interesting issue emerges : since the resource is now efficiently managed, is it possible that the marginal productivity of labour increases in such proportions that the former users, now working as wage earners, actually gain from privatization ? The question applies to two situations of particular interest:

1. The resource is now privately owned by an outsider who manages it competitively and hires former users as wage labour.

2. The rights in the resource are sold competitively by the state and the former users become the private owners of the resource. The proceeds of the sale (which represent the discounted sum of the rents which an efficient use of the resource will yield over time) are siphoned off by the state.

In these two situations, will the former users necessarily lose ? This is the question raised by Weitzman (1974) in a celebrated article [see also Cohen and Weitzman, 1975 : 311-3], and the answer given is yes. Unfortunately, the proof provided seems to be unnecessarily complicated. As a matter of fact, the underlying argument can be easily formulated with the help of. a standard diagram, as is shown below. Assume that the average product, AP, is decreasing in the variable factor, L (this is indeed the classical situation where the tragedy of the commons arises). Thus the marginal product of the variable factor, MP, is also decreasing and, for each level of L, $MP(L) < AP(L)$. Let us draw the supply curve of the variable factor, S(w), where w stands for its market price, and assume that $S'(w)>0$. Then we can draw the following diagram :

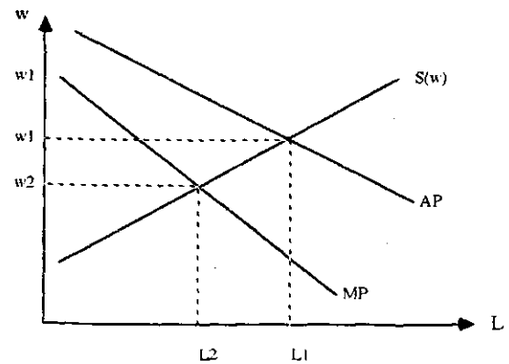

Diagram 3.1 : the welfare impact of privatization according to Weitzman (1974)

In an open access situation, we know that the variable factor is being remunerated at its average product, w_1, while, in the competitive situation, it is remunerated at its marginal product, w_2. It is evident from the graphical analysis above that $w_2<w_1$, $L_2<L_1$, and $w_2L_2<w_1L_1$. This is the argument given in Weitzman (1974) : the remuneration of the variable factor falls.

It deserves to be stressed that Weitzman's argument actually compares open access (OA) to private property (PP), i. e., the no-rent to the maximum-rent situation. With the help of the graphical analysis presented above, it is simple matter to extend the argument to unregulated common property (CP). Indeed, we already know that the remuneration to the variable factor, w(.), is higher under common property than under open access : w(CP)≥w(OA). From the above, it is evident that w(OA)>w(PP). Therefore, w(CP)>w(PP). The same relationship obtains when total income is considered since the rise in earnings accruing to each unit of the variable factor far exceeds the reduction of employment due to the shift from open access to common property.

As a result, "there may be a good reason for propertyless variable factor units to be against efficiency improving moves (...) like the introduction of property rights (...) unless they get a specific kickback in

one form or another." (Weitzman (1974), 234). It is indeed striking from Weitzman's proof that former resource users lose not only in terms of employment but also on account of reduced individual labour earnings.

CONCLUSIONS

The case of the property rights school for privatization of natural resources rests upon a number of crucial implicit assumptions. To the extent that most of these are not fulfilled in reality, privatization does not any more appear as a first-best solution that can automatically ensure an efficient use of the natural resources. Due to pervasive market imperfections and the crucial importance of equity considerations, other property regimes or regulated systems may be more appropriate in certain circumstances. There is no way of escaping the fact that economists need to assess the precise context in which tragedies of the commons occur before commending a particular property regime.

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