

Values and the Environment

by Andrew Feenberg

Environmental pessimists argue that we must regress to a lower level of development to survive. Environmental optimists argue on the contrary that regression is unnecessary and that expenditures on environmental quality are an optional “cost” we can accept or reject as we see fit. Both share the notion that technology as we know it reveals the truth of modern industrial society once and for all. The pessimists believe industrial technology is incompatible with survival, the optimists that it poses only trivial problems of adjustment. These are the alternatives that dominate public discourse on the environment.

In the background of both positions is what I call the trade-off theory of environmentalism according to which environmental quality comes at the expense of other goods. Just how seriously we take the environmental crisis will then determine how much prosperity we are prepared to trade off. A lot say the ones, a little say the others.

The goal of this talk is to criticize the trade-off theory and to suggest a different way of thinking about environmental politics. There is a lot at stake in this debate. Trade-off theory has emerged as the standard conservative response not only to environmentalism but to many other issues involving technological reform.

For example, trade-offs pop up in discussions of industrial management and administration. Once again we hear that more democracy means less productivity and efficiency. Technological imperatives condemn us to obedience at work.

The same kind of arguments proliferate in medicine. Women demanding changes in childbirth procedures in the early 1970s were often told they were endangering their own health and that of their babies. Today many of the most controversial changes have become routine, for example, partners admitted to labor and delivery rooms. When AIDS patients in the 1980s sought access to experimental treatment they were told they would impede progress toward a cure. Their interventions did not prevent the rapid discovery of the famous “drug cocktail” that keeps so many patients alive today. Over and over technological reform is condemned as inefficient, morally desirable perhaps, but not practical. Over and over the outcome belies the plausible arguments against reform.

Despite its modern neo-liberal dress, the trade-off model goes way back. It poses the dilemma Mandeville mocked in a famous bit of doggerel at the end of the 18th Century. In the preface to his poem, he denounces those silly enough to complain about the filth of London’s streets, the major environmental problem of his day. In demanding cleanliness, they wish away the very prosperity of the city, which is the cause of the filth. The poem concludes:

... Fools only strive To make a Great an honest Hive ...
Bare Vertue can't make Nations live In Splendour;
they that would revive A Golden Age,
must be as free For Acorns, as for Honesty.

Today the acorns sometimes come in unexpected forms. I want to begin by discussing one surprising example before turning at length to the more familiar neo-liberal version of the trade-off argument. I am referring to the anti-industrial demand for alternative technology. Back in the early 1970s, Paul Ehrlich argued that environmental crisis was caused by both economic and population growth. He advocated "de-development" of the advanced societies to reduce overconsumption. This suggestion found support in *The Limits to Growth*, a famous study of the prospects for industrial collapse due to resource exhaustion and pollution. No-growth ideology formed the theoretical background to many early discussions of alternative technology. These critics argued that since industrial society is inherently destructive of the environment, we should junk it and return to preindustrial crafts.

The idea that industrial technology is irredeemable is essentially determinist. To claim that society must choose between industry and crafts is to concede that the existing industrial system is the only possible one. I propose a very different approach: democratic reform of modern industrialism leading to alternative technologies within the framework of modernity. This requires reconstruction of the industrial system through the incorporation of new values into industrial design.

The risk of confusion between these two very different conceptions of technical change is evident in Robin Clarke's list of utopian characteristics of what he calls soft technology. The list includes dozens of pairs of hard and soft attributes. Some, like the following, could guide either the reconstruction of industry or a return to crafts.

"ecologically unsound/ecologically sound
alienation from nature/integration with nature
centralist/decentralist
technological accidents frequent and serious/technological accidents few and unimportant."

But alongside these ecumenical objectives, Clarke lists such things as:

"mass production/craft industry
city emphasis/village emphasis
world-wide trade/local bartering
capital intensive/labour intensive."

These latter attributes determine a strategy of radical deindustrialization.

