THE CASE AGAINST FREE MARKET ENVIRONMENTALISM

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Introduction

There are certain social tasks which the market generally tends to fulfill. It co-ordinates decisions of widely dispersed individuals and enterprises without demanding endless hours of negotiations. It provides individuals with the opportunity to express their economic preferences in a direct fashion (subject, of course, to income constraints). It provides enterprises with incentives to produce quality goods at low costs, and to search for new innovations. Defenders of free market environmentalism (henceforth "FME") hold that it fulfills one further task as well. In their view unregulated free markets provide the best hope for avoiding environmental crises.

Before we turn to the arguments for and against this position, we should take a moment to consider the policy implications of FME in order to find out exactly what is at stake. I have handed out a sheet consisting of some of the regulations and programs that are ruled out by FME. If you believe that any of the sorts of things listed on this sheet are good ideas, then you cannot accept FME.

I. The General Libertarian Argument for FME

Libertarianism is the social philosophy that holds that the best society is one where state activity is limited to protecting against force and fraud, with all other matters left to voluntary agreements in the marketplace. If one holds this general view, then FME follows at once. And so any argument for libertarianism provides an argument for FME as well. The standard argument for libertarianism begins with the claim that the negative right to liberty, that is the right to do as we wish as long as we do not engage in force or fraud against others, is a moral absolute. From this the conclusion is derived that the right to use our property as we wish

without interference from the state is also a moral absolute.

Since we are here to discuss environmental matters I do not wish to spend much time on this argument. But I would like to make three brief comments. First, libertarianism contradicts most people's moral intuitions. Imagine two people, one with a net worth of $3 billion, the other homeless and about to die from malnutrition. Libertarianism holds that it is immoral to tax the former person $1 to provide protein for the latter person. Most people would not accept this conclusion. Second, libertarianism rests on an extreme form of individualism, in which social relations are external to individuals. This social atomism is very questionable. Third, there are reasons to think that the libertarian model may be internally incoherent. It is based on capitalist markets, but the functioning of capitalist markets demands state action beyond protecting against force and fraud.

Perhaps we can return to these points in the discussion period. But now it is time to turn to the main arguments for FME that refer specifically to environmental matters. These arguments are taken from Anderson and Leal's recent book, Free Market Environmentalism.[i]

II. The Tragedy of the Commons Argument for FME

A. The Argument

If an aggregate of individuals has access to some asset in common without any system of private property rights to structure that access, then each individual will tend to use an excessive amount of that asset. Lack of individual property rights, then, leads to a result that is collectively irrational, the rapid depletion of the common asset. Whether we are talking about a piece of land, a body of water, the earth's atmosphere, or a plant or animal species, if something is used in common, then no individual has a motivation to preserve the thing in question. Environmental crises are the inevitable result. (Hardin)

If this is the diagnosis, the cure follows at once: private property rights and the scope of markets should be extended further. For an individual who privately owns something has a

rational self-interest in the preservation of that thing. Private property rights to land, water, the atmosphere, species, and so on, ought to be created whenever possible. (3, 15, 121)

B. Some Criticisms

In making this argument defenders of FME assume that private property rights lead owners to use their property in an environmentally sound fashion.[ii] Unfortunately capitalist markets work in a way that prevents us from assuming this.[iii]

Consider a family farm that has stayed in a particular family for many generations. We can assume that the owners hope that they will be able to leave their farm to their children in a good condition. But economic pressures may lead them to engage in practices that undermine this hope. Suppose that the prices of agricultural inputs have risen significantly while the prices of farm commodities have declined, resulting in a high level of farm debt. In this case a farmer may be forced to attempt to increase production in order to avoid being foreclosed. The farmer may know that intensified production is not an environmentally sound practice in the long run. But economic pressures can prevent action in the here-and-now from being based on a long-term perspective. In periods of economic decline this sort of pressure may be quite strong throughout the economy.

