

44. Korinna Horta, "Fueling Strife in Chad and Cameroon: the Exxon-Shell-Elf-World Bank Plan for Central Africa," *Multinational Monitor*, Vol. 18, No. 5 (May 1, 1997): 10.
45. "Drilling to the Ends of the Earth: The Case Against New Fossil Fuel Exploration," <http://www.an.org/oilreport/ecosystems.html>, 1998.
46. *Ibid.*
47. Horta, "Fueling Strife in Chad and Cameroon."
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50. K. Walsh, "World Bank Funding of Chad/Cameroon Oil Project," Environmental Defense Fund (March 17, 1997), [www.harford-hwp.com/archives/32/031.html](http://www.harford-hwp.com/archives/32/031.html).
51. There were an estimated 1000 Bakola Pygmies in the entire Pipeline project area.
52. Rachel Naba, "Oil Exploited, Nature Disturbed," <http://theearthcenter.com/chad.html>.
53. Brooks, 1994, rpt. in Newberry and Gladwin, 2002, 526.
54. William E. Newberry, and Thomas N. Gladwin, "Shell and Nigerian Oil," (1997 report) in eds, Thomas Donaldson, Patricia H. Werthane, and Margaret Cording, *Ethical Issues in Business: A Philosophical Approach*, 7th Edition (Upper Saddle River, NJ: Prentice Hall, 2002), 522-40. In 1993, Shell shut down its operations in Ogoniland, but continued to drill for oil and gas in other parts of Nigeria. Shell then dramatically revised its Code of Ethics, invested at least \$100 million in cleaning up Ogoniland, and pledged over 1/4 billion dollars in exploring alternate energy sources. ([www.shell.com](http://www.shell.com), 2003).
55. Andrew Nikiforuk, "Oil Patch Pariah," *Canadian Business Magazine* (December 10, 1999).
56. "Changing Oil: Emerging Environmental Risks and Shareholder Value in the Oil and Gas Industry," (Washington, D.C.: World Resources Institute, July 2002), 25.
57. "World Bank Group Approves Support for the Chad-Cameroon Petroleum Development and Pipeline Project," Washington, D.C., World Bank, News Release No. 2000/AFR (June 6, 2000), 2.
58. When this news of Shell and Total/Elf's withdrawal became public on November 11, more than 10,000 Chadians took to the streets of capital city N'Djamena to protest the withdrawal. Protestors were mainly angry at France. Posters read "Elf's Withdrawal is Unworthy of the Common History of Chad and France" and "We congratulate the World Bank and Exxon." ["10,000 Protest Pullout of Elf, Shell from Huge Oil Deal in Chad," *Agence France-Presse*, November 16, 1999]. Chad's minister of communication threatened legal action over "an important breach of contract compromising the higher interests of the Chadian nation." [Abid Aslam, "Rights: Nigerian Oil Venture Targeted," *Inter Press Service*, November 11, 1999.]

## Scarcity or Abundance?

JULIAN L. SIMON

Is a big wheat harvest a good thing? Sometimes we read headlines such as "Good harvest, bad news"—the bad news being for wheat farmers, who face low prices. On balance a big harvest surely is better for society as a whole than a small harvest. Still, the headline is negative, as if a bad thing has happened.

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Is the trend of black infant mortality rates discouraging? Take a look at Figure 1 and make your judgment, please. My own judgment is that the overall picture is good for blacks as well as for the community as a whole, because many fewer babies are dying nowadays than in earlier years and many fewer parents need to grieve. Unless you focus only on the relative positions of the two groups, there seems slim basis for judging the situation as bad, unless you enjoy being morally indignant.

This is the point of these examples: viewing the same facts, one person may be optimistic while the other is pessimistic. The contradiction often happens because persons judge from different points of view. Frequently the root of the difference is the length of the period you focus on—the short run or the long run. For many issues—and especially issues related to economic and population growth—the long-run effect is the opposite of the short-run effect. More people are an economic benefit in the long run, though they are a burden in the short run.

My central proposition here is simply stated: Almost every trend that affects human welfare points in a positive direction, as long as we consider a reasonably long period of time and hence grasp the overall trend. . . .

I will first review some important absolute trends in human welfare. To repeat, my thesis is that just about every important measure of human welfare shows improvement over the decades and centuries.

Let's start with some trends and conclusions that have long represented the uncontroversial settled wisdom of the economists and other experts who work in these fields, except for the case of population growth. On that latter subject, what you read below was a minority viewpoint until sometime in the 1980s, at which point the mainstream scientific opinion shifted almost all the way to the position set forth here.

### LENGTH OF LIFE

The most important and amazing demographic fact—the greatest human achievement in history—is the decrease in the world's death rate. We see that it took thousands of years for life expectancy at birth to increase from just over twenty years to the high 20s. Then, in just the past two centuries, the length of life you could expect for your newborn child in the advanced countries jumped from perhaps thirty years to about seventy-five years. It is this decrease in the death rate that is the cause of there being a larger world population nowadays than in former times. Is this not the greatest change that humankind has ever experienced?

Then, starting well after World War II, the length-of-life-one-could expect in the poor countries leaped upward by perhaps fifteen or even twenty years, caused by advances in agriculture, sanitation, and medicine. Are not these trends remarkably benign?

### AGRICULTURAL LABOR FORCE

The best simple measure of a country's standard of living is the proportion of the labor force that works in agriculture. If almost everyone works at farming, there can be little production of non-agricultural goods. We see the astonishing

data began in 1961. Our environment is increasingly healthy, with every prospect that this trend will continue.

### THE VANISHING FARMLAND CRISIS

The supposed problem of farmland being urbanized has now been entirely discredited, out-and-out disavowed by those who created the scare. This saga serves to illuminate many similar environmental issues.

### THE GREENHOUSE EFFECT, THE OZONE LAYER, AND ACID RAIN

What about the greenhouse effect? The ozone layer? Acid rain? I'm not a technical expert on the atmosphere. I can say with confidence, however, that on all of these issues there is major scientific controversy about what has happened until now, why it happened, and what might happen in the future. All of these scares are recent, and there has not yet been time for complete research to be done and for the intellectual dust to settle. There may be hard problems here, or there may not.

Even more important for people is that no threatening trend in human welfare has been connected to those phenomena. There has been no increase in skin cancers from ozone, no damage to agriculture from a greenhouse effect, and at most slight damage to lakes from acid rain. It may even be that a greenhouse effect would benefit us on balance by warming some areas we'd like warmer, and by increasing the carbon dioxide to agriculture.

Perhaps the most important aspect of the greenhouse-ozone-acid rain complex, and of their as-yet-unknown cousin scares which will surely be brought before the public in the future, is that we now have large and ever-increasing capabilities to reverse such trends if they are proven to be dangerous, and at costs that are manageable. Dealing with greenhouse-ozone-acid rain would not place an insuperable constraint upon growth, and would not constitute an ultimate limit upon the increase of productive output or of population. So we can look these issues squarely in the eye and move on.

### ARE THESE PREDICTIONS SURE ENOUGH TO BET ON?

I am so sure of all these upbeat statements that I offer to bet on them, my winnings going to fund new research. Here is the offer: You pick (a) any measure of human welfare—such as life expectancy, infant mortality, the price of aluminum or gasoline, the amount of education per cohort of young people, the rate of ownership of television sets, you name it; (b) a country (or a region such as the developing countries, or the world as a whole); (c) any future year, and I'll bet a week's or a month's pay that that indicator shows improvement relative to the present while you bet that it shows deterioration.

1. Here is the overarching theory that I offer you to explain why things happen exactly the opposite of the way Malthus and the contemporary

Malthusians predict—and why I offer to bet that any measure of human welfare that you choose will show improvement rather than deterioration.

In 1951, Theodore Schultz published an article called "The Declining Economic Importance of Land." He showed that because of technological change, two related things were happening: Food production per person was going up, and the need for agricultural land was going down—even as population was growing very fast. In 1963, Harold Barnett and Chandler Morse showed that despite all the theory about limited quantities of raw materials, and reducing richness of the lodes that are mined, all the raw materials they studied had become less expensive and more available for the decades since the 1870s. A general process underlies these specific findings: Human beings create more than they use, on average. It had to be so, or we would be an extinct species. And this process is, as the physicists say, an invariance. It applies to all metals, all fuels, all foods, and all other measures of human welfare, and it applies in all countries, and at all times. In other words, this is a theory of "everything economic," or really, a theory of economic history.

2. Consider this example of the process by which people wind up with increasing availability rather than decreasing availability of resources. England was full of alarm in the 1600s at an impending shortage of energy due to the deforestation of the country for firewood. People feared a scarcity of fuel for both heating and the iron industry. This impending scarcity led to the development of coal.

Then in the mid-1800s, the English came to worry about an impending coal crisis. The great English economist W. S. Jevons calculated that a shortage of coal would bring England's industry to a standstill by 1900; he carefully assessed that oil could never make a decisive difference. Triggered by the impending scarcity of coal (and of whale oil, whose story comes next), ingenious profit-minded people developed oil into a more desirable fuel than coal ever was. And in 1993 we find England exporting both coal and oil.