Why is it important to draw a sharp line between a program of anti-industrial alternative technology, and a program of alternative industrialism? There is a significant

philosophical issue here which has to do with our evaluation of modernity. Modernity and technology are mutually interdependent. Anti-modern theorists such as Heidegger have made us aware of this by basing their critique of modernity on a rejection of modern technology. Such fundamental concepts of modernity theory as Giddens' "disembedding" or Habermas's "postconventional morality" are inconceivable without urbanization and modern means of transportation and communication. When Clarke valorizes the village and local bartering over the city and world-wide trade, he is thus intervening in the debate over the value of modernity.

I am firmly convinced that we need to develop a critical, democratic politics of technology within and not against the general project of modernity. This is a much contested position, both by those who despair of modernity and those who see no need for serious criticism of its accomplishments. I present here the critical modernist position in opposition to the most challenging arguments on both sides.

I would like to turn now to the more influential conservative environmental philosophy based on neo-liberal economics. This is an optimistic approach. It too treats environmental regulation as a matter of trade-offs but it draws far less drastic conclusions than Ehrlich and Clarke.

A trade-off is a forced choice between alternatives. If the federal government spends its money on guns, it can't buy as much butter, and vice versa. The same applies to our personal budget. Given this simple fact, we need to decide how much environmental protection is worth relative to other goods we must sacrifice to achieve it. For example, how much is cleaner air worth?

Cost/benefit analysis of regulations is supposed to be able to answer this sort of question by precisely quantifying and comparing alternatives. Each incremental increase in the cleanliness of the air produces an incremental decrease in the number of respiratory illnesses. Estimate the cost of improving the air, for example by tightening the standards for automobile exhaust, then estimate the benefits of reduced medical costs, compare the two figures, and you've got the answer.

This approach seems obvious, and indeed cost/benefit analysis is a pragmatically justifiable procedure useful in many specific cases. But note its rather conservative political implications when generalized as the basis of an environmental philosophy. It has been used, along lines anticipated by Mandeville, to argue that too much environmentalism will end up impoverishing society.

But how credible is this claim? Not very. The current value we place on the various elements of trade-offs may not make much sense in scientific or human terms. Organizations tend to hide costs that might interfere with their plans, and it is difficult to know how to place a monetary value on such things as natural beauty and good health. But these values must be translated into economic terms to enter the calculation. When non-economic or so-called "ideological" values are imposed by standards, cost/benefit analyses can be devised to show that they interfere with economic performance. The trade-off

approach is thus often invoked to resist environmental regulation despite the flimsiness of the estimates of costs and benefits on which it is based.

The alternative is simply to impose standards based on these values. Naturally, costs will come up in the debate over standards, but they will be evaluated much more flexibly and alternative arrangements designed to deal with them discussed much more freely if the issues are not boiled down to set of numbers pretending to scientific status.

The question I'm going to pose throughout the rest of this talk is whether these pseudo-scientific arguments can supply us with an environmental philosophy. Do we really understand the issues when we start out from the notion that there are trade-offs between environmental and economic values? While there are obvious practical applications of cost/benefit analysis, I'm going to argue that it fails as a basis for environmental philosophy. It is important to remember this qualification. I am not opposed to cost/benefit analysis as such, but to the ambitious claims made for it.

Behind the trade-off approach lies an implicit philosophy of technology which I believe is incorrect. Once it falls, the limits of the approach it supports become apparent. That philosophy of technology assumes two connected principles, technological determinism and the neutrality of technology. I'll discuss them next in relation to several historical examples. In my conclusion I will argue that environmentalism is not about trade-offs but that it is really about a choice of civilization. The question it poses is what kind of a world do we want to live in, not do we want more or less of this or that. This was of course also the point of the opponents of industrialism I discussed at the beginning of this talk. But contrary to them, I believe alternative industrial models are possible based on different technological choices.

The idea of trade-offs belongs to economics, the science of allocating scarce resources. Economics is based on the proposition that one can't optimize two variables. Optimization means obtaining a maximum of the target variable. To optimize A, some of B must be let go. As I explained to my class when I presented this lecture to them, If you want a big screen, you'll have to hold off on that ski trip.

While this seems clear enough, there are several background assumptions that economists make when they talk about trade-offs and these assumptions are not so obvious. In the first place, it is necessary that the options in a trade-off be clearly defined. But defined by whom? There is an unfortunate ambiguity on this point which is typical of economics in general.