Even if particular enterprises are not threatened by bankruptcy, a tension between short-term economic imperatives and long-term environmental interests can still arise. If significant numbers of investors are willing to dump stocks whose quarterly performance disappoints them, corporations come under intense pressure to maintain their quarterly earnings. This short-term pressure may lead these corporations to neglect long-term investments, including those that would protect the firm's assets from environmental damage.[iv] Also, capital accumulated in one region need not be reinvested in that same area; if returns are greater elsewhere there is a great likelihood that it will not be reinvested in the first area. This too undermines the assumption that property holders refrain from subjecting their property to environmental degradation.

Let me present two scenarios to make this last point clearer. In the first case, at some time T1 an investment of $100 is made in a production facility located on a specific area of land. The owners wish to preserve the value of this land, so they spend $25 installing safeguards to protect against environmental damage. By T2 let us suppose the firm has made $75 profit from its investment. At this point a new investment opportunity opens up that the owners estimate to be extremely promising. They are able to sell the land for the $100 they paid for it, which together with the $75 profit gives them $175 to invest in the new opportunity.

In the second case everything is the same except that the firm does not invest in the environmental safeguards. As a result, the land is not as valuable at T2 as it was at T1. When the owners come to sell it they are only able to obtain $85. But they have made greater profits in the period between T1 and T2 as a result of lower costs. Their profit is $100 instead of the $75 they would have received had they invested in the environmental safeguards. Together with the $85 they received from the sale of the land, they now have $185 to invest in the new opportunity, placing them in a better position than in the first case.

Of course if the costs of the environmental safeguards were less, or if failure to install the safeguards resulted in a greater loss of real estate value, then the firm in the first scenario might end up in the better position. But that is precisely my point. There is no invisible hand operating here that ensures that environmentally sound practices will be employed just because property rights are in private hands. Self-interested economic agents will calculate the costs of environmentally benign practices over against the costs they will incur if they do not institute those practices. If they estimate the former to exceed the latter, environmentally sound practices will tend to be ignored. The owners of capital make investments in order to attain a return within a given unit of time. The key question for capitalist investors is not "What will the physical condition of my holdings be at time T2?" but instead "How much capital will I have accumulated by T2?" If considerable amounts of capital can be accumulated at the cost of harming their

holdings, this is of little concern as long as attractive investment opportunities are available elsewhere.[v] (Walker)

III. The Externalities Argument for FME

A. The Argument

Competition forces capitalist firms to search constantly for ways to lower their internal costs, that is, the costs they must pay out of their own pocket. However if the costs of environmental harm are dispersed onto society as a whole, the market may give polluters a disincentive to minimize those costs. Imagine that an individual firm has to decide whether to install costly pollution control equipment. If its competitors install this equipment and it does not, then its costs will be lower, everything else being equal. It will enjoy a competitive edge. If the firm's competitors do not install the equipment while the firm in question does, then these competitors will have lower costs, giving them a market advantage. And so the rational decision for any given firm is to refrain from purchasing the pollution control equipment.

If the underlying problem here is the failure of firms to take social costs into account, then the obvious solution is to force polluters to internalize the costs of pollution. Defenders of FME argue that this can be done through the extension of property rights and the enforcement of strong liability laws. (87, 139) If environmental harms are inflicted on property then, the owners of this property will be able to sue polluters for damages. This gives polluters a clear incentive to reduce pollution in the future.

B. Some Criticisms

Defenders of FME are quite correct to condemn any weakening of liability laws. But there are a number of problems with this approach that must be considered as well.