Another element in the story: Because of increased demand due to population growth and increased income, the price of whale oil for lamps jumped in the 1840s, and the U. S. Civil War pushed it even higher, leading to a whale oil "crisis." This provided incentive for enterprising people to discover and produce substitutes. First came oil from rapeseed, olives, tallow, and camphine oil from pine trees. Then inventors learned how to get coal oil from coal. Other ingenious persons produced kerosene from the rock oil that seeped to the surface, a product so desirable that its price then rose from \$0.75 a gallon to \$2.00. This high price stimulated enterprisers to focus on the supply of oil, and finally Edwin L. Drake brought in his famous well in Titusville, Pennsylvania. Learning how to refine the oil took a while. But in a few years there were hundreds of small refiners in the United States, and soon the bottom fell out of the whale oil market, the price falling from \$2.50 or more at its peak around 1866 to well below \$1.00.

We should note that it was not the English or American governments that developed coal or oil, because governments are not effective developers of new technology. Rather, it was individual entrepreneurs who sensed the need, saw opportunity, used all kinds of available information and ideas,

COAL

made lots of false starts which were very costly to many of those individuals but not to others, and eventually arrived at coal as a viable fuel—because there were enough independent individuals investigating the matter for at least some of them to arrive at sound ideas and methods. And this happened in the context of a competitive enterprise system that worked to produce what was needed by the public. And the entire process of impending shortage and new solution left us better off than if the shortage problem had never arisen.

Here we must address another crucial element in the economics of resources and population—the extent to which the political-social-economic system provides personal freedom from government coercion. Skilled persons require appropriate social and economic framework that provides incentives for working hard and taking risks, enabling their talents to flower and come to fruition. The key elements of such a framework are economic liberty, respect for property, and fair and sensible rules of the market that are enforced equally for all.

3. The world's problem is not too many people, but lack of political and economic freedom. Powerful evidence comes from pairs of countries that have the same culture and history, and had much the same standard of living when they split apart after World War II—East and West Germany, North and South Korea, Taiwan and China. In each case the centrally planned communist country began with less population "pressure," as measured by density per square kilometer, than did the market-directed economy. And the communist and non-communist countries also started with much the same birth rates. But the market-directed economies have performed much better economically than the centrally planned economies. This powerful explanation of economic development cuts the ground from under population growth as a likely explanation.

4. In 1993 there is an important new element not present twenty years ago. The scientific community now agrees with almost all of what you have just heard. My comments today do not represent a single lone voice, but rather the scientific consensus.

The earlier remarks about agriculture and resources have always represented the consensus of economists in those fields. And now the consensus of population economists also is not far from what I have said to you.

In 1986, the National Research Council and the National Academy of Sciences published a book on population growth and economic development prepared by a prestigious scholarly group. This "official" report reversed almost completely the frightening conclusions of the previous 1971 NAS report. "Population growth is at most a minor factor. . . . The scarcity of exhaustible resources is at most a minor constraint on economic growth," it now says. It found benefits of additional people as well as costs.

A host of review articles by distinguished economic demographers in the last three or four years have confirmed that this "revisionist" view is indeed consistent with the scientific evidence, though not all the writers would go as far as I do in pointing out the positive long-run effects of population growth. The consensus is more toward a "neutral" judgment. But this is a huge change from the earlier judgment that population growth is economically detrimental.

By 1993, anyone who asserts that population growth damages the economy must either be unaware of the recent economic literature on the subject or turn a blind eye to the scientific evidence.

There are many reasons why the public hears false bad news about population, resources, and the environment. Many of these matters are discussed in my earlier books. (E.g. Simon, 1984) But lately I have come to emphasize the role of unsound logic and scientific understanding.

These are some of the elements of bad thinking that predispose people to doomsday thinking: (a) Lack of understanding of statistical variability, and of the consequent need for looking at a large and representative sample and not just a few casual observations. (b) Lack of historical perspective, and the need for looking at long time series and not just a few recent observations. (c) Lack of proportion in judgments. (d) Lack of understanding of the Hume-Hayek idea of spontaneously evolving cooperative social systems—Adam Smith's "invisible hand." (e) Seduction by exponential growth and the rest of Malthusian thinking. (f) Lack of understanding of Frédéric Bastiat's and Henry Hazlitt's one key lesson of political economics—that we must consider not just the short-run effects of an action that we might take but also the effects well into the future, and not just the local effect but also the effect on faraway communities. That is, we must take into account not just the immediate and obvious impacts, but also the slow-responding adjustments which diffuse far from the point of initial contact and which often have the opposite result from the short-run localized effects.

6. In response to questions about species extinction, the World Conservation Union (IUCN) commissioned a book edited by Whitmore and Sayer (1992) to inquire into the extent of extinctions that appeared after the first draft of this book. The results of that project must be considered amazing. All the authors are ecologists who express concern about the rate of extinction. Nevertheless, they all agree that the rate of known extinctions has been and continues to be very low. This is a sampling of quotations (with emphasis supplied), first on the subject of the estimated rates:

60 birds and mammals are known to have become extinct between 1900 and 1950. (Reid, 1992, p. 55)

[F]orests of the eastern United States were reduced over two centuries to fragments totalling 1–2% of their original extent . . . during this destruction, only three forest birds went extinct—the Carolina parakeet (*Conuropsis carolinensis*), the ivory-billed woodpecker (*Campephilus principalis principalis*), and the passenger pigeon (*Ectopistes migratorius*). Although deforestation certainly contributed to the decline of all three species, it was probably not critical for the pigeon or the parakeet (Greenway, 1967). Why, then, would one predict massive extinction from similar destruction of tropical forest? (Simberloff, 1992, p. 85)

IUCN, together with the World Conservation Monitoring Centre, has amassed large volumes of data from specialists around the world relating to species decline, and it would seem sensible to compare these more empirical data with the global extinction estimates. In fact, these and other data indicate that the number of recorded extinctions for both plants and animals is very small. . . . (Heywood and Stuart, 1992, p. 93)

it is impossible to estimate even approximately how many unrecorded species may have become extinct. (Heywood and Stuart, 1992, p. 95)

While better knowledge of extinction rates can clearly improve the design of public policies, it is equally apparent that estimates of global extinction rates are fraught with imprecision. We do not yet know how many species exist, even to within an order of magnitude. (Reid, 1992, p. 56)

the literature addressing this phenomenon is relatively small. . . . Efforts to clarify the magnitude of the extinction crisis and the steps that can be taken to defuse the crisis could considerably expand the financial and political support for actions to confront what is indisputably the most serious issue that the field of ecology faces, and arguably the most serious issue faced by humankind today. (Reid, 1992, p. 57)

The best tool available to estimate species extinction rates is the use of species-area curves. . . . This approach has formed the basis for almost all current estimates of species extinction rates. (Reid, 1992, p. 57)

There are many reasons why recorded extinctions do not match the predictions and extrapolations that are frequently published. . . . (Heywood and Stuart, 1992, p. 93)

The most important difference between my and . . . the doomsters' approach to environmental issues is that I base my conclusions on the historical record of the past rather than Malthusian speculation that is inconsistent with the historical statistical record.

#### Note

See *The Ultimate Resource 2* (Princeton: Princeton University Press, 1998), chapters 1-3.

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Known extinction rates are very low. Reasonably good data exist only for mammals and birds, and the current rate of extinction is about one species per year (Reid and Miller, 1989). If other taxa were to exhibit the same liability to extinction as mammals and birds (as some authors suggest, although others would dispute this), then, if the total number of species in the world is, say, 30 million, the annual rate of extinction would be some 2800 species per year. This is a very significant and disturbing number, but it is much less than most estimates given over the last decade. (Heywood and Stuart, 1992, p. 94)

. . . if we assume that today's tropical forests occupy only about 80% of the area they did in the 1830s, it must be assumed that during this contraction, very large numbers of species have been lost in some areas. Yet surprisingly there is no clear-cut evidence for this. . . . Despite extensive enquiries we have been unable to obtain conclusive evidence to support the suggestion that massive extinctions have taken place in recent times as Myers and others have suggested. On the contrary, work on projects such as Flora Meso-Americana has, at least in some cases, revealed an increase in abundance in many species (Blackmore, pers. comm. 1991). An exceptional and much quoted situation is described by Gentry (1986) who reports the quite dramatic level of evolution in situ in the Centinela ridge, in the foothills of the Ecuadorian Andes where he found that at least 38 and probably as many as 90 species (10% of the total flora of the ridge) were endemic to the "unprepossessing ridge." However, the last patches of forest were cleared subsequent to his last visit and "its prospective 90 new species have already passed into botanical history," or so it was assumed. Subsequently, Dodson and Gentry (1991) modified this to say that an undetermined number of species at Centinela are apparently extinct, following brief visits to other areas such as Lita where up to 11 of the species previously considered extinct were re-found and at Poza Honda near La Mana where six were rediscovered. (Heywood and Stuart, 1992, p. 96)

. . . actual extinctions remain low. . . . "Many endangered species appear to have either an almost miraculous capacity for survival, or a guardian angel is watching over their destiny! This means that it is not too late to attempt to protect the Mediterranean flora as a whole, while still identifying appropriate priorities with regard to the goals and means of conservation." (Heywood and Stuart, 1992, p. 102)

. . . the group of zoologists could not find a single known animal species which could be properly declared as extinct, in spite of the massive reduction in area and fragmentation of their habitats in the past decades and centuries of intensive human activity. A second list of over 120 lesser-known animal species, some of which may later be included as threatened, show no species considered extinct and the older Brazilian list of threatened plants, presently under revision, also indicated no species as extinct. . . . (Brown and Brown, 1992, p. 127)