The trade-off concept has an obvious source in common experience where the agent who chooses between the options defines them. But when it is incorporated into economics, it borrows plausibility from that experience while overstepping its limits in important ways. Economists sometimes extend the notion of trade-offs to include purely theoretical alternatives that figure in no actual calculus of well-being. This confuses the issues in public debate over live options.

Few of us would consider our failure to earn income through prostitution as a trade-off of moral principles for money for the simple reason that this is not a live option for us. Similarly, well established environmental and safety standards are not up for grabs and their theoretical cost is irrelevant to present concerns. Now, there may be good reasons for the economists' extension of the concept in some cases, but we will see that it turns out to be very important not to confuse the ordinary and this technical sense of the concept of trade-offs.

There's a second background assumption we must bring out into the open. For it to make sense to talk about trade-offs, all other things must remain equal. This assumption is called *ceteris paribus*. If laws change, if prices change, if the relation between goods changes, then what looks like a trade-off may no longer be one. One specific type of change that interests us involves cases where obtaining A turns out to be a condition for obtaining B. If you learn that you'll receive the big screen as a prize for winning the skiing contest, you no longer have to worry about trading off one against the other. You can have both!

Ceteris paribus is certainly plausible in most short run economic decisions. When you're making up your personal budget and deciding what you can afford it makes sense to assume that all other things will be equal, that you won't win the lottery, or get struck by lightning, or discover unexpected mutual dependencies between the goods you covet. But if you extend the time span enough, if you talk about history and not about ordinary economic life, it's not at all plausible to assume that things will remain equal. The trade-off approach simply fails to explain historical cases that parallel the environmental case. The changes involved can't be understood on the model of an individual working out a budget.

In order to maintain *ceteris paribus* in history you have to exclude cases like the big screen-ski trip case in which apparent trade-offs dissolve as it turns out that A is a condition of B. In technological terms, the equivalent would be the emergence of a new path of development made possible and necessary by regulation. Applied to history, *ceteris paribus* thus implies that progress proceeds along a fixed track from one stage to the next. This view is called technological determinism. It holds that there is one and only one line of technical development.

Determinism is often accompanied by the belief in the neutrality of technology. Means are simply means, and don't tell you what to do. They have no implicit value content except in so far as they can be judged more or less efficient. The neutrality thesis is familiar to us from the gun-control debate where it is expressed in the slogan: Guns don't kill people, people kill people. Guns are neutral and values are in the heads of the people who choose the targets.

Together, technological determinism and the neutrality thesis support the idea that progress along the one possible line of advance depends exclusively on rational judgments about efficiency. Since only experts are qualified to make those judgments, environmentalists obstruct the main line of progress when they impose their ideological preferences on the process of technological development. In every case where economic

values compete with other values for our allegiance, a trade-off must take place. Where goals conflict, one or the other must be sacrificed, environmental protection or technological advance, or in Mandeville's terms again, virtue or prosperity.

I'll discuss an alternative view later in this lecture. Anticipating my conclusion, I will argue that technological development can switch tracks in response to constraints. On its new track, it may achieve several goals that were originally in conflict along its old one. Before introducing a philosophy of technology which supports this proposition, I want to discuss two historical examples in some detail.

The first case concerns child labor. It's fascinating to go back to the British Parliamentary Papers and read the debates of 1844 on the law regulating the labor of women and children. The issue arose because manufacturing took more and more children off the land and put them in factories. No one worried about the children so long as they worked on their parents' farm or shop. But the morality of child labor was questioned when they were sent out to factories, big anonymous institutions without parental supervision.

Lord Ashley was the leading speaker for regulation in the parliamentary debates. Today we would call his arguments ideological. He referred to no economic benefit of abolishing child labor or limiting the labor of women but instead emphasized the moral importance of motherhood. He worried that the factory system would result in a generation growing up without the tender care of a mother. He even complained that the mothers, once they were sent to work in factories, could be heard using foul language.

The response to Lord Ashley came from Sir J. Graham who complained about inflation, international competition, and technological imperatives, just like those who resist environmental regulation today. Why inflation? Because children cost less to feed and therefore can be paid less. If you replace their labor with adult labor, costs and prices go up. And who will that hurt? The poor, the very people you're trying to help! So Sir J. Graham said that the abolition of child labor is based on "a false principle of humanity that is certain to defeat itself." What about international competition? Regulation makes no sense in a globalized economy. If other nations continue to employ child labor they will put us out of business. And technological imperatives: this is the most interesting point.

Sir J's argument on this point is vague but there is a famous old photograph by Lewis Hine which helps to understand his concerns. This photograph shows a little girl standing in front of the equipment she uses in a cotton mill. She looks about ten years old, standing there in a white dress in front of ranks of machines going back into the distance. At first you look at the picture and you don't realize that there's something strange about it. But then you notice that the machines are built to her height. The whole mill has been designed so that a four feet tall child can tend the machines. Industrial technology, like the chairs in an elementary school classroom, was designed for children. If child labor is eliminated the machines will have to be replaced. Adult laborers can't be bending down all day. So technological imperatives require child labor.

Doesn't this sound familiar? We have all heard about environmental Luddites out to destroy industry. Well, it's an old refrain. But what actually happened when they passed legislation regulating the labor of women and children? In fact child labor was phased out in all the industrial countries. Regulation and economics did not conflict as factory owners feared. They found ways of doing without the little workers. The intensity of labor increased and productivity went up, more than compensating for the higher wages paid adults. Since children went to school for longer periods, they entered the labor force with more skills and discipline, which also improved productivity. A whole process unfolded, partly stimulated by the ideological debate over how children should be raised, and partly economic. It led eventually to the current situation in which nobody dreams of returning to cheap child labor in order to cut costs, at least not in the developed countries.

This picture of the elimination of child labor in the developed countries might be contested on economic determinist grounds. Isn't it possible that it was the evolution of technology and labor organization that made the employment of children unprofitable, with regulation appearing only after the fact to consecrate economic necessity? Then ideology would have no causal role at all in the history of child labor. A rather crude interpretation of Marx is the obvious source of this argument. It sounds good—like most “just so” stories, the explanation is elegant in its simplicity—but historians and sociologists have been invalidating this type of explanation regularly for a century now. It so happens that history is not subject to such monocausal accounts. The news has long since reached theoretically sophisticated Marxists, if not Chicago. \

What is more, economic determinism misses the hermeneutic or cultural dimension of historical change. In developed countries, child labor violates fundamental cultural assumptions about the nature of childhood. Today we see children as consumers, not as producers. Their function is to learn, insofar as they have any function at all, and not to make money. This change in the definition of childhood and what it means to be a child is the essential advance that has occurred as a result of the regulation of labor.

In sum, although the abolition of child labor was promoted for ideological reasons, it was part of a larger process that redefined the direction of economic progress. In the child labor case all other things are not equal because a new path of development emerged. On this path regulation actually contributes to increasing social wealth. Technology is not neutral in this case either. It establishes the meaning of childhood and embodies that meaning in machines. The low machines suited to operation by the ten-year old girl make a statement about what it is to be a child. The value society places on childhood is embodied in the design of the equipment.

Here is a second example. Steamboat boilers were the first technology regulated in the United States. In the early 19th-century the steamboat was a major form of transportation like the automobile or airline today. The US was a big country with few paved roads and lots of rivers and canals. Steamboats were how people got around. But steamboats blew up when the boilers weakened with age or were pushed too hard. After several particularly murderous accidents the city of Philadelphia consulted with experts on

how to design safer boilers. This was in 1816. It was the first time an American governmental institution interested itself in the regulation of technology, but in the end nothing was done and the accidents continued. In 1837, at the request of Congress, the Franklin Institute issued a detailed report and recommendations based on rigorous study of boiler construction. Congress was tempted to impose a safe boiler code on the industry but boilermakers and steamboat owners resisted and Congress hesitated to interfere with private property.

It took from that first inquiry in 1816 to 1852 for Congress to pass effective laws regulating the construction of boilers. In that time 5000 people were killed in steamboat accidents. Once Congress imposed a better way of making boilers with thicker walls and safety valves, the epidemic of explosions abruptly ended.

To us it seems obvious that regulation was needed. But there's a kind of paradox here because consumers kept on buying tickets despite the rising toll. The steamboat business expanded as more and more people traveled. At the same time people voted for politicians who demanded regulation. So what did they want? Did they want cheap travel or did they want safety? That is truly a trade-off.

The controversy was finally settled at another level. In everyday life, our goals are nested in hierarchies. The student goes to campus to take a class to get a degree to get a job, and so on. Sometimes, particular goals fall into position in several different hierarchies. Thus the same student might also go to campus to take a class to sit next to a girl to ask her out on a date.

Trade-offs are complicated where goals are nested in different hierarchies. This is especially so where a different decision procedure is associated with each hierarchy, each procedure introducing a different bias into the choice.

For example, when I consider which of several types of cars to buy, my decision may be different depending on whether I consider only my personal wishes or consult with the family. A purely individual decision may well differ from a communal one because the family will situate the options in goal hierarchies that I might not have considered. (I can hear them saying, "What about camping? Have you thought of how we could use an SUV for a trip to the Grand Canyon?")

This complication is relevant to the steam boat paradox. In this case, individual market based decisions lead to different consequences than collective political decisions because safety is situated in different goal hierarchies in the two cases. Individual travelers simply want to reach their personal destination at a reasonable price. The politics of the case is, well, political.

The basis for government regulation is the commerce clause of the Constitution under which the government controls interstate transportation. This is not just a matter of economics but concerns national unity. Like the highway system today, the canals and rivers of the early 19th century unified the territory of the United States. The movement

of people, ideas, and goods, the movement of troops, all the things that define a nation depend on transport and in that period most especially on steam transport.

Now national unity is not an individual economic matter but a political matter. Safe transport had obvious individual benefits, and indeed most of the congressional debate concerned those benefits, but it was also a legitimate national issue. Senators from the West argued that they should not have to fear for their lives in traveling back and forth between the nation's capital and their constituents.

From an individual standpoint the imposition of regulation traded off ticket prices for safety, but at the collective level something quite different was going on. Regulation of transport still today is also about insuring national unity and that is not an economic matter. The infrastructure of national unity lies beyond the boundaries of the economy. It cannot be traded off for anything.

Once security of transport is treated as an essentially political matter, it ceases to figure in routine economic calculations. It no longer makes sense to worry about the trade-off of ticket prices for safety once the principle of national interest in safe transportation is established. Just as we don't worry about all the money we are losing by not marketing our bodies, so the cost of insuring a certain minimum security of transportation figures in no one's account books.

Of course a zealous accountant might still insist that we monetize all these considerations and mark them down as expenses. So say opponents of regulation today. But once the boundaries of the economy shift, so many cultural and technical consequences follow that it makes no sense to look back with an eye to costs and benefits.

Individuals no longer consider the excluded option as a factor in their personal well-being and so the only trade-off in which it plays a role is in the economist's head. In his opinion we are less well off than we might be because we can no longer trade off A for B in optimal amounts, but what has his opinion to do with the wealth of society? In the only sense in which it's significant for policy, social wealth must be measured with respect to the fulfillment of actual desires, not theoretical constructions. At most we might be interested in the economist's opinion regarding the known value of options of which most people are temporarily ignorant such the consequences of smoking or pollution. Since it's impossible to say how we'd evaluate vast civilizational options in monetary terms, cost/benefit analysis is irrelevant in such cases.

Thus when Americans are told they are spending \$100 billion a year on environmental protection and that this expenditure replaces goods they might have bought with their money, I think they are being tricked. Most of that \$100 billion went into improved design standards we now take for granted, for example, proper toxic waste disposal, safer water supplies, and so on. Economists may regard these as "goods" we've bought but we do not think like that any more than New Yorkers conceive of Central Park as a piece of real estate they've acquired and could sell if they wanted something else for a change.

One might object that in failing to appreciate such theoretical trade-offs, we ignore economic realities, but that is a short term view. The type of cultural change I am talking about here is eventually locked in by technical developments. For example, in the abstract one could redo all the calculations of labor costs taking into account the savings that might be made with cheap child labor, but that is an economic absurdity to the extent that the entire modern economy presupposes the educated and disciplined products of schooling and could not be operated by children. Priorities change too so it is impossible to compare the value of something like cleaner air or water to other goods on a constant basis over historical time.

The steamboat case suggests another kind of problem with determinism and the neutrality thesis. This case shows how economic considerations are sometimes undercut by the instability of the problem definition associated with particular technologies. For there to be a trade-off account, the options must be stabilized. But in the steamboat case the options are not stable. There are two slightly different and competing problem definitions, one at the individual and the other at the collective level, and it's not clear what the problem is until it is finally settled. In this case the decision about what kind of technology to employ cannot be made on the basis of efficiency because efficiency is relative to some known purpose. If the purpose has not been decided, if you don't know what problem you are trying to solve, you can't judge efficiency.

There is a philosophy of technology that acknowledges these difficulties. It's called social constructivism. Constructivism argues against technological determinism that there are many paths of development and that the choice between them is social and political and not a simple matter of efficiency. A way of life is expressed in design. Values are thus embedded in technology. I will come back to the environmental question from a constructivist perspective in the conclusion to this paper, but let me first tell you a little more about this alternative in philosophy of technology.

Constructivist technology studies grow out of an earlier revolution in science studies. Thomas Kuhn's famous theory of scientific revolution helps to understand the relationship between these fields. Kuhn argued that the apparent rationality of scientific progress is at least partially illusory. In fact scientific advances are under-determined by reason and embody fundamental social and cultural values as well as evidence and arguments. This parallels what I have been saying about technology.

The technological development of the boiler appears purely rational—surely a safer boiler is better from an engineering standpoint. But the history shows that it took 40 years to decide to make safer boilers, and then the moving force behind the change was political ideology, not considerations of efficiency.

We have the same kind of problem in understanding the development of technology Kuhn had with science. Kuhn's solution was the notion of paradigms, referring to a model for thought and research. Such models have tremendous influence on those who come afterward. For example Newtonian mechanics dominated physics research for several hundred years. In Newton physicists had not just a correct theory of gravitation, but a model of how to do physics.

Scientific revolutions occur when paradigms change. Normal science, Kuhn argued, is the kind of science people do when they work within the established paradigm. The technological parallel would be what I call technical codes, the codes that govern technical practice. These incorporate value decisions that are embodied in technical disciplines and ultimately in technical designs.

As we saw, the technical code of the mill in Hine's photograph dictated certain height specifications which corresponded to a decision about who can work, whether they should be children or adults. Our technology includes a height specification for adults. That presupposes a different decision about the age composition of the labor force. Similarly, the boiler code looks merely technical but it actually embodies a decision about security of life and national security; that decision is embodied in the technical specifications.

Normal progress in technology would be the pursuit of efficiency within a paradigm. Once a decision is made on the boiler code, then all kinds of refinements are possible. Revolutions in both science and technology involve fundamental changes in values reflected in the paradigms or codes that control the normal pursuit of truth or efficiency by researchers or engineers.

This constructivist approach has consequences for our understanding of the rationality and autonomy of the technical professions. At every stage in the history of their field experts inherit the results of earlier controversies and struggles, earlier revolutions. Engineering students do not have to learn how this or that regulation got embodied in design. The results are rational in themselves and presented as such. This gives rise to an illusion of autonomy that is characteristic of technical disciplines. In fact their autonomy is more limited than they think. They imagine their past as a succession of rational decisions about the best way to do things when in fact it is the result of social choice between several good ways with different social consequences. There's a kind of technological unconscious in the background of technical disciplines.

Since values enter into the evolution of technical disciplines in this way, major civilizational changes give rise to technological changes. Withdrawing children from the labor process and putting them in school is an enormous change, a change of civilization. Such a change is bound to show up in a different path of technological development.

Technological revolutions look irrational at first but in fact they simply establish another framework for rationality, another paradigm. Thus it's neither rational nor irrational in some absolute sense to build a boiler that won't blow up. Constructivists would say that the decision to build a safer boiler is under-determined by pure considerations of technical efficiency because it also depends on a decision about the importance of safety. As we've seen, that's a value question that's settled through political debate.

Now let me return to the question of environmental values and the economy with this constructivist argument in mind. We have identified several problems with the trade-off approach.

First, the trade-off approach assumes the fixity of the background, the *ceteris paribus* clause, but technological change over the long time spans of history invalidates that assumption. All things are not equal in history since cultural change and technological advance alter the terms of the problem.

Second, the trade-off approach fails to appreciate the significance of the shifting boundaries of the economy. We don't mourn the cost of using adult labor instead of child labor for the simple reason that child labor is no longer an economic issue.

Third, the trade-off approach confuses short run economic considerations with civilizational issues. The civilizational issues concern who are we and how we want to live. This is a different question from getting more of A even if it means we will have less of B. That latter question is of course legitimate and economics is usually the best guide in framing it more precisely. But like other intellectual disciplines, economics has limits and exceeds them to its peril...and ours.

Here is a contemporary example that concerns a current environmental issue, the case of clean air regulation and asthma. Currently, asthma attacks are treated as a cost in order to be plugged into cost/benefit calculations. One economist's study of the revised clean air act valued asthma attacks at \$25 apiece. This must have been an average. Some asthma attacks are worth more, others less. Although this is offensive to anyone with asthma, it makes some kind of sense to the extent that our society is not fully committed to the struggle against this disease and its main economic impact is on school attendance.

But it's entirely possible that we will respond to the rapidly rising incidence of asthma and the rising death rate associated with it by attempting to clean the air to the point where pollution is no longer a factor in causing this disease. If we were to rule asthma out of account in this way by setting health-based standards that place it beyond the boundaries of economic calculation, we would eventually arrive at a state of affairs which would seem obvious and necessary both technically and morally.

Polluting methods would be replaced gradually by clean ones everywhere. No one would make parts for the old polluting devices anymore and they would be abandoned. After a while, the new ones would be better in many respects, not just environmentally, since all later progress would be designed for the new devices. It would not occur to our descendants to save money by going back to the old ways in order to cheapen industrial production or transportation. They would say, "We are not the kind of people who would trade off the health of our children for money," much as we would immediately reject the suggestion we supplement the family budget by sending our children out to work in a factory. This would be a civilizational advance in the environmental domain.

This leads to the question of why environmental values appear as values in the first place. Indeed, why does environmentalism appear as an ideology intruding on the economy? This is explained by the fact that our civilization was built by people indifferent to the environment. It's this heritage of indifference that makes it necessary to formulate concern for the environment as a value and to impose regulation on industry. Environ-

mental considerations were not included in earlier technical disciplines and codes and so today they appear to come from outside the economy.

This need not imply an overly harsh judgment of our predecessors. Not only are we richer and better able to afford environmental protection, but the immense side effects of powerful technologies that have come into prominence since World War II have made environmental regulation a necessity for us in a way it was not for them. However, it does imply a harsh judgment of contemporaries who rely on specious economic arguments to justify dismantling regulations we can well afford today and desperately need. However powerful these conservative politicians may look at the moment, we can expect their current offensive to fail as the consequences of environmental deregulation make an obvious mockery of their claims.

From this standpoint it seems likely that the ideological form of environmental values is temporary. These values will be incorporated into technical disciplines and codes in a technological revolution we are living unawares today. Environmentalism will not impoverish our society. We will go on enriching ourselves but our definition of prosperity and the technologies instrumental to it will change and become more rational in the future judgment of our descendents who will accept environmentalism as a self-evident advance. Just as images of Dickens in the bootblack factory testify to the backwardness of his society, so will images of asthmatic children in smog-ridden cities appear to those who come after us.

Although its progress is slow and there are setbacks, environmentalism has the temporality of a revolution. Revolutions represent themselves to themselves as fully real in the future and look back from that imagined outcome at the limitations of the present. The French revolutionary Saint-Just asked what "cold posterity" would someday have to say about monarchy even as he called for its abolition. With history as our guide, we too can overleap the ideological obstacles to creating a better future by realizing environmental values in the technical and economic arrangements of our society.

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