For one thing, defenders of FME claim that their approach would diffuse social conflicts by eliminating the zero sum game in which industrialists and environmentalists waste resources lobbying government officials. (8, 59, 84, 92, 95) It now appears that these conflicts are simply

displaced from the administrative and legislative apparatus of the state to the judicial apparatus. As Robert Kuttner wrote in Business Week, "the flip side of rugged individualism and weak government is endless lawsuits." (Kutter 16)

Another difficulty raises the issues of class and race. While the legal system in principle offers equal protections to all, this may not always be the case. Suppose that a firm with a vast army of well paid corporate lawyers engages in polluting activities that inflict damages on a poor household. One would have to be quite naive to believe that in these circumstances the legal system can be relied upon to ensure that the firms in question internalize the costs of their damaging practices. It is worth noting that a U.S. General Accounting Office study documented that three out of four off-site commercial hazardous waste landfills were located in predominately African American communities, even though African Americans represented only 20% of the people in the region. One reason for this is surely that these communities are less likely to afford adequate legal representation.

A similar problem arises when it is possible for wavers to be signed that release a firm from liability. Suppose a corporation announces that it will invest in a region with a high level of unemployment. It then selects its workforce. At the last minute it informs these people that it will shift its investment elsewhere unless they agree to sign a form waiving the corporation of any responsibility for damages that may occur as a result of exposure to toxins at the workplace. Desperate for jobs, the workers sign the wavers. Here too the liability system breaks down as a mechanism for ensuring that corporations internalize the costs of their environmentally damaging practices. And FME rules out the possibility of these workers organizing themselves politically and attempting to force the state to pass legislation limiting their exposure to toxic chemicals.

Another relevant issue has to do with the complexity of the world. Liability laws work best in cases where tracing the causal chain of events is a relatively simple matter: individual or firm w engaged in practice x that inflicted harm y on individual or firm z. Unfortunately the

world in which we live is not always so simple. In many cases there are a variety of individual firms engaging in a multiplicity of practices that may - or may not - have had a causal role in bringing about harm y. The greater the number of plausible causal stories, the more difficult it is to legally establish the liability of any particular individual or firm for the harm in question.[vi] At this point property rights and liability laws cannot be relied upon to ensure that the costs of pollution are all internalized by the polluting individuals and firms.[vii]

Finally, even if all of the above difficulties are overlooked one insuperable problem remains. The FME argument, once again, was that environmental harm can be minimized if those upon whom the harm is inflicted have enforceable property rights allowing them to sue polluters. But unsound environmental practices can inflict harm on future generations. Future generations cannot sue in court today. While not all corporations have a time perspective limited to the next quarterly report, no corporation takes into account costs for which it may be liable in five or six generations. And so even if the liability system were to work faultlessly, it would still fail to force polluters to internalize all of the costs of their polluting activities. In brief, Anderson and Leal's claim that "When property rights can be clearly defined and enforced, there is willing consent and compensation and pollution problems disappear" (136) simply does not hold.[viii]

IV. The Proper Trade-Offs Argument for FME

A. The Argument

Both the costs of environmental safeguards and the value of the benefits resulting from these safeguards shift with changes in technology, income levels, and subjective values. Defenders of FME insist that decisions here should be left to economic agents who can flexibly adjust to these shifts. Only they will be in a position to determine the proper trade-off between the benefits and the costs of environmental protections. This requires an extension of property rights and market transactions. For in their view only market prices provide an "objective measure" of both benefits and costs. (18)

If, for example, farmers cannot prevent fishermen and women from using streams bordering their farms, these fishermen and women benefit without having to incur any costs connected with maintaining the fish population. And farmers have to decide whether to incur the expenses necessary to ensure that these streams are well stocked with fish without the possibility of receiving any financial return later. However if these same farmers were given private rights to these streams, they could exclude all fishermen and women not willing to pay them a fee. The possibility of collecting these fees would create a powerful incentive for them to ensure an adequate habitat for fish populations whenever the benefits of doing so outweighed the costs.[ix] (108-09)

Another sort of case illustrating this dynamic concerns the relationship between environmental groups and land developers. If the former are in a position to benefit from environmentally sound practices without having to bear any of the costs of those practices, then they are likely to ignore these costs when they formulate their demands. In a market context, in contrast, if an environmental group wishes to purchase lands from property owners and keep the lands in their pristine condition, they are free to do so. They must, however, take into account the costs of doing so, both the cost of compensating the present owners and the opportunity costs they themselves face when the land is kept out of development. (3, 90-94, 110)

B. Some Criticisms

Assigning a market price to certain sorts of costs is fairly straightforward, for instance, the costs of maintaining wildlife habitat or investing in pollution control equipment. Assigning a market price to certain sorts of benefits is also relatively easy; the benefits to fishermen and women can be measured by the fees they are willing to pay for access to streams. But if we are to hold that market prices provide an "objective measure" of environmental costs and benefits it must be possible to measure all (or nearly all) of these costs and benefits in market prices. And this cannot be done.

* There is no practical way of charging a price for the aesthetic pleasure of seeing a beautiful mountainside from the distance. (20)

* There is no straightforward way to put a price tag on the sense of well-being that someone who has never visited the wilderness feels simply from knowing that it is there.[x]

* There is in principle no way to measure in present price terms the future costs of today's environmental practices (e.g. the costs of species extinction[xi], acid rain, or accidents resulting from the storage of nuclear wastes), given the inherent uncertainty of the effects of these practices, the speed at which they will occur, future technological developments, and so on.[xii]

* Given the uncertainty of technological developments, present market prices do not reflect the benefits wild species may have in the future as a source of food crops, pharmaceuticals, fiber, etc.

* What is the market price of the emotional feeling that comes from seeing the sun as a source of life and warmth instead of as a deadly enemy?

* If environmental regulations save or extend human lives, how can that benefit be assigned an unequivocal market price? Is it the price an individual can afford to pay for life insurance? Is it a function of the wages the labor market would provide for someone performing a specific type of work?[xiii] And how much should we add to compensate for the emotional loss of a spouse? A parent? A friend? A distant acquaintance?

My point is not that prices cannot be assigned to such matters, but that these prices cannot claim to be an "objective measure" of anything. If only some of the costs and benefits of environmental practices can be easily put in price terms, then cost/benefit analyses in market price terms has an inherent bias. Certain costs and certain benefits will tend to be stressed, while others will tend to be ignored.[xiv]

There is a second area where a potential divergence between market demands and

ecological demands arises. Anderson and Leal implicitly assume that if the benefits of preserving the ecosystem of a particular region outweigh the costs, then agents wishing to preserve that region will be able to outbid all others. Anderson and Leal attempt to justify this assumption by reporting cases where groups like the Nature Conservancy Fund has been able to purchase land in order to take it out of development. They also point out that the major environmental groups in the U.S. together have $414,607,984 in funds that in principle could be used in this fashion. (94)

They do not mention that the Irvine Company alone owns land in areas south of Los Angeles whose value has been estimated to be in excess of $10 billion. (Davis 132) Assuming this figure is in the right ballpark, then even if all of the major environmental groups in the U.S. pooled their entire resources together in order to prevent the environmental problems besetting Los Angeles (traffic jams, smog, noise, soil erosion, water shortages, etc.) from spreading south, they would still be $9,585,392,016 short of being able to purchase the holdings of just a single landholder in Southern California. Only giant land developers have access to this sort of capital, developers who have shown themselves to be completely indifferent to the spread of the environmental problems listed above.[xv]

Anderson and Leal assume that if market prices are not used to determine the costs and benefits of environmental "amenities," the only alternatives are to ignore the question of costs and benefits altogether or to hand over the determination of costs and benefits to impartial "experts." (12) While cost/benefit analysis is not the ultimate standard in environmental questions (see below), it ought not to be disregarded altogether. Nor should it be left to so-called experts. The reliance on market prices to evaluate costs and benefits, and the turn to technical experts to measure costs and benefits, both have one thing in common. They are both attempts to depoliticize environmental debates through reliance on some "objective measure." This is a fantasy. Defining and weighing costs and benefits are inherently political matters. Cost/benefit

analysis has an important role to play in environmental disputes. But this role is one of making the political commitments and factual assumptions of the contending positions explicit. It is not one of eliminating politics from the discussion. (Shrader-Frechette)

V. FME and the State

Defenders of FME always have one last card to play against their critics: whatever environmental problems may arise in the market, there are no reasons to think the state can do a better job. For one thing, state officials are not altruistic angels devoting their lives to the selfless pursuit of the common good. State bureaucrats have particular interests of their own that they pursue. They may, for instance, strive to enhance their power and status within the bureaucracy by increasing their budgets. If expensive development projects on publicly owned lands are the best way to do this, they will favor such projects even when they are not environmentally sound. (54) Or enhancing their power and status may require that they respond to pressures placed on them by special interest groups. This can lead either to too little or too much environmental protection. (14-16) Anderson and Leal point out how the political strength of an "iron triangle" of politicians, state bureaucrats, and farmers has led government agencies to provide massive state subsidies for irrigation projects on Western lands. With their costs subsidized farmers put more land into cultivation than they would otherwise do, at great environmental cost.[xvi] (56) On the other hand, when environmental groups become politically powerful, they may lobby successfully for restrictions on economic activity, even when that activity is environmentally sound.[xvii]

The second difficulty with relying on the state to resolve environmental problems is that state officials are not forced to weigh the costs and benefits of their policies. (14) If intensive lobbying by environmental groups leads state bureaucrats to rule out certain forms of economic development, these officials do not themselves have to pay the opportunity costs of the foregone development. (83) Or if proposed environmental regulations disperse the costs of these

regulations over the citizen body as a whole, then the path of least resistance for state bureaucrats may be to institute such regulations, even if these costs in total exceed the benefits to be won.[xviii] Anderson and Leal conclude that the proper role of government is to define and enforce transferrable property rights. Then it should get out of the way.

B. Some Criticisms

Anderson and Leal are certainly correct that the state's environmental record has often been nothing short of horrific. State officials have all too often been swayed by the influence of private interest groups when formulating environmental policies,[xix] and they have all too often failed to consider the costs of policies prior to instituting them.[xx] But before we adopt the FME perspective we should examine a number of points Anderson and Leal fail to consider.

Anderson and Leal appear to have a double standard when they contrast the market and the state. While they stress the ability of the market to evolve in the face of new challenges, their view of the state is static: state officials always and everywhere pursue their private interests; there is always and everywhere a likelihood that state agencies will be "captured" by outside interest groups. (14-17) This overlooks the obvious fact that a wide variety of different state forms are possible. In some of these state forms the above dangers are all but inevitable; in others the possibility exists that they can be held in check.

Forms of the state where state officials are not accountable to the public, where state policies are formulated behind closed doors, are most likely to be described in the terms used by Anderson and Leal. In contrast, the more state policy formation is subject to public scrutiny the less likely this is. Anderson and Leal spend no time whatsoever trying to imagine ways to democratize the state in order to protect against the possibility of state policy being dictated by a coalition of state officials and the most powerful private interest groups. Ideas to be considered here include eliminating PAC funding, making government documents easily available, establishing "citizen sabbaticals" where citizens would have a right to paid leave to study policy

matters, abolishing the conflict of interests in which agencies in charge of regulating certain industries are also engaged in promoting them, dismantling the "revolving door" in which individuals move from regulated industries to regulating agencies and back, and so on.

Turning to the question of cost/benefit analysis and the state, the first point regards the limits of cost/benefit analysis. Throughout their work Anderson and Leal employ the phrase "environmental amenities" in sharp contrast to "property rights." Anderson and Leal assume that their categorizations of certain things as amenities and certain others as rights is obvious and uncontroversial. It is neither.

Almost all moral philosophers grant that human beings have a right to life. Using this as a starting point a number of moral philosophers have derived the right to a livable environment. (Velasquez 237-40) If this is accepted the terms of the discussion change completely. The reduction of smog, noise, exposure to toxins, and so on, are not "amenities," but things to which citizens have a right, and the government has the duty to ensure that this right is protected. In circumstances of economic duress the costs of enforcing a right may be so great that the state must refrain from doing so. (Rawls, 63) But otherwise the enforcement of a right ought not be contingent upon the outcome of cost/benefit analysis - an outcome that, as we have seen, inevitably involves a subjective element.[xxi]

A second point is that when Anderson and Leal discuss the costs of state environmental regulations they do so in a static fashion, concentrating on the costs involved at the time the regulations are imposed. But regulations set off an extended process of technical innovation. Regulations phasing out the use of deadly toxins encourage the search for substitutes. Efficiency standards ensure a market for the more efficient products, thereby providing a spur to product innovations. As these sorts of technical changes occur, the costs of using fewer toxins and the costs of producing more efficient products declines significantly, while the benefits of these practices remain high. From this dynamic perspective the case against state regulatory activity

made by defenders of FME loses much of its force.

Conclusion

The final point I would like to make also refers to technology policy. Defenders of FME present a picture of the economy in which markets develop on their own simply as a result of decisions made by individual economic agents. This picture is a myth that bears little correspondence to actually existing markets. The logic of market competition generates a tendency for firms to underinvest in risky new technologies, in basic research that may not have any commercial application for many years, and in basic research that provides important background information without itself ever having direct commercial application. (Shonfield) As a result of the tendency for the market to allocate inadequate investment in these crucial areas, countries committed to technological advance have without exception instituted state technology policies.

The United States has been no exception. Since World War II federal expenditures have financed between one-half and two-thirds of total R&D. The federal government's financing of basic research has been even more dominant, representing over two-thirds of total basic research spending. The main thrust of U.S. technology policy has targeted military technologies developed by firms in the aerospace, communications, and electronics industries. (Markusen and Yudken) These firms have had much of their basic research subsidized with public monies, and the government has also stepped in and provided markets for crucial technologies when there were no markets for them in the commercial sector.[xxii] The development of jet aircraft, artificial intelligence, superfast parallel-processing computers, semiconductors, Very High Speed Integrated Circuits, hypersonic aircraft technology, high-performance turbine engines, advanced composite materials, x-ray lithography, high definition television, machine tools, optoelectronics, computer-based manufacturing technologies, and micromachines are just a few examples of crucial technologies whose development has been subsidized with public funds.[xxiii]

Market imperfections make it inevitable that the state will have some sort of technology policy. But nothing makes a militarized technology policy inevitable.[xxiv] Publicly funded R&D programs that aim to develop manufacturing processes that are nontoxic to workers and pollution-free are also possible, as are programs addressing solid waste disposal, alternative sources of energy, environmental clean-ups, and so on. Within the FME framework it is not possible to conceive either the general need for a technology policy nor the desirability of an environmentalist technology policy in specific. In my opinion this is not the least of the reasons why FME is unacceptable.

NOTES

i. Page references not otherwise attributed are to this work.

ii. Unless, of course, the state interferes by providing incentives to ignore sustainability, for instance water subsidies that encourage farmers to exhaust their soil.

iii. The tragedy of the commons argument also is bad anthropology. There are many cases in history where access to common property was regulated by the community such that overuse did not occur.

iv. On the general issue of how short-term financial pressures force firms to neglect long-term investments, see Dertouzos, et. al.

v. Anderson and Leal themselves come close to acknowledging this point on p. 42. They note that if timber prices are not rising at the prevailing interest rate, it will be profitable for timber owners to liquidate trees at the fastest rate possible, investing the returns elsewhere. They fail to mention that this admission undercuts the claim that private property rights and sound environmental practices go hand-in-hand.

vi. Consider the case of smog occurring in urban areas as a result of excessive development. Who has created this situation? An individual developer? A set of developers? All developers in the area? An individual home buyer, a set of home buyers, or all home buyers together? An individual automobile owner, a set of auto owners, or all auto owners? I do not see how waiting for technical advances that bring down the costs of assigning property rights is going to be of much help here.