Closer examination of the existing data on both well- and little-known groups, however, supports the affirmation that little or no species extinction has yet occurred (though some may be in very fragile persistence) in the Atlantic forests. Indeed, an appreciable number of species considered extinct 20 years ago, including several birds and six butterflies, have been rediscovered more recently. (Brown and Brown, 1992, p. 128)

And here are some comments from that volume on the lack of any solid basis for estimation:

. . . How large is the loss of species likely to be? Although the loss of species may rank among the most significant environmental problems of our time, relatively few attempts have been made to rigorously assess its likely magnitude. (Reid, 1992, p. 55)



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## Cost-Benefit Analysis: An Ethical Critique

STEVEN KELMAN

At the broadest and vaguest level, cost-benefit analysis may be regarded simply as systematic thinking about decision-making. Who can oppose, economists sometimes ask, efforts to think in a systematic way about the consequences of different courses of action? The alternative, it would appear, is unexamined decision-making. But defining cost-benefit analysis so simply leaves it with few implications for actual regulatory decision-making. Presumably, therefore, those who urge regulators to make greater use of the technique have a more extensive prescription in mind. I assume here that their prescription includes the following views:

1. [There] exists a strong presumption—that an act should not be undertaken unless its benefits outweigh its costs.
2. In order to determine whether benefits outweigh costs, it is desirable to attempt to express all benefits and costs in a common scale or denominator, so that they can be compared with each other, even when some benefits and costs are not traded on markets and hence have no established dollar values.
3. Getting decision-makers to make more use of cost-benefit techniques is important enough to warrant both the expense required to gather the data for improved cost-benefit estimation and the political efforts needed to give the activity higher priority compared to other activities, also valuable in and of themselves.

My focus is on cost-benefit analysis as applied to environment, safety, and health regulation. In that context, I examine each of the above propositions from the perspective of formal ethical theory, that is, the study of what actions it is morally right to undertake. My conclusions are:

1. In areas of environmental, safety, and health regulation, there may be many instances where a certain decision might be right even though its benefits do not outweigh its costs.

*Regulation* (Jan., Feb., 1981), pp. 74-82. Reprinted by permission of the American Enterprise Institute for Public Policy Research, Washington, D.C.

2. There are good reasons to oppose efforts to put dollar values on non-marketed benefits and costs.

3. Given the relative frequency of occasions in the areas of environmental, safety, and health regulation where one would not wish to use a benefits-outweigh-costs test as a decision rule, and given the reasons to oppose the monetizing of non-marketed benefits or costs that is a prerequisite for cost-benefit analysis, it is not justifiable to devote major resources to the generation of data for cost-benefit calculations or to undertake efforts to "spread the gospel" of cost-benefit analysis further.

## II

In order for cost-benefit calculations to be performed the way they are supposed to be, all costs and benefits must be expressed in a common measure, typically dollars, including things not normally bought and sold on markets and to which dollar prices are therefore not attached. The most dramatic example of such things is human life itself; but many of the other benefits achieved or preserved by environmental policy—such as peace and quiet, fresh-smelling air, swimmable rivers, spectacular vistas—are not traded on markets either.

Economists who do cost-benefit analysis regard the quest after dollar values for nonmarket things as a difficult challenge—but one to be met with relish. They have tried to develop methods for imputing a person's "willingness to pay" for such things, their approach generally involving a search for bundled goods that are traded on markets and that vary as to whether they include a feature that is, by itself, not marketed. Thus, fresh air is not marketed, but houses in different parts of Los Angeles that are similar except for the degree of smog are. Peace and quiet is not marketed, but similar houses inside and outside airport flight paths are. The risk of death is not marketed, but similar jobs that have different levels of risk are. Economists have produced many often ingenious efforts to impute dollar prices to nonmarketed things by observing the premiums accorded homes in clean air areas over similar homes in dirty areas or the premiums paid for risky jobs over similar nonrisky jobs.

These ingenious efforts are subject to criticism on a number of technical grounds. It may be difficult to control for all the dimensions of quality other than the presence or absence of the non-marketed thing. More important, in a world where people have different preferences and are subject to different constraints as they make their choices, the dollar value imputed to the non-market things that most people would wish to avoid will be lower than otherwise, because people with unusually weak aversion to those things or unusually strong constraints on their choices will be willing to take the bundled good in question at less of a discount than the average person. Thus, to use the property value discount of homes near airports as a measure of people's willingness to pay for quiet means to accept as a proxy for the rest of us the behavior of those least sensitive to noise of airport employees (who value the convenience of a near-airport location) or of others who are susceptible to an agent's assurances that "it's not so bad." To use the wage premiums accorded hazardous work as a measure of the value of

life means to accept as proxies for the rest of us the choices of people who do not have many choices or who are exceptional risk-seekers.

A second problem is that the attempts of economists to measure people's willingness to pay for non-marketed things assume that there is no difference between the price a person would require for giving up something to which he has a preexisting right and the price he would pay to gain something to which he enjoys no right. Thus, the analysis assumes no difference between how much a homeowner would need to be paid in order to give up an unobstructed mountain view that he already enjoys and how much he would be willing to pay to get an obstruction moved once it is already in place. Available evidence suggests that most people would insist on being paid far more to assent to a worsening of their situation. The difference arises from such factors as being accustomed to and psychologically attached to that which one believes one enjoys by right. But this creates a circularity problem for any attempt to use cost-benefit analysis to determine whether to assign to, say, the homeowner the right to an unobstructed mountain view. For willingness to pay will be different depending on whether the right is assigned initially or not. The value judgment about whether to assign the right must thus be made first. (In order to set an upper bound on the value of the benefit, one might hypothetically assign the right to the person and determine how much he would need to be paid to give it up.)

Third, the efforts of economists to impute willingness to pay invariably involve bundled goods exchanged in private transactions. Those who use figures garnered from such analysis to provide guidance for public decisions assume no difference between how people value certain things in private individual transactions and how they would wish those same things to be valued in public collective decisions. In making such assumptions, economists insidiously slip into their analysis an important and controversial value judgment, growing naturally out of the highly individualistic microeconomic tradition—namely, the view that there should be no difference between private behavior and the behavior we display in public social life. An alternate view—one that enjoys, I would suggest, wide resonance among citizens—would be that public, social decisions provide an opportunity to give certain things a higher valuation than we choose, for one reason or another, to give them in our private activities.

Thus, opponents of stricter regulation of health risks often argue that we show by our daily risk-taking behavior that we do not value life infinitely, and therefore our public decisions should not reflect the high value of life that proponents of strict regulation propose. However, an alternate view is equally plausible. Precisely because we fail, for whatever reasons, to give life-saving the value in everyday personal decisions that we in some general terms believe we should give it, we may wish our social decisions to provide us the occasion to display the reverence for life that we espouse but do not always show. By this view, people do not have fixed unambiguous "preferences" to which they give expression through private activities and which therefore should be given expression in public decisions. Rather, they may have what they themselves regard as "higher" and "lower" preferences. The latter may come to the fore in private decisions, but people may want the former to come to the fore in public decisions. They may sometimes display racial prejudice, but support anti-discrimination laws. They may buy a certain

product after seeing a seductive ad, but be skeptical enough of advertising to want the government to keep a close eye on it. In such cases, the use of private behavior to impute the values that should be entered for public decisions, as is done by using willingness to pay in private transactions, commits grievous offense against a view of the behavior of the citizen that is deeply engrained in our democratic tradition. It is a view that denudes politics of any independent role in society, reducing it to a mechanistic, mimicking recalculation based on private behavior.

Finally, one may oppose the effort to place prices on a non-market system out of a fear that the very act of doing so will reduce the thing's perceived value. To place a price on the benefit may, in other words, reduce the value of that benefit. Cost-benefit analysis thus may be like the thermometer that, when placed in a liquid to be measured, itself changes the liquid's temperature.

Examples of the perceived cheapening of a thing's value by the very act of buying and selling it abound in everyday life and language. The disgust that accompanies the idea of buying and selling human beings is based on the sense that this would dramatically diminish human worth. Epithets such as "he prostituted himself," applied as linguistic analogies to people who have sold something, reflect the view that certain things should not be sold because doing so diminishes their value. Praise that is bought is worth little, even to the person buying it. A true anecdote is told of an economist who retired to another university community and complained that he was having difficulty making friends. The laconic response of a critical colleague—"If you want a friend why don't you buy yourself one"—illustrates in a pithy way the intuition that for some things, the very act of placing a price on them reduces their perceived value.

The first reason that pricing something decreases its perceived value is that, in many circumstances, non-market exchange is associated with the production of certain values not associated with market exchange. These may include spontaneity and various other feelings that come from personal relationships. If a good becomes less associated with the production of positively valued feelings because of market exchange, the perceived value of the good declines to the extent that those feelings are valued. This can be seen clearly in instances where a thing may be transferred both by market and by non-market mechanisms. The willingness to pay for sex bought from a prostitute is less than the perceived value of the sex consummating love. (Imagine the reaction if a practitioner of cost-benefit analysis computed the benefits of sex based on the price of prostitute services.)

Furthermore, if one values in a general sense the existence of a non-market sector because of its connection with the production of certain valued feelings, then one ascribes added value to any non-marketed good simply as a repository of values represented by the non-market sector one wishes to preserve. This seems certainly to be the case for things in nature, such as pristine streams or undisturbed forests: for many people who value them, part of their value comes from their position as repositories of values in the non-market sector.

The second way in which placing a market price on a thing decreases its perceived value is by removing the possibility of proclaiming that the thing is "not for sale," since things on the market by definition are for sale.

The very statement that something is not for sale affirms, enhances, and protects a thing's value in a number of ways. To begin with, the statement is a way of showing that a thing is valued for its own sake whereas selling a thing for money demonstrates that it was valued only instrumentally. Furthermore, to say that something cannot be transferred in that way places it in the exceptional category—which requires the person interested in obtaining that thing to be able to offer something else that is exceptional, rather than allowing him the easier alternative of obtaining the thing for money that could have been obtained in an infinity of ways. This enhances its value. If I am willing to say "You're a really kind person" to whoever pays me to do so, my praise loses the value that attaches to it from being exchangeable only for an act of kindness.

In addition, if we have already decided we value something highly, one way of stamping it with a cachet affirming its high value is to announce that it is "not for sale." Such an announcement does more, however, than just reflect a preexisting high valuation. It signals a thing's distinctive value to others and helps us persuade them to value the thing more highly than they otherwise might. It also expresses our resolution to safeguard that distinctive value. To state that something is not for sale is thus also a source of value for that thing, since if a thing's value is easy to affirm or protect, it will be worth more than an otherwise similar thing without such attributes.

If we proclaim that something is not for sale, we make a once-and-for-all judgment of its special value. When something is priced, the issue of its perceived value is constantly coming up, as a standing invitation to reconsider that original judgment. Were people constantly faced with questions such as "how much money could get you to give up your freedom of speech?" or "how much would you sell your vote for if you could?", the perceived value of the freedom to speak or the right to vote would soon become devastated as, in moments of weakness, people started saying "maybe it's not worth so much after all." Better not to be faced with the constant questioning in the first place. Something similar did in fact occur when the slogan "better red than dead" was launched by some pacifists during the Cold War. Critics pointed out that the very posing of this stark choice—in effect, "would you *really* be willing to give up your life in exchange for not living under communism?"—reduced the value people attached to freedom and thus diminished resistance to attacks on freedom.

Finally, of some things valued very highly it is stated that they are "priceless" or that they have "infinite value." Such expressions are reserved for a subset of things not for sale, such as life or health. Economists tend to scoff at talk of pricelessness. For them, saying that something is priceless is to state a willingness to trade off an infinite quantity of all other goods for one unit of the priceless good, a situation that empirically appears highly unlikely. For most people, however, the word priceless is pregnant with meaning. Its value-affirming and value-protecting functions cannot be bestowed on expressions that merely denote a determinate, albeit high, valuation. John Kennedy in his inaugural address proclaimed that the nation was ready to "pay any price [and] bear any burden . . . to assure the survival and the success of liberty." Had he said instead that we were willing to "pay a high price" or "bear a large burden" for liberty, the statement would have rung hollow.

### III

An objection that advocates of cost-benefit analysis might well make to the preceding argument should be considered. I noted earlier that, in cases where various non-utility-based duties or rights conflict with the maximization of utility, it is necessary to make a deliberative judgment about what act is finally right. I also argued earlier that the search for commensurability might not always be a desirable one, that the attempt to go beyond expressing benefits in terms of (say) lives saved and costs in terms of dollars is not something devoutly to be wished.

In situations involving things that are not expressed in a common measure, advocates of cost-benefit analysis argue that people making judgments "in effect" perform cost-benefit calculations anyway. If government regulators promulgate a regulation that saves 100 lives at a cost of \$1 billion, they are "in effect" valuing a life at (a minimum of) \$10 million, whether or not they say that they are willing to place a dollar value on a human life. Since, in this view, cost-benefit analysis "in effect" is inevitable, it might as well be made specific.

This argument misconstrues the real difference in the reasoning processes involved. In cost-benefit analysis, equivalencies are established *in advance* as one of the raw materials for the calculation. One determines costs and benefits, one determines equivalencies (to be able to put various costs and benefits into a common measure), and then one sets to toting things—waiting, as it were, with bated breath for the results of the calculation to come out. The outcome is determined by the arithmetic, if the outcome is a close call or if one is not good at long division, one does not know how it will turn out until the calculation is finished. In the kind of deliberative judgment that is performed without a common measure, no establishment of equivalencies occurs in advance. Equivalencies are not aids to the decision process. In fact, the decision-maker might not even be aware of what the "in effect" equivalencies were, at least before they are revealed to him afterwards by someone pointing out what he had "in effect" done. The decision-maker would see himself as simply having made a deliberate judgment; the "in effect" equivalency number did not play a causal role in the decision but at most merely reflects it. Given this, the argument against making the process explicit is the one discussed earlier in the discussion of problems with putting specific values on things that are not normally quantified—that the very act of doing so may serve to reduce the value of those things.

My own judgment is that modest efforts to assess levels of benefits and costs are justified, although I do not believe that government agencies ought to sponsor efforts to put dollar prices on non-market things. I also do not believe that the cry for more cost-benefit analysis in regulation is, on the whole, justified. If regulatory officials were so insensitive about regulatory costs that they did not provide acceptable raw material for deliberative judgments (even if not of a strictly cost-benefit nature), my conclusion might be different. But a good deal of research into costs and benefits already occurs—actually, far more in U.S. regulatory process than in that of any other industrial society. The danger now would seem to come more from the other side.

## A Boat for Thoreau

WILLIAM McDONOUGH

One of the great leaders of the United States, Thomas Jefferson, saw himself primarily as a designer. This is evident from his tombstone, which he designed, and on which we can read three things: "Thomas Jefferson, author of the Declaration of American Independence, author of the Statute of Virginia for Religious Freedom, and Father of the University of Virginia." These were the three things Jefferson thought were worth mentioning on his tombstone. He did not record his various activities—that he had been president of the United States, minister to France, an architect. He recorded only what he had left behind for future generations: his creative legacy, to the world, his lasting contributions to prosperity. Consider looking at the world as a series of design assignments. How would we present the design assignment of the Declaration of Independence? Perhaps it could be framed like this: please prepare a document that provides us with the concept of "life, liberty and the pursuit of happiness free from remote tyranny." That would be the retroactive design assignment of the Declaration of Independence.

In Mr. Jefferson's case, "remote tyranny" referred to the King of England, George III: someone who ruled from a distant place, who was not sensitive to local needs and circumstance. Now, seven generations later, I believe we need to look at the concept of many Declarations of Interdependence, because we realize that some of the remote tyranny future generations will suffer—is us. Right now, we—as a culture—are imposing what I call intergenerational remote tyranny. I would like to focus on this tyrannizing effect from a design perspective and consider how we can design it out.

Thomas Jefferson clearly understood the idea of intergenerational remote tyranny. In 1789, he wrote a letter to James Madison, which I paraphrase here:

The earth belongs to the living. No man may by natural right oblige the lands he owns or occupies to debts greater than those that may be paid during his own lifetime. Because if he could, then the world would belong to the dead and not to the living.<sup>1</sup>

In *Silent Spring*, Rachel Carson stated that the founding fathers who wrote the Bill of Rights—despite their intellectual gifts and foresight—could not have imagined that corporations, governments, and individuals would poison children downstream.<sup>2</sup> They did not protect us from this kind of tyranny in the Bill of Rights because they could not even conceive of such a problem. We have to remember that Jefferson and Madison were living in a world that was effectively solar-powered. Their homes, the original grounds of the University of Virginia, were built with local materials: local clay, local fuel

sources, solar-driven fuel sources. These people inhabited a world of natural energy flows. At that time, you could look out to the West and see a vast expanse of natural resources. Petrochemicals had not yet been invented. Yet Jefferson's phrase "The earth belongs to the living" is a powerful commentary on the tyrannies we are now seeing due to poor design.

Regulations are signals of design failure. They can even be seen—in the case of regulated toxic emissions—as licenses to kill. Polluters are basically telling us, "You are going to be poisoned. The question is, how long will it take?" Regulation is a signal of design and ethical failure. So I agree with a lot of the discussion about removing regulations to liberate business, but I would like to do it for all generations, not just this one. And I would like to do it by design, on purpose, with intention.

Jefferson's design legacy still provides for us, his seventh generation, and it continues to offer profound benefits even as the world changes around us. To see the legacy he brought to the Bill of Rights more clearly, we have to consider what it promulgated over time and imagine what it might promulgate in the future.

Jefferson wrote, "No man may by natural right . . ." "Natural rights" had become a fundamental concept for Jefferson, and he expanded on it often. In *The Rights of Nature*, Roderick Nash pointed out that the concept of rights has been expanding since the Magna Carta gave rights to white noble English males in 1215. In 1776, the Declaration of Independence gave rights to white American land-owning males. In 1864, we had the Emancipation Proclamation. In 1922, female suffrage. In 1964, the Civil Rights Voting Act. And then, in 1973, the Endangered Species Act: the first time in our history that human beings took responsibility for giving other living species the right to exist. We acknowledged the rights of nature itself. From our perspective, "natural rights" has now expanded to include the rights of nature itself.<sup>3</sup>

If we project this pattern out, it is clear that our next discourse must be about endangered ecosystems, because we are finally realizing our interdependent connection to the natural world, and it won't be enough that there's a snail here or a condor there. We now understand that we are all connected to the web of life. Our understanding of rights and responsibilities must expand to include the rights and responsibilities of all living things.

Many people question the use of the word *dominion* in the Book of Genesis, which states that human beings are given dominion over the earth. Some wish the word had been *stewardship*, because of the relationship that might imply. Yet stewardship and dominion are both still anthropocentric concepts and presume we are in charge of everything. The Native American question is really the most relevant: How do we find ourselves in kinship with nature? How do we recognize ourselves as a vital and responsible part of it? To see the world this way, and to begin creating things within that context, is an exciting prospect. We need to understand and design for a world of fecundity, growth, and abundance, not for a world of destruction, loss, and limits.

What is the natural world, and how are humans meant to inhabit it? In 1836, Emerson wrote an essay entitled "Nature" in which he reflected on these questions: If human beings are natural, are all things made by humans

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natural? For that matter, what is Nature? He concluded that Nature is all those things that are immutable—those “essences” unaffected by man. His examples were the mountains, the oceans, the leaves.<sup>4</sup>

Following Emerson, Thoreau contemplated the mutability of nature and the search for our rightful and meaningful place within it. Unlike Emerson however, he understood that we can affect the natural world. Today, the notion that nature is immutable, that there are “essences” so powerful they are beyond our ability to *affect* them, is obsolete.

We used to be able to throw things away. Remember that? Things went “away.” Where is “away” now? “Away” is here. “Away” is someone’s backyard. There is no place to go from here. We now see that we inhabit a smaller and smaller planet. “Away” has become very close indeed.

In this context, we must again ask ourselves, “What is natural?” and, “What are our intentions as evidenced by our designs?” Early in the 1830s, Ralph Waldo Emerson went to Europe on a sailboat and returned on a steamship. Let me abstract this for effect: He went over on a solar-powered recyclable craft operated by crafts persons practicing ancient arts in the open air. He returned in a steel rust bucket putting oil on the water and smoke in the sky, operated by people working in the dark shoveling fossil fuels into the mouths of boilers. We are still designing steamships. Most buildings we design are essentially steamships. On any given day, the sun is shining and we’re inside with the lights on causing the production of nuclear isotopes, carbon dioxide, nitrous oxides, and sulfur dioxide. Every time you find yourself in a building illuminated by electric light when the sun is shining, you should think, “I am in a steamship. I am in the dark.” We need a new design. We need a boat for Thoreau.

Peter Senge, a professor at MIT’s Sloan School of Management, works with a Learning Laboratory, a program where he discusses how organizations learn to learn. One of the first questions he asks the CEOs and chairs that attend his leadership program is, “Who is the leader on a ship crossing the ocean?” The responses he gets are *captain*, *navigator*, *helmsman*. But Senge tells them no: the leader of that ship is the designer of that ship, because you can be the best captain in the world, but if your ship is not designed to be seaworthy, you’re going down.<sup>5</sup> From my perspective as a designer, the ship designed during the First Industrial Revolution is going down. I want to focus on the design of that ship, and I want us to imagine what the boat for Thoreau might be like—how it would work, what it would be made of, and what effects it might have. This boat is my metaphor for the design assignment of the Next Industrial Revolution.

What is the fundamental design principle of a steamship and most modern systems? The only one I can discover is, “If brute force doesn’t work, you’re not using enough of it.” In fact, that’s the design principle behind most modern architecture, behind what is known as the “International Style.” You can build the same building in Reykjavik as in Rangoon, you simply heat one and cool the other. If you’re too hot or too cold, just add more energy. If brute force doesn’t work, you’re not using enough of it. This principle kills culture. This principle kills society. This principle kills nature. And this principle kills diversity. It kills the richness of experience—the wealth of our relationship to the web of life and place.

I would like to posit the design principles for the Next Industrial Revolution, and I would also like to describe a new design assignment. But first

let me describe the retroactive design assignment of the First Industrial Revolution: Would you design a system of production and a system of commerce that

- produces billions of pounds of highly toxic hazardous material and puts them in your soil, your air, and your water every year?
- measures prosperity by how much of your natural capital you can dig up, burn, deplete, throw into holes in the ground and into the rivers and otherwise destroy?
- measures productivity by how few people are working?
- measures progress by how many smokestacks you have?
- requires thousands of complex regulations to keep you from killing each other too quickly?
- produces a few things so highly dangerous and toxic they will require future generations to maintain constant vigilance while living in terror?

That is the retroactive design assignment of the First Industrial Revolution. Is this an ethical assignment?

I am sure the framers of the Bill of Rights had no idea this could be posited as a design. In fact, I don’t think it is a design, because it didn’t happen by intention. The First Industrial Revolution happened incrementally, in a series of steps, as designers and engineers responded to single problems with the materials and information at hand. We have now reached the point where we can agree that this is not a design assignment we wish to accept in our time, and it is certainly not one we want to pass on to our children. It is time to look again at the horizon with delight and anticipation, with a new responsibility and a new design legacy in mind.

A magnificent example of true intergenerational responsibility is the great Peacemaker of the Six Nations of the Iroquois, who instructed all chiefs to make decisions on behalf of their seventh generation to come. Those of us here today are Thomas Jefferson’s seventh generation: he designed the Declaration of Independence for us. So it’s our turn now to make decisions on behalf of our seventh generation. Let’s design a system for what I call the Next Industrial Revolution that

- introduces no hazardous material into the soil, the air, and the water every year
- measures prosperity by how much natural capital and how much solar income we can accrue in productive and fecund ways
- measures productivity by how many people are being gainfully and meaningfully employed
- measures progress by how many buildings have no smokestacks, no dangerous effluents, and no pipes
- does not require regulations to stop us from killing one another too quickly
- produces nothing that will require future generations to maintain vigilance and live in terror

I believe we can accomplish great and profitable things within that conceptual framework. But first, we must step out of the framework of guilt. Guilt does not help us. People who feel guilty often tell themselves, “I am guilty, I am guilty,” and then they keep doing what they were doing. This is the way they compensate, by saying, “I am bad. I am bad. I am sorry.” What we need is a much more productive concept: Negligence starts tomorrow.

If you recognize the tragic consequences of bad design and mindlessly continue to do what you are doing, then you are negligent. But what we want is change, not guilt. Because if you project the tragedy, as Jaime Lerner, the brilliant civic visionary and governor of Parana, Brazil, has pointed out, you have the tragedy. Unless you change immediately, you are unintentionally invested in watching the tragedy occur. As designers with intention, you have then adopted what Governor Lerner would call a "Strategy of Tragedy." As he would say, when you recognize the tragedy you have the tragedy.

The New York City Regional Plan Association just published a report entitled *A Region at Risk*, which indicated that a generation ago the impervious surfaces of the New York metropolitan region—the roads, the buildings, the parking lots—made up 19 percent of the city's surfaces. In 1996, they made up 30 percent. The projection for 2020? 45 percent impervious surfaces.<sup>6</sup> Imagine this pattern continuing until the amount of impervious surfaces rises to 70 or 80 percent. Where are the songbirds? What is the temperature? Where do the children play? What does the water look like? This is a tragedy. How do we deal with this tragedy? The only way to counter a Strategy of Tragedy is to adopt a Strategy of Change.

This Strategy of Change must go beyond what business and government have responded with, which we call "eco-efficiency." A primary response to the Earth Summit by the Business Council for Sustainable Development and the environmental organizations was eco-efficiency—do more with less. Although eco-efficiency is a noble and valuable concept, it is not going to save us for several reasons. First of all, its motivation is guilt. When we adopt eco-efficiency, we are basically telling ourselves, "I am bad. I am bad. I am using too much fuel and too much wood. I'm destroying cultures. I'm creating pollution. I've got to cut my energy consumption. I've got to go through all this tedious stuff because I'm bad."

When I gave the opening address at a conference celebrating the conclusion of the Environmental Protection Agency's 33/50 Voluntary Toxics Reduction Program last year, we found that people there were very excited—and rightly so—because they had achieved toxic reductions of 90 percent. But we have to wonder what we were doing before these reductions. Even more importantly, we have to realize that the 10 percent we have now becomes a new, negative 100 percent, because current scientific studies are telling us that even the smallest trace amounts of certain contaminants can have devastating effects—on our endocrine systems, for example. So this smaller amount of dangerous effluent becomes a new 100 percent to eliminate entirely. This isn't revolutionary; it's still a linear process headed for zero and never getting there, like Zeno's Paradox. What do we tell our children? "You're really bad. Try to feel better by being less bad. And your goal is zero." This is our legacy? I don't know any business person who thinks a goal of zero is very exciting.

From the "Third World's" perspective, eco-efficiency is simply the "First World" figuring out how to use the "Third World's" resources longer. Since our 20 percent of the world is using up 80 percent of the world's resources, they see eco-efficiency as a way for us to steal from the rest of the world for a longer period of time.

That's the problem with eco-efficiency from a designer's perspective: it tells us to leave the way we do things in the world the same—to just get better and more "efficient" at it. It's the same system that got us into trouble

in the first place, slowed down. Paradoxically, this may make eco-efficiency even more insidious, because people are lulled into thinking the problem is being solved, when we're really just going in the same direction.

Let me borrow an analogy from Dave Crockett, a city councilor in Chattanooga: if you're driving out of Charlottesville, Virginia, you can go north to Washington, D.C., or you can go south to Lynchburg. If you find yourself going one hundred miles an hour toward Washington when you're supposed to be going to Lynchburg, it isn't going to help you to slow down to twenty miles an hour. We've got to turn around. We've got to be going somewhere else. But where? What principles do we use to get there?

A real Strategy of Change requires a new and inspiring vision of taking, making, using, and consuming in the world. We need massive creative imagination, with the design goal of imagining what perfect looks like. Then we can have a new, positive, 100 percent to work on. That's what I'm really interested in: redesign toward that 100 percent, so we can wake up in the morning and say, "I am only 20 percent sustainable. Tomorrow I want to be 21 percent. I'm trying to reach 100 percent sustainability. That's my chart." We've got to chart a new course and begin heading in a different direction. That means we have to start imagining what the new course looks like, and start framing the conditions required to achieve it.

I have developed some principles that we use in our work:

1. *Waste Equals Food.*<sup>7</sup> In nature, there is no such thing as waste, so the first thing we must do is eliminate the concept of waste. I am not saying we need to minimize waste; I am saying we need to eliminate the entire concept of waste.
2. *Use Current Solar Income.* Nature does not mine the past; it does not borrow from the future. It operates on current income. Most of us can't pursue our professional lives working out of capital reserves. We have to work with current income, and so should our designs.
3. *Respect Diversity.* One size does not fit all. We are all different. Every place in the world is completely different; material flows, spiritual flows, character flows, cultural flows, energy flows—all of these vary in different places. We should celebrate our differences instead of trying to make us all the same.

These are the fundamental principles. But we also need new design criteria. The traditional design criteria used by designers until now are three: *cost*, *performance*, and *aesthetics*. Can I afford it? Does it work? Do I like it? Now we have to add three more characteristics: Is it ecologically intelligent? Is it just? Is it fun? How do I apply these principles to find out what is ecologically intelligent? How do I apply these principles to find out what is just? (The fun part I'm going to leave to you.)

If *Waste Equals Food*, we eliminate the concept of waste. If we eliminate the concept of waste, there is no such thing as waste, and everything becomes a product. So we need some guidelines to help us design these products. I have been inspired by a chemist named Michael Braungart from Germany, and he and I have developed a series of protocols that we use when designing products. We've identified a whole typology of products.

If *Waste Equals Food* and "food" implies nutrients, then we need to understand that nutrients work within a metabolism. What are the metabolisms we find in the world? What are the artifacts of human artifice, and what is their relationship to these metabolisms? Remember that question of Emerson's: If human beings are natural, are all things made by humans natural?

We now know that many things made by humans are not "natural." So there are two fundamental metabolisms in the world: one is biological, the world of biological systems, of which we are physically a part; the other is the metabolism of human industry that exists apart from natural systems. We need to design products to go into each of these metabolisms so that they nourish one metabolism without contaminating the other.

The things we design to go into the biological metabolism should not contain mutagens, carcinogens, heavy metals, persistent toxins, bioaccumulative substances, or endocrine disrupters. The things we design to go into the technical metabolism should circulate in a closed loop forever; they should not unintentionally contaminate the organic metabolism, because many materials we marshal into the technical metabolism can damage or kill the organic metabolism.

We need to design into these two metabolisms, and this will mean products are differentiated into three fundamental types: a *Product of Consumption*, a *Product of Service*, and an *Unmarketable Product*. A *Product of Consumption* is designed to return safely to the organic cycle. It is literally a consumable and goes back to the soil. A *Product of Service* is designed to go back into the technical cycle, into the industrial metabolism from which it came. An *Unmarketable Product* is a product that should not be made because it can't feed either of these two metabolisms; this category includes substances such as radioactive materials and currently indissoluble contaminated materials, like the chromium contained in shoes.

I spent most of my childhood in the Far East, in Hong Kong, and when I moved to America, I was amazed by the fact that we no longer seem to be people with lives; we've become "consumers" with lifestyles. When did we stop being people with lives? We are not "consumers." We are people. The media will tell us how many "consumers" bought television sets, but how do you consume a television set?

Imagine I had a television hidden behind my desk and I said, "I have this amazing thing. It's a *Product of Service* because you want the function, not the thing. You want the service the item provides, but you do not necessarily want the ownership of its complex and potentially hazardous materials. Again, you want the function, not the thing. Before I tell you what the thing does, which will interest you, let me tell you what it is: It is thousands of chemicals, it has toxic heavy metals, it has a potentially implosive glass tube, and we want you to put it at eye level with your children and encourage them to play with it." Do you want this in your house? Why are we selling people hazardous waste? What do you want with this thing? You want to watch television, you don't want to own hazardous waste. When you pay for a television set today you have the right (the "right") to take this combination of valuable heavy metals and miscellaneous toxins and dump it in a trashcan. Future generations are going to look back and say, "What were you thinking? What did you do with the mercury? What did you do with the chromium? You lost its quality! You put it in little holes all over the planet where we can never get it back! And it is persistently toxic! What were you thinking?"

Think about the redesign of this product as a *Product of Service*, because what happens is remarkable. When you have finished with the use of the machine, you ask yourself, "Whose food is this?" A television set is obviously food for the electronics and other industries.

My partner and I work with major corporations to redesign these products to be, in effect, leased by the manufacturer to the customer—not consumer, customer. Customers purchase the use of a machine, and when they are finished with it they can return it to the manufacturer and say, "Thank you very much for the use of this television. I would like a new one." The system is designed so that the old product goes back into what we call the "technical cycle" and becomes a *Product of Service* again—forever. This design for return we call our Eco-leasing concept.

We talk about recycling, but most of us don't recycle in the full sense of the word; we often do what Michael Braungart and I call "downcycling"—we reduce the quality of a material until its value is practically nonexistent. In other words, we slow its journey to the landfill. For example, when a high quality plastic like PET is "recycled" it may be mixed with other plastics to produce a hybrid of much lower quality, which is then used to make park benches. The original elevated quality can never be retrieved. So what we call recycling is still working with a *Cradle-to-Grave* life cycle.

Michael Braungart points out that the *Cradle-to-Grave* mentality is definitely Northern European. In Sweden, if you throw a banana peel on the ground it is going to be there a long time, because nothing rots quickly. Northern Europeans tended to bury everything. Western culture, then, tends to bury unwanted things. Consequently, our culture developed products in terms of a *Cradle-to-Grave* life cycle concept; once you finish with something you bury it because you don't want to look at it. In the abstract, one might say it's too bad the First Industrial Revolution didn't begin in a place like Mali. As Dr. Braungart notes, if you go to "primitive" places today, you might see a lot of aluminum cans lying on the ground outside a fence and think the people there are inconsiderate and slovenly. But those people once drank out of clay cups or gourds, and when they finished, they would simply toss the vessel over the fence and the goats, ants, or beetles would take it away. Its organic materials would nourish other organisms and go back to the soil. So these people are still doing what they've been doing forever; modern production just hasn't provided them with an intelligent design for a container that turns back into dirt—a design in what I call a *Cradle-to-Cradle* life cycle.

Plastic bottles could easily be redesigned so that they don't contain questionable substances and could safely replenish the soil. Right now they may contain antimony, catalytic residues, UV stabilizers, plasticizers, and antioxidants. What happens when the people in Mali throw that over the fence? Why not design a bottle so that when you finish with it you toss it into the compost or it biodegrades by the roadside, or it can be used as fuel for needy people to cook with? It should be safe fuel. If a clothing manufacturer wants to make clothing out of it, it should not contain potentially toxic substances. Plastic bottles were not originally designed to become clothing; they were designed to hold liquids. We have a fundamental design problem. We need to design things so they go into the biological or the technical cycle, safely, *Cradle-to-Cradle*.

*Use Current Solar Income.* I think we're going to resolve the energy problem, because we have current solar income. Energy from the sun is the only income the planet has (except for meteorites); all our other materials are already here. If you're in business, you understand that you must work from current income, not savings. Because we have that income from

the sun, I think it won't be long before we find elegant solutions to the energy situation.

The University of Virginia's School of Architecture is about to build a building addition project designed to be a net energy exporter, a structure that produces more energy than it consumes. Why would we want to make a building that produces more energy than it needs? The reason is that *sustainability* may just be a shibboleth—the magic word that lets us into the temple of hope. A lot of people use the term *sustainability* as if it's going to save us. But sustainability as it's presently defined may be only the edge between destruction and restoration. Why would we want to simply sustain where we are now? We're in a depletive mode. We need to actually design things that are restorative. Think about the high-tech designs you see around you: airplanes, computers, space age stores. Imagine how much farther we can go, how wonderfully ambitious we can really be.

What is one of the best designs we know of for inspiration? How about a tree? How about a design that can accrue solar income, is fecund, produces habitat for all sorts of living things including people, provides fuel, food, and micro-climate, distills and transpires water, sequesters carbon, and makes oxygen? How many things do you know that do that? How many things have humans designed that make oxygen?

Why not make a building that produces oxygen? Why not make a building that produces energy? We're not very bright or ambitious designers if we can't even emulate a tree, which nature has put right there in front of us as an obvious model. Just compare a tree to most rooms. Right now, I'm in a room that sucks electrical energy from a grid, I'm responsible for the production of nuclear isotopes simply by turning on a light switch, and I'm probably breathing all sorts of chemical experiments I don't even realize I am undertaking. Compared to a tree, this is obviously primitive design. If I'm going to be a sophisticated designer, I had better start thinking more about trees—about buildings that produce more energy than they need and purify their water, and I had better start thinking about designing buildings and sites that absorb water quickly and release it slowly in a pure form like healthy soil. A building could be a restorative thing, a thing that is more fecund than destructive.

Do modern buildings absorb water quickly and release it slowly? Absolutely not. Water coming to human environments has been treated as if it is chemistry; H<sub>2</sub>O suffering from physics, and falling, and we have got to get it away as quickly as possible. But water is the flux of life. Human beings are biology; we are where chemistry and physics conjoin. So our designs need to celebrate this flux and celebrate water, not just flush it, contaminated, away as fast as we can. We are now conceptualizing designs "without pipes." We are designing building materials and sites that absorb, filter, and transpire water, that keep buildings cool and provide habitat on site. Just like nature, they will release water slowly and cleanly.

One particular project we are designing right now is a new corporate campus for a large corporation in San Bruno, California, near San Francisco. The roof is a giant, undulating, grass-covered savannah. In the middle of the site there is an open-air courtyard around an established grove of oaks. So from the air a bird looking down might think, "Oh. That looks nice." Where are the songbirds in modern building? This roof is for songbirds.

When you're inside the building the ceiling looks like a cloud. The interior is fully daylight, so the sun illumines the workspace during the day. Workers spending their day indoors feel as if they've been outdoors. We've put in raised floors, which everyone wants for planning flexibility but no one can afford, and we've put them in because they allow us to run cool evening air from the San Francisco area against the concrete slabs all night long to refresh the air and cool the building down. This design means we don't have to pump foreign energy into the building during the day to cool it, and it also means there's fresh air individually directed into each person's breathing zone. Because of these strategies, we're able to cut energy equipment and energy consumption and pay for the raised floors. The building works just like an old hacienda, but goes even further with new techniques. From the air the roof is the earth. From the interior the roof is the sky. A building that's like a tree. A building that's like a meadow. Why not do this all the time?

We can do this all the time, but we need integrative thinking. We need new design principles, new aesthetics, and new engineering. Imagine what might happen if we applied our design principles to various things starting with the molecule and working up the scale to buildings, cities, and regions.

We were asked to design a fabric for a unit of the Steelcase Corporation, the largest office furniture maker in the country, and we told them we were honored to be among the famous designers they'd selected—Richard Meier, Aldo Rossi, Robert Venturi, Denise Scott Brown—these were all impressive architects. But we said we had one stipulation: unlike the others, we would not just design what the fabric looks like; we would design what it is. The company told us they expected we might say that, so they presented us with an option: what about a blend of cotton, which is natural, and PET soda bottles, which are recycled? If you put the two together, they said, you have natural, you have recycled—all the current eco-product buzzwords. You're all set. It's also durable and cheap.

But let's think about this for a minute: Is this blend an organic nutrient? Is this a Product of *Consumption*? Can it go back to soil safely? Not with the PET. Is it a product of service? Can it go back to technical cycles? Not with the cotton. Look again at our criteria: Is it ecologically intelligent? Is it just? Cotton currently occasions over 20 percent of the world's pesticide use, causes hydrological disasters, and has never been associated with social fairness. As I mentioned earlier, recycled fabrics from plastic bottles may contain antioxidants, UV stabilizers, and antimony residues from catalytic reactions. Does this belong next to human skin? Why would we want to help a company make this kind of product?

In this case, we decided to create a fabric that would be an organic nutrient, a Product of Consumption. Our client, Susan Lyons, the design director at DesignTex, arranged for us to work at Rohner Textil, a respected textile mill in Switzerland, with Albin Kälin, a director who had already made many advances at his mill. But when we arrived, Kälin told us that our project was fortuitous, because the trimmings of his bolts of cloth had just been declared hazardous waste by the Swiss government. He could no longer bury or burn it in Switzerland but had to pay to export the trimmings. Haven't you hit the wall of the First Industrial Revolution when the edges of your product are declared hazardous waste but you can still sell



what's in the middle? With eco-efficiency, people contend, "My cadmium releases have been reduced and reduced," but if you look carefully, you realize that their new worst emission may be the product itself.

"Wouldn't it be nice," we told Min, "if the trimmings of your cloth became mulch for the local garden club?" So we got to work, and the first thing we reviewed was what it means to sit in a cloth-covered chair for extended periods of time. The fabric makers had interviewed people in wheelchairs, since they represent the worst case of extensive sitting, and we found out that they wanted dryness, because the biggest problem they have is moisture buildup. So we used wool, which absorbs water, and ramie, a plant similar to nettles, which provides a strong structural fiber that wicks water. The wool in the fabric absorbs moisture and the ramie wicks it away, so you're cool in the summer, warm in the winter, and comfortable all the time. Is it ecologically intelligent? Is it just? Ramie has been organically grown for thousands of years without any help from the chemical industry. And we hope the sheep in New Zealand are happy—they're free-ranging sheep.

Once we had developed the cloth, we had the finishes, the dyes, and all the rest of the process materials to consider. Remember the smokestack analogy: the filters have to be in our heads, not on the ends of pipes. Design filters. Our design filters told us that if this fabric were going back to the soil safely, it had to be free of mutagens, carcinogens, heavy metals, persistent toxins, bio-accumulatives, endocrine disrupters, and so on. Then we approached sixty chemical companies, and when we asked them to join us and put their products through this review, they summarily declined. Finally, the chairman of Ciba Geigy in Basel agreed to let us in.

Michael Braungart and our scientific colleagues reviewed 8,000 chemicals in the textile industry using this "design filter" and had to eliminate 7,962. This left 38 chemicals. We created the entire fabric line with those 38 chemicals. Everything we needed—dyes, auxiliaries, fixatives, et cetera—came from those 38 chemicals. The fabric has won gold medals and design awards and is a success in the marketplace. It is good business, and it is also creating a new standard for business excellence.

After the fabric was in production at the factory in Switzerland, a strange thing happened. Inspectors came to inspect the water coming out of the factory, and they thought their equipment was broken. They didn't find the things they expected to find. So they went to the front of the factory and checked the inflow pipes. As they expected, the water going in was Swiss drinking water. Their equipment was fine. It turned out that during the manufacturing process the fabrics were further filtering and purifying the water. Consider this concept: when the water coming out of your factory is as clean as the water going into your factory, and the water going into your factory is Swiss drinking water, that means you can cap the pipe. That means you would rather use your effluent than your influent. If you don't have anything bad coming out of the factory, there's nothing to regulate. Isn't that interesting: there are no more regulations implicit in this complete redesign. In fact, there are less! In this case, there may be none at all. This is not eco-efficiency—this mill is not "less" bad. It's not bad, period. We did not say we wanted to cut our cadmium or our mercury as much as we can. We completely redesigned this product based on a new set of principles. Welcome to the Next Industrial Revolution.<sup>8</sup>

What happened within the chemical industry as a result of all these efforts is also interesting. Naturally, your ordinary engineers who were using conventional materials got a little nervous, because implicit in what we were doing was an analysis of what had gone on before. Why were they using this chemical? Why all this cobalt? Why all this antimony? Why all these heavy metals? Why mutagens? Why carcinogens? The chemists told us that because their customers wanted something blue, their job was to figure out how to make it blue, not to solve environmental or health problems—just to make sure to tell customers to be careful handling the stuff and stay within regulatory limits. Is this ethical? Is this intelligent?

Regulatory structures cost a lot of money and require the government to tax their commerce in order to get the money to set up a regulatory structure. Then, the same people the government just taxed have to spend money to set up an anti-regulatory structure to respond to the regulatory structure. Now, have we made anything yet? How are we doing on competition in world markets? What does it mean when environmental regulation all of a sudden prevents you from being in the marketplace and competing with Taiwan, Korea, and the Philippines, where their environmental regulations are not so stringent and they can make things more cheaply? What ends up happening is that commerce, which is looking for the quickest, cheapest thing, goes to Taiwan, goes to Korea, and buys chemicals and dyes because they are much less expensive than the locally produced ones. But because these cheap materials are not produced as carefully, what customers get from them is what we call "Products Plus": you get the dye, plus, perhaps, PCBs, plus heavy metals, plus carcinogens, plus all of these other things you did not intend to buy but that come with the cheap product. Instead of going to someone who is working hard to be clean and good, commerce goes to companies that have figured out how to compete purely on an economic basis. That's a tough economic situation.

The Dutch realized that if their industries could police themselves, the government would not have to regulate them, and they would not have to place those compliance cost burdens on their industries. They could compete in world markets. So they created the Green Plan, which asks Dutch commerce to figure out the quickest, most effective solution to environmental problems, and if commerce doesn't do that then the government says it will have to step in to regulate. Now that all of this is taking place, imagine what would happen if the textile industry in Holland started to look around and ask, "How do we do this?" And suddenly, because of our redesign, here is Ciba Geigy with a package of thirty-eight chemicals that will make any color safely. To guarantee quality, all you have to do is specify their whole package. But you must use their package exclusively, or other chemicals reviewed with the same "design filter," because in order to guarantee quality you can't contaminate it with materials from some other supplier who has not been reviewed. As a result of using this exclusive protocol, you do not need special storage rooms for hazardous waste. You do not need to file with regulatory agents for handling hazardous material. Your workers are not wearing protective equipment anymore because there is nothing to fear. Within the textile industry this little revolution starts: "Wait a minute! I hear over there they're not exposing their workers to carcinogens. Why can't we do that?" And the chairman of a major chemical company looks pretty smart for having taken the obvious next step in Total Quality Management.

Let's look at the concept of Total Quality Management, at the ideas started by W. Edwards Deming. He began as a statistician who was sent into factories to monitor production during World War II. Since so many men were at war, women had gone in to work in the factories, and he was there to judge the statistical effect. Let's abstract this story for a moment to get the main point of his discovery: a statistician goes into the factory, and he notes that the men who had manufactured artillery shells before the women took over produced, say, approximately a thousand shells a day, with an inspector throwing out "rejects" at the end of the process. The men expected lemons, they expected failure. They anticipated it and planned on it.

After the men had gone to war, the statistician watched the women at work to see what would happen. He watched them make twenty shells in the first week, forty in the next, then eighty, then a hundred, then three hundred, then five hundred, then seven hundred, then nine hundred, then twelve hundred, then fourteen hundred. They leveled off at a thousand, and all the shells were perfect. Production was up, quality was up. The statistician investigated the system more closely to find out what had happened, and guess what he found out? The women talked to each other. They sat in the round and discussed their mutual problems and needs. There was no hierarchy, no inspection. They went about their business and shared the worst work. They also adopted the policy that they would not accept the concept of failure: the idea of making an artillery shell that would blow up in their husbands' faces in the middle of the war was absolutely unacceptable to them. They eliminated the concept of failure. They did not count on failure, and the result was Total Quality Management.

When the men came back after the war, the statistician explained what had happened, but the men told him they had hierarchies, they had quotas, they were inspection-based, and they had just won a major war. So the statistician moved on to a more hospitable audience in Japan, and the rest is history.

The United States eventually profited from his experience. I remember when you used to buy a car and you hoped it wouldn't turn out to be a lemon. No one expects a lemon today, but when I was a kid, you didn't want to be the one who got the lemon. You were expecting one to come off the line. Then "Quality" became "Job One" at Ford after years of being "Job One" in Japan, which captured huge pieces of the auto market. That was literally due to Deming.

The Total Quality Management concept started a revolution in production. Because those women rejected the concept of failure—the concept of a defective product—Total Quality Management can be seen as a working engagement to the concept of zero defects. Just-in-time delivery came along as a result of high interest rates, high handling costs, and expensive inventory, and can be seen as providing the benefits of zero inventory. Zero accidents have always been a noble goal, and now, with total redesign, we can have zero emissions and zero waste (of undesirable materials). As Gunter Pauli likes to say, this is the next step in Total Quality Management.

The organic fabric we designed is a *Product of Consumption*; after its useful life, it goes back into the organic metabolism and feeds the soil. We're also working with Guilford of Maine, a subsidiary of Interface Corporation, to design the *Product of Service* version of fabrics, and we're working with partners in the chemical industry to develop and redesign polyester products

that eliminate concerns for heavy metal residues from catalytic reactions, so people will no longer be exposed to them. Then, if we actually do recycle these materials back into the human environment, we will not be recycling heavy metals. We're also designing new dye protocols. In fact, we've recently identified a whole new line of dyes to go with polyesters based on our "design filters." The resulting fabrics will be safe and recyclable forever. They will never need to go into a landfill.

Interface Corporation is a major U.S. carpet and textile manufacturer that wants to lead the way in the Next Industrial Revolution. Ray Anderson, Interface Inc.'s founder and chairman, read about our concepts in Paul Hawken's *Ecology of Commerce*,<sup>9</sup> and was moved by this important book to transform his business.

Interface Corporation is also adopting our *Product of Service* concept and the eco-leasing concept that goes with it for their large carpet business. They are calling it their *Evergreen Lease*. One way to understand how this concept has revolutionary economic implications is to think of it this way: If you buy a conventional carpet you buy a liability, not an asset. When you finish with it you're going to have to pay to get it removed. What does that mean to American business, to natural flows and materials, to prosperity? The chairman of Interface understood the problems of such a system. By adopting the *Product of Service* concept, his company will continue to own the material but will effectively lease it and maintain it for the customer that wants the use of it. When the customer has finished with the service of the carpet, Interface will take back their *technical nutrient*.

However, it's not enough to take a carpet back if it's not designed properly. The average carpet is nylon embedded in fiberglass and PVC. It was never designed to be recycled. You can really only "downcycle" it: you shave off some of the nylon material, and then you're left with a material "soup" that you can't use effectively. We've redesigned the actual carpet and its entire delivery system so a customer can say, "I don't like red anymore. I want blue," without feeling guilty. Right now, when you order a carpet you're contributing to the destruction of natural systems, because you're basically taking a bunch of petrochemicals the manufacturer compiled to make the product and then throwing them "away" in a landfill. Under the new protocol, your carpet order would create jobs and the negative material flows would go down or be eliminated. Consequently, when you want to change your carpet color you can have fun instead of feeling guilty. The old design process requires virgin or imperfect recycled material; the new design employs people to re-circulate technical nutrients. So you can trade throwing away petrochemicals for jobs.

What else does this new protocol mean to commerce? If our companies and countries expect to be wealthy in the future, why would they put the valuable nutrients of their industry into a landfill? The essence of our argument to Ray Anderson was simply this: If you'd been using this concept from day one, you would have four billion pounds of technical nutrients designed for use in your industry. That's how much carpet you've made since you started the company. Four billion pounds, and where is it? It's in holes in the ground, or on its way there. The street value of this? Over one billion dollars. This is how you could accrue capital over time and accrue assets: by designing carpet to constantly become technical nutrients for your own company. Michael Braungart and I can apply this thinking to almost any industry with similar results.

On the regional level, we helped create the concept of Zero Emissions Zoning for Chattanooga, "the Pittsburgh of the South." Chattanooga had what Dave Crockett called a "civic heart attack" in 1968. The city was rated as having the worst air quality in the country—even worse than Los Angeles. So the city's civic leaders looked at this problem and decided to clean up their own air. They've been doing this for the last thirty years. But when their eco-industrial concept was initially proposed, a lot of industry CEOs said, "Zero Emissions Concept? What are you talking about? No corporation is going to accept it. No one will come here and do business." Then Gunter Pauli, who worked with Ecover in Europe and is now at the United Nations University in Tokyo, arranged an international conference and announced one of the first companies to agree with the Zero Emissions Concept in Chattanooga: DuPont. The chairman of DuPont actually stood up in Chattanooga and declared zero emissions a goal for his entire company. This is not a marginal event. This is big business.

Many industrial leaders claim there is no such thing as a factory without emissions. What we are talking about is zero waste and unwanted emissions. But we did it in Switzerland, so we respond with Amory Lovins's famous phrase, "It exists, therefore it is possible." I think these new design assignments are the most exciting and revolutionary ways of approaching commerce. And I believe that commerce is the primary engine of change, which is why I am involved with and respect the power of commerce so deeply.

Paul Hawken introduced me to the book *Systems of Survival*, in which Jane Jacobs states that humans have developed two fundamental systems for their own survival: the syndrome of the guardian and the syndrome of commerce.<sup>10</sup> A guardian is, for example, the government, a system that is meant to preserve, protect, and maintain. We grow very nervous when our government officials get cozy with commerce, because the guardian is meant to shun commerce. You should not be able to buy a government official. And the guardian's biggest fear is a traitor, someone who has sold out—a commercial term. The government will kill a traitor. It will go to war, and it can incarcerate and even kill you if you threaten the state or society. It's the only system that can legally sanction murder and duplicity.

So the guardian is slow, serious, and reserves the exclusive right to kill. Commerce, on the other hand, is meant to be quick, creative, adroit, and honest. If you are dishonest, people will stop doing business with you; because it doesn't take them long to realize that their involvement with you is not profitable if you cheat, lie, or steal. Now, let me restate the characteristics of the guardian versus those of commerce: the guardian is simple, slow, direct and even brutal when it feels the need to be. Commerce is quick, clever, and honest. As Jacobs points out, every time you put the two together you get what she calls a "monstrous hybrid."

When a city or town calls for Zero Emissions Zoning, what are they saying? That's the guardian saying, "Don't try to kill us. We'll do transportation and schools, but don't try to kill us, business." Then business—It would be DuPont in Chattanooga's case—says, "We can do that. With no complex regulations, we can figure out how not to release anything that will kill you. That's our job." The guardian wouldn't need to regulate commerce, and commerce wouldn't have to figure out how to respond to detailed micromanaged regulations, but only if commerce designs comprehensive production systems

that don't release toxic emissions. Commerce doesn't need to be in the killing business.

We must, by design, allow commerce to do what commerce does best: be creative, be inventive, be quick, be smart, and be honest. And let government do what government does best simple, important things like saying, "Don't kill us." Then our arrangements get less confused and complex.

Finally, I believe our primary design assignment, and the question we should ask ourselves in business in the future, comes down to this: How do you love all the children? Not some of the children. Not just your own children. All of the children.

Jaime Lerner has been working with the whole city of Curitiba, Brazil, around this precept. He has been developing systems that respect all the children's needs for safe shelter and food, health care, education, transportation, creative opportