Environmental Problems under Socialism

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The Problem

For several decades, the degree to which socialism generates environmental problems has been a matter of controversy. Oskar Lange, writing in the 1930s, argued that socialism would do a much better job of accounting for all costs than capitalism; hence externalities would be minimized (Lange 1938). On the other hand, some scholars have argued that central planning and state ownership of the means of production do not necessarily prevent environmental degradation (Goldman 1972). However, with the collapse of the Soviet Union and the coming of democracy to Eastern Europe, information has flowed much more freely, and the extent of ecological disruption has become more widely known. As reports have accumulated, it has become clear that the environmental problems of these countries are large indeed.[1]

Children from the Upper Silesia area of Poland have been found to have five times more lead in their blood than children from Western European cities. Half of the children in that area suffer from pollution related illnesses (Maremont, Kapstein, and Schares 1990). Romania has no air pollution controls and in some areas horses are only allowed to stay for two or three years. "They have to be taken away, or else they will die," says Dr. Alexandru Balin, a physician in the Romanian town of Copsa Mica (Painton 1990, p. 40).

The worst air pollution is in the industrial corridor of the southern part of East Germany, across northern Czechoslovakia, and into

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[1]Although there are many sources that document the environmental crises of the ex-socialist countries, the most complete discussion to date is found in Feshbach and Friendly (1992).

southern Poland (Simons 1990). In this area a soft lignite coal with a high sulfur content is the main fuel source. In Leuna, in what was formerly East Germany, at any given time 60 percent of the population suffers from respiratory ailments (Charles 1990). Four out of five children in Espenhain develop chronic bronchitis or heart ailments by the age of seven (Painton 1990). In Telpice, a town in northwest Czechoslovakia, air pollution keeps children inside for about a third of the winter. In an attempt to preserve the children's health, school is held in cleaner towns six weeks a year (Maremont, Kapstein, and Schares 1990).

Water pollution has also been a significant problem in numerous Eastern European countries. Drinking water in Hungary is seriously contaminated with arsenic. Sewage treatment is nonexistent or very primitive in many large cities. Bulgarian agriculture suffers from heavy metals pollution through irrigation waters of much of its best farming regions (Maremont, Kapstein, and Schares 1990).

As deplorable as conditions are in Eastern Europe, the situation in the former Soviet Union is little better. Air and water pollution abound there also. Even more significant has been the massive alteration of two major bodies of water, Lake Baikal and the Aral Sea.

Lake Baikal, the largest and deepest fresh water lake on earth, had long been noted for its remarkably purity. The Lake Baikal basin is also home to over 1,200 fish and plant species not found elsewhere (Feshbach and Friendly 1992, p. 117). In 1957, Soviet planners decided paper mills should be located on the shores of Lake Baikal to take advantage of the surrounding forests and ample supply of clean water. Massive pollution resulted and significant deterioration of the lake occurred. The effluent from the pulp factory is discharged directly into the lake and has created a polluted zone 23 miles wide (Thompson 1989).

Even more dramatic has been the destruction of the Aral Sea. An enormous, shallow, body of water located in the south-central portion of the Soviet Union, it was once larger than any of the Great Lakes except Lake Superior (Micklin 1988). Shortly after the Communists came to power a decision was made that the Soviet Union should become self-sufficient in cotton production. This required massive diversions of irrigation water, and most of it has come from the two rivers that feed the Aral, the Amu Darya and the Syr Darya. The inflow to the Aral Sea has been reduced to almost nothing and as a consequence the Aral Sea has been decreasing rapidly in size. From 1960 to the present the area of the Aral Sea has diminished 40 percent and the volume 66 percent (Micklin 1988, p. 1170).

The exposure of enormous salt bottoms has resulted in devastating salt storms and, accompanied by dramatic climatic changes, has significantly changed the ecology of the entire region. Twenty of the 24 fish species native to the Aral Sea have disappeared and the annual fish catch, which employed 60,000 people in the 1950s, has been reduced to zero (Micklin 1988, p. 1172). The plight of the city of Muynak is typical: in the 1960s it was a thriving sea port and fishing center; now it is land locked and more than 40 miles from the Aral Sea (Hofheinz 1992). The Soviet government even shipped frozen fish 1,750 miles in an attempt to keep the processing plant open (Ellis 1990, p. 81).

It is evident that the ecological disasters of the Soviet Union and Eastern Europe are mind-boggling. Philip P. Micklin, a geography professor at Western Michigan University and a leading authority on the Aral Sea said, "I doubt if there has ever been an environmental problem of this magnitude" (Ellis 1990, p. 76). Another author has called Eastern Europe "the dirtiest, most degraded region on Earth" (Solomon 1990, p. A14).

But of course the question that is most pressing is why did the centrally planned economies do so poorly in providing for the environment? Why did industrialization and modernization bring so much more havoc than in other economies? In answering that question it is useful to review the development of modern economic theory as it applies to externalities.

Externalities in Modern Economic Theory

Arthur C. Pigou is generally credited with being the first to formalize the concept of an externality. Writing in 1912, he discussed how a factory would produce more than the optimal amount of smoke because of a divergence between private and social costs.[2] He expanded on this discussion in his *The Economics of Welfare* ([1920]1962, pp. 185–6), where he wrote:

> Corresponding to the above investments in which marginal private net product falls short of marginal social net product, there are a number of others, in which, owing to the technical difficulty of enforcing compensation for incidental disservices, marginal private net product is greater than marginal social net product. Thus, incidental uncharged disservices are rendered to third parties when the game-preserving activities of one occupier involve the overrunning of a neighboring occupier's land by rabbits—unless, indeed the two occupiers stand in the relation of landlord and tenant, so

[2]Pigou, *Wealth and Welfare* (1912).

> that compensation is given in an adjustment of the rent. They are rendered, again, when the owner of a site builds a factory there and so destroys a great part of the amenities of the neighboring sites; or, in a less degree, when he uses his site in such a way as to spoil the lighting of the houses opposite; or when he invests resources in erecting buildings in a crowded centre, which, by contracting the air space and the playing-room of the neighborhood, tend to injure the health and efficiency of the families living there.

Pigou's analysis has become so much a part of standard economic analysis that it is taught in almost all introductory classes. The concept of a divergence between social and private cost is also the basis of much public policy work, especially in environmental areas.

However, Ronald Coase (1960) enriched and corrected the Pigouvian framework by pointing out that in a world of well defined property rights and zero transaction costs exchange will eliminate externalities and insure that resources are allocated to their highest valued use. Thus, to use Pigou's example, if the game-preserver wanted to take actions that increased the rabbit population on a neighbor's land he could purchase the right to do so, if that right was held by the neighbor. On the other hand, if the game-preserver held the right to take actions that increased the rabbit population, the neighbor could compensate the game-preserver in order to prevent such an increase.

In such a world the actions that resulted would be socially optimal. If the game-preserver valued the increase in game more than the cost to the neighbor of the nuisance of more rabbits, he would either purchase the right to do so from the neighbor, or would not sell the right to prevent such an increase to the neighbor. On the other hand, if the neighbor found the cost of the rabbits to be greater than the value to the game-preserver of the increase in game, he would, depending on the initial allocation of rights, either purchase the right to be rabbit free, or not sell the right to increase the number of rabbits.

Note that Pigou understands the possibility of compensation in his description of the landlord tenant relationship, but fails to comprehend how property rights would produce the same situation even without a preexisting contract.

The Coasian approach shifts the externality discussion in that it removes us from the institutional vacuum that Pigou seems to operate in and thus causes one to focus on property rights and transaction costs. For public policy purposes it becomes important to see that rights are defined and that institutional barriers do not make transactions costs unduly high.

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A final important step in the analysis of externalities came with the recognition that property rights are not static, but develop in response to economic conditions.[3] As resources become more valuable it behooves people to expand effort on definition and enforcement activities. Such activity, when combined with Coasian exchange, can be an important element in the reduction of externalities.

For instance, in the United States when settlers moved West where water was scarce, the doctrine of prior appropriation evolved and replaced the riparian system that had dominated in the East. Under the riparian doctrine all owners of stream banks had co-equal rights to undiminished flows. Such a system made no allowance for diversion of water and had no provision for trading of rights. However, in the West diversion was an important use, but removing water from the stream reduced the water available for downstream users. Thus, under the riparian system the upstream diverter had no incentive to calculate the full costs of his actions and he imposed a negative externality on those downstream.

In response to this externality and to the increased value of water, a different system of rights developed. Under the new doctrine of prior appropriation, the first appropriator was granted exclusive right to the water and later appropriators' rights were conditioned on the prior rights of those who had gone before. Diversion was also permitted, and the exchange of water rights was allowed. Thus, a significant externality was eliminated.

Even in cases where high transaction costs prevent trades, efficient solutions of conflicts can emerge nevertheless. According to Bruce Yandle (1991, pp. 5–6):

> Common Law rules of liability, which can be traded using the vehicle of mutually agreeable contracts, and legal processes that provide damage payments may substitute for the actual trade of environmental rights in a world with positive transactions costs.

Thus, allowing common law liability rules to evolve has been a historically important way of solving externality problems. For instance, under such a system English Common Law assigned a right of liability to downstream users in the case of water pollution and thus required payment of damages when such pollution occurred (Yandle 1991, p. 16).

Externalities and the Centrally Planned Economy

The above synopsis of the development of externality and property rights theory yields useful insights into environmental problems

[3]For elaboration of this argument, see Demsetz (1967, pp. 347–49); Anderson and Hill (1975, pp. 163–79); and Umbeck (1981).

under central planning. Pigou's discussion of the divergence between private and social net product is particularly applicable and is more general than usually imagined. Although Pigou is mainly cited for his insights concerning negative spillovers such as smoke, it is clear that he is discussing any situation where a decisionmaker acts without taking full account of all costs and benefits. But such a description fits well the manager and the central planner in command economies. Not just environmental costs, but many other costs and benefits are ignored by the decisionmaker in these societies. In fact, one could describe such an institutional framework as one where Pigouvian externalities abound in every facet of life. However, since environmental problems are the focus of this paper it is useful to examine more closely central planning to see just how these types of externalities come about.

Incentive Problems

Much is external to those responsible for making decisions under socialism for two reasons: incentive problems and inadequate information. Incentives to act correctly are missing because of a lack of private property rights. Without property rights, it is virtually impossible to hold those who control resources accountable since they have no claim on changes in the value of the resource. Even when they ignore whole sets of costs their own welfare may be little altered.

For instance, it is very easy to allow political considerations to dominate economic choices, often to the detriment of the environment. In many cases, the overriding political imperative in socialist economies was increased industrial output, with little attention paid to accompanying air or water pollution (Goldman 1972, p. 64).[4] Since property rights are a mechanism for appropriately assigning costs, their absence meant planners could opt for increased physical output without having to compensate those who bore costs in the form of pollution.

Krakow, Poland is a prominent example for a decisionmaking process in which the crassest of political reasons were the guiding principles. This city is the location for a large steelwork whose effluent is

[4]One could also argue that preferences were such in these economies that the choices that were made were optimal; people simply preferred higher levels of pollution because they wanted the jobs and incomes that accompanied them. However, the fact that environmental concerns were at the heart of many of the first democracy movements in Eastern Europe would lead one to doubt this conclusion. Also, pollution levels in Eastern Europe are much higher at similar levels of industrialization and income than in Western Europe. It is not clear why preferences would be so radically different between the two regions.

doing enormous damage to the historic buildings and sculptures of the city. A journalist, Jon Thompson (1991, p. 44) reported:

> The next day, I met Stanislaw Juchnowicz, a distinguished-looking architect with spectacles and silver hair, president of the Polish Ecology Club. "Why," I asked him, "was a huge steelwork built next to a city of such historic importance?"
>
> *He paused, weighing his answer.* "*You must understand, it was* a political decision. There is no iron ore here, and we had very little industry. According to the theory of our communist masters, the wage-earning class was supposed to have a leading role in society. In the 1950's all the countries under communist rule underwent *massive industrialization. Krakow was a university town with* very few wage earners. Putting the steelworks here was a deliberate attempt to destroy the old order by creating a class of wage earners where none existed before."

In a system of private property rights, residual claimancy provides a means whereby decisionmakers cannot be oblivious of costs in taking actions like those described above. If one had to purchase all resources in the market place, it would be difficult to justify placing a steel plant in a particular location simply to alter the social structure of a city.

The general inefficiency of production under socialism is another indicator of the lack of incentives to prevent waste. Czechoslovakia consumes about three times the energy of the average western nation per unit of output (Bingham 1991, p. 101). In the former Soviet Republics manufacturing uses four times as much energy per unit of GNP as in the United States (Hofheinz 1992, p. 110). Chemical plants in the Soviet Union for many years emitted large amounts of a potent pollutant, fluorine, into the atmosphere (Komarov 1980, p. 92). Despite numerous studies by engineers that showed that the fluorine could be recovered at a profit and sold to other enterprises, the plant managers found it easier to continue to pollute. There was no effective system in place whereby a manager was rewarded for taking such cost reducing and environment improving actions.

Private rights are also a way of ensuring that those who control resources take account of the effect of present actions on future resource values. Since the price of a resource reflects the capitalized value of the future income stream from that resource the decision makers have every reason to take account of future effects of their actions.

However, under a system of central planning and state ownership, it is much more likely that the resource manager will be shortsighted. The lack of property rights means the decisionmakers are not penalized through decreases in the asset value when they ignore

future consequences of their actions. Boris Komarov (1980) provides the following examples for the Soviet Union:

> A. P. Kitaev, director of the Pakhvistnevski Logging Enterprise in Iaroslav Province, admits in passing that in the ten years he has worked there, the management has never questioned him about fulfillment of the plan for replanting seedlings, but only about the plan for fellings [p. 100].
>
> One sorry tale was the breeding of polar foxes on farms. Sorry, because to feed the voracious foxes, whales were killed, including, of course, very rare species, females, and the young. Harpooners easily distinguish authorized from prohibited species by their spout; but they are always paid for the number of carcasses, and there has never been a case in which a harpooner was punished for a mistake. They *are* punished for nonfulfillment of the plan [p. 123].

Finally, the lack of private property rights meant the legal system was ineffective in terms of stopping pollution. One of the features of private property is the ability to stop other people from taking actions that damage your property. The courts provide a means of redress when such actions are threatened or take place. However, under socialism the lack of private rights meant individuals could not use the system to prevent harm to property. Farmers in Bulgaria were well aware that heavy metals carried in irrigation water were lowering crop yields and that the sources of the pollution were readily identifiable. However, with no property rights the farmers had no actionable claim against those causing the problem.

Likewise, despite numerous laws designed to prevent pollution, factory managers had little incentive to install pollution control measures. In certain cases fines were levied against the factory, but the manager was allowed to include these fines in his budget allocation from the central ministry. The fact that power and law were in the same hands meant that there was little chance of redress through the legal system. One part of the state would have been suing another arm of the state, with that same state deciding the case.

It is also important to note that the incentive system under socialism discouraged diversity. People who had divergent preferences or opinions about resource use found it difficult to act on their desires. Minority viewpoints are seldom recognized under central planning and this was certainly the case in the area of ecological concerns. Under a system of private rights, an individual who believes a resource is being over-exploited has only to convince the resource owner to sell it; then that individual can preserve it as he wishes. However, no such allowance for divergent preferences exists when resources are under political control. It is essentially a "winner takes

all" system. Since the prevailing sentiment of those in power in Communist regimes favored forced industrialization and the rapid use of resources, that position dominated all decisions.

Information Problems

The argument that socialism suffers from a badly structured incentive system is a powerful one. However, environmental problems resulted from bad information as well as from poor incentives. Even if resource managers would have wanted to behave in an ecologically responsible manner they would have found it difficult to do so because of the low quality of information they had to work with.

Prices represent an efficient network for consolidating information and providing rapid feedback to decisionmakers. However, such an information flow depends upon private property rights, because prices represent bids and offers to take actions with regard to property. Only when the decisionmaker faces the true opportunity costs of his actions do prices reflect economic reality. Since property rights are not fully defined and enforced in most market economies, prices do not always convey completely accurate information. Pigouvian externalities do exist. However, such occurrences represent aberrations, and most of the time people act on reasonably good information under these systems. However, under central planning and with state ownership of property exactly the opposite is the case; prices that accurately reflect reality are aberrations. Also, there is no feedback mechanism by which prices are adjusted so they become more accurate. In the face of such an information blackout, it is not surprising that environmentally unsound decisions dominate.

The difficulty of securing accurate information is illustrated by two examples from Bulgaria. In the winter of 1991 I visited a large shipyard in Varna. When questioned about the possibilities for privatizing the facilities the manager assured me his operation would be easy to sell off because it consistently showed a profit. However, in a private conversation, another official pointed out that the shipyard was allocated its steel at a price that was one third of the world price. Thus, the manager had no sound basis for making his judgments about profitability.

In a similar vein, Bulgaria has long been a leading producer of forklifts for the world market. Seen as one of the successes in a sea of failures, its forklift factory is an important source of foreign earnings and national pride. Lead is an important material in forklift production and is produced in the town of Kardszhali. However, the smelter is also causing massive health problems to area residents. By U.S. standards all of the children of the town have dangerously

high concentrations of lead in their blood. Because of the importance of the lead manufacture to the forklift industry, however, officials have been reluctant to close down the lead and zinc complex.

It would seem that the traditional conflict between jobs, economic growth, and environmental quality is at play here. However, recent evidence indicates that the Ministry of Industry supplies lead and zinc to the forklift industry at one quarter of world prices (Harden 1990). Thus, it may well be that no conflict exists. An industry that is heavily subsidized and a net loser for the economy is also responsible for enormous environmental costs.

The lack of accurate prices is also reflected in other ways. There is no differential rent system in most communist countries; land and timber close to population centers are priced the same as more distant resources, despite the fact that the closer land has a higher amenity value. Therefore, in making their calculations of which resources to exploit first, planners have no incentive to use the more distant ones. As a consequence, forests in the vicinity of major population centers are rapidly harvested, while others further removed are left unharvested (Goldman 1972, p. 169).

Not only is information of poor quality under socialism, there is also little mechanism for improving it. Resource managers are seldom rewarded for generating good information nor are they punished for conveying poor information. Therefore mistakes are slow to be corrected. Komarov (1980) reports that a state farm close to the Crab Lakes in the Soviet Union was mandated to fulfill a reclamation plan. Several of the lakes were drained, but according to Komarov (pp. 51–52):

> The draining of silty shallows added not a single hectare of new meadowland to the state farm. It was known beforehand that this would be the case, and the farm probably didn't even need the land. In what other economy would it be possible to squander thousands of rubles digging drainage canals and destroying lakes when it was known beforehand that no one would benefit at all from it?

Although prices are a crucial source of information, they are not the only one that is important to maintaining ecological integrity. The role of the press can be instrumental in making people aware of major environmental disruptions and identifying those responsible. However, a free press depends on private property rights. It is the opportunity to purchase newsprint, rent production facilities and hire reporters without state approval that gives the press its freedom. The fact that all property was state owned in socialist economies

meant the press played no role in monitoring the environment and holding responsible those who despoiled it.

When the Chernobyl accident occurred in the Soviet Union and the nuclear cloud was headed for Bulgaria the top government officials secreted themselves away in special shelters with ample supplies of food and water. Bulgarian citizens, however were not even informed that the disruption had happened and continued to eat contaminated fruit and vegetables.

In Czechoslovakia the government had data concerning the amount of sulfur dioxide in the air in different regions but kept it secret (Dickman 1990). Scientists in East Germany also generated detailed information on pollution levels and types but that was also not made available to the general population (Charles 1990). In Bulgaria it was a crime to publish scientific findings about industrial pollution (Harden 1990).

Finally, information was significantly biased because of ideological considerations. The labor theory of value, a major component of Marxist ideology, holds that cost is determined by the amount of labor invested in producing an item. Since natural resources exist without any such investment it would violate Marxist ideology to charge a price for water, land, or minerals. Thus, it is not surprising that overuse of these resources occurs. When the basic water law was passed for the Soviet Union in 1970 a leading jurist said:

> The principle of using water resources permanently and without charge is inherent in the law of water use in the USSR. Natural reserves of water are always allotted for use without charge and in the overwhelming majority of cases for an indefinite period of time [Goldman 1972, p. 40].

Lack of Exchange Solutions

I have argued above that Pigouvian externalities abound in socialist economies and that they are responsible for much of the environmental disruption that has occurred. But, as Coase (1960) has pointed out, many potential externalities are resolved through exchange. However, not only does socialism ensure that externalities will occur, it also puts significant barriers in the way of their resolution through exchange. Of course, the fact that property rights are not allowed to formally exist means exchange is limited. Nevertheless, quasi-rights do evolve, and they could be exchanged if the system allowed.

One author has suggested that in the Soviet Union "ruling class control constitutes a set of de facto property rights over the goods of the economy" (Schap 1988, p. 393). Those property rights exist because managers and ministry officials have decisionmaking authority.

However, central planning mitigates against exchange relationships among ministries or production units. Therefore, the potential for externalities to be resolved through contracts is lessened because of high transaction costs.

For instance, in the Georgian Republic in the Soviet Union, contractors avail themselves of large amounts of sand from the Black Sea beaches. These make for a cheap source of materials for concrete, and, because the beaches are state property, no one can formally object. However, such actions have had a serious impact on the value of waterfront property. As early as 1960 it was estimated that Soviet Black Sea beaches had shrunk by 50 percent, and resort hotels have collapsed (Goldman 1972, pp. 158–59). The ministry in charge of resorts has, of course, had the value of its quasi-property rights significantly diminished. However, even if the loss to that ministry is greater than the gain to the ministry that controls construction, and hence is responsible for using up the beaches, there is no formal mechanism by which the appropriate officials can enter into a mutually profitable exchange.

A similar situation has occurred with the building of dams for hydroelectric projects and the diversion of water for irrigation. In many cases these projects have had a serious impact on fishing or on farmland.[5] Again, de facto property rights do exist in many of these situations, especially on the state and cooperative farms. The farm workers and managers control the resources to a certain extent and have some degree of residual claimancy. However, even when the potential loss to the farm or to the fishery far exceeds the gains from the water project, no exchange is possible that would allow the resolution of the conflict. Neither can the farms (or the Ministry of Agriculture) compensate the water developers in order to stop the projects, nor can they demand compensation if the projects go forward.

A similar situation occurs when farm land suffers from pollution. In Bulgaria over 70 percent of the land suitable for farming has been affected by industrial pollution, much of it carried by irrigation water (Harden 1990). Again, those who operate the cooperative farms are very much aware that their property has been dealt a severe blow. However, high transaction costs keep them from entering into an exchange to resolve the problem.

[5]See, for instance, Ellis (1990), Micklin (1988), Goldman (1972, p. 65), and Komarov (1980, p. 57).

No Evolution of Property Rights

The final area which causes environmental problems under socialism is the lack of a mechanism by which property rights can evolve. As countries industrialize certain resources become more scarce, particularly clean air and water. Since defining and enforcing property rights is very much an economic activity, it does not necessarily pay to invest in such activity when resources are not scarce. However, with increasing scarcity individuals will find it worthwhile to make such investments and property rights will develop.[6]

Centrally planned economies have no mechanism for such development and state ownership of property usually means that a rigid system of rights exists. Hence, even though certain resources become more valuable over time no evolution of rights occurs. In the case of the Black Sea beaches discussed above, it is not clear that formal property rights existed to all of the waterfront prior to the Communist revolution of 1917. However, in an economy where entrepreneurial initiative and freedom of contract were allowed, one can be assured that rights to that property would have developed as beaches became more valuable.

Likewise, in the case of the Aral Sea fishing rights were largely a matter of historical precedent. However, as those rights became more valuable, pressure would have led to formalization and codification. Under an evolutionary legal structure like the Common Law, actionable claims would have come into being and would have offered the Aral fishermen either legal redress or the opportunity for market exchange when massive irrigation projects threatened their livelihood.

Conclusion

It is not surprising that socialist economies have experienced significant environmental problems. The structure of incentives and information under socialism ensures the existence of a multitude of classical Pigouvian externalities. The lack of well-defined property rights and the existence of artificially high transaction costs mean that Coasian exchange cannot function to resolve conflicts when the use of a resource affects the value of another resource. Socialist economies also have rigid systems that do not allow property rights to develop in response to changing values. All of these elements mean that ecological disruption is likely, and the record amply testifies to the truth of that conclusion.

[6]For a more complete discussion of this concept as applied to environmental problems, see Anderson and Leal (1991).

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