vii. Anderson and Leal themselves admit this point, and concede that they have no response to it. They grant concede that in these circumstances utilitarian arguments in favor of governmental regulations trump the argument for FME. (140) However they write as if these were relatively

unusual circumstances that do not occur often enough to call the entire framework of FME into question. Given the prevalence of complex causal chains in the world, this is a very questionable assumption.

viii. One last issue here: the externalities argument seems to assume that all environmental damages can be compensated for after they have occurred. But what if the damage in question is irreversible? In this case, a monetary award to the plaintiff may compensate the plaintiff for any economic losses he or she might face as a result of the environmental damage, but it does not remove the environmental damage itself.

ix. Anderson and Leal insist that relying on the state to provide environmental amenities often creates a disincentive for environmentally sound practices in the private sector. If hunting and fishing opportunities are provided on state-owned lands at little or no cost, private land holders will not be able to compete. They therefore will have less incentive to ensure that fish and animal populations are thriving, and more incentive to turn to economic pursuits that threaten fish and wildlife habitat. (62, 68)

x. Surveys can ask people to estimate in price terms the value these sorts of things have to them. I believe that such benefits are real and must be taken into account in cost/benefit analysis. But as Anderson and Leal note, the results can hardly be taken as market prices. (26) Their solution here is apparently to disregard such benefits entirely. This in effect concedes that market prices do not accurately capture environmental benefits.

xi. Anderson and Leal seem to assume that the set of commodities for which a market price is assigned (e.g. fish) includes the set of entities crucial for the reproduction of the ecosystem. They Nowhere do they even begin to formulate such an argument. They do mention is that if a species

that once had economic value as a commodity loses that value, property holders will become completely indifferent to its survival. (32) They do not ask whether this sort of dynamic undermines the claim that market prices provide an "objective measure" for weighing environmental costs and benefits.

It is difficult to see how an argument of the sort required could ever be plausibly constructed. The assumption we are considering is equivalent to the assumption that the system of commodity exchange could be extended to incorporate the entire biosystem. But the ontological reality is that economic systems are embedded within the biosystem. Once this is accepted, there are strong ontological reasons for questioning whether the imperatives of commodity circulation and capital accumulation necessarily coincide with the imperatives of biosystem reproduction. There is no reason to assume that all entities with ecological value necessarily have economic value as well. If this is the case property rights and market transactions alone cannot be counted on to fulfill biosystem imperatives.

xii. Economists often try to avoid this point by reducing uncertainty to risks with known probabilities of occurring. But probabilities cannot be assigned to the effects of species extinction, acid rain, accidents resulting from the storage of nuclear waste, and so on.

xiii. In a Resources for the Future cost/benefit study of the 1990 amendments to the Clean Air Act the value of lives was measured as a function of the wage premium coal miners, police, and other workers receive in return for facing dangerous conditions. As John Miller comments, "A life, by most noneconomists' measures, is worth more than the wages necessary to attract workers with few alternatives into dangerous working conditions." (Miller 8)

xiv. Consider the following passage:

Another argument against market competition for public land resources is that a value

> cannot be placed on environmental amenities. But when the government reserves land from development, a value is being placed on the reservation; the political process has decided that it is worth at least the opportunity cost of the resources left undeveloped. Moreover, expenditures on litigation and lobbying reflect a minimum value for the environmental amenities in question. (94; emphases added)

The attentive reader will have noticed the logical slip here. The question concerned whether or not market prices can capture environmental benefits in full. The best that Anderson and Leal can come up with is two suggestions regarding how to fix "the minimum value for the environmental amenities" in market price terms. This is not sufficient.

xv. One final consideration why market prices do not provide an "objective measure" for environmental benefits should be mentioned in passing. This has to do with the way political factors can influence market prices. The pattern of income distribution is affected by the degree to which taxes are progressive, the level of interest rates, the money supply, the degree to which fiscal policy is expansionary, etc. Shifts in income distribution lead to shifts in demand, which in turn affect market prices. For example, the more income distribution is unequal, the fewer households will be able to afford vacations in wilderness areas. This will affect the prices charged for access to these areas. A similar point holds for environmental risks in the workplace (a topic Anderson and Leal ignore completely in their book). If the government pursues policies that encourage unionization and full employment, wages will tend to be higher for jobs where environmental risks are high. If the government pursues the opposite policies, wages in these jobs will be lower. Given this, wages in themselves cannot be relied upon to provide an "objective measure" of environmental risks in the workplace.

xvi. Subsidies for agricultural crops have the same effect. (57-58, 72)

xvii. For example, environmental groups have called for total bans of oil drilling on lands providing a habitat for endangered species, despite the fact that new technologies for drilling exist that leave the habitat virtually untouched. (87-90)

xviii. An example presented by Anderson and Leal is the regulation forbidding the exploration of oil in the Arctic wilderness. The cost of this regulation is higher gasoline prices, a cost dispersed among all users of gasoline in the country. (15)

xix. The tone of Anderson and Leal's rhetoric would lead an unsuspecting reader to believe that the state has been equally swayed by corporate interests and by environmental groups. This is a completely false impression. Corporate interests have "captured" state agencies and influenced the direction of state environmental policies far more than environmental groups ever have. This is exactly what Anderson and Leal's own theory of the state would lead one to expect. On their view state officials always seek to further their own private interests, and the groups in society with the greatest economic resources are most likely to further the interests of state officials.

xx. Here too the reader must be wary. Corporate influence on the state has been much more successful in over-stressing the costs of environmental regulations than environmental groups have been in over-emphasizing the benefits.

xxi. Two examples can illustrate this point. The coal industry attempted to have legislation protecting workers against brown lung disease overturned. Its lawyers argued that according to their estimates the costs of this legislation outweighed the benefits. The U.S. the supreme court has held that the value of worker safety has precedence over appeals to cost/benefit analysis, unless the proposed standard was infeasible or would effectively destroy the company were it implemented. In the famous Pinto case Ford motors decided not to install an inexpensive ($11) safety device on

cost-benefit grounds. The jury found that the right to consumer safety outweighed cost/benefit considerations. (McGinn 235, 243)

xxii. "Who would pay money for a computer that had 18,000 vacuum tubes and failed once a day on average? Only the military. Defense paid for development of the ENIAC and provided a market for many of the computers developed in the 1940's and early 1950's. It wasn't until the late 1950's that a significant commercial market for these machines developed. Likewise, the military and NASA snatched up the first crude integrated circuits at $100 a pop in the early 1960's, when no one else would. DARPA [the Defense Advanced Research Projects Agency] paid for the worlds's first switching network in the 1970's, advancing a technology that has become the staple of datacommunications. This decade's spin-off examples include expert systems, which derived from rule-base programming work sponsored by DARPA in the late 1970's. And you can thank DARPA for Unix-based workstations, as well . . . 'The field of computer science, pure and simple, was invented and fueled by DARPA,' says Dan Dimancescu, technology policy consultant and author of several books of R&D policy." (Leibowitz 54-55)

xxiii. Another relevant point is that most basic research in the US is undertaken by universities. In recent years some of the most important sources of industrial basic research (Du Pont Central Research Laboratories, the RCA Sarnoff Laboratories, General Electric's central R&D facility, Bell Telephone Labs) have either closed down or reduced their commitment to basic research, and so the role of university research is becoming even more significant. Since 1960 the federal share of university research funding has been stable at around 63%. (In contrast, industrial funds account for a mere 6% of university research.) To this we must add that public funds have subsidized the education of the workforce, including that of scientific-technical personnel.

xxiv. It is interesting to note that in a book that hardly misses an opportunity to disparage the state

Anderson and Leal fail to mention the worst environmental catastrophe directly caused by state policy: the leakage of nuclear waste generated in the production of nuclear weapons.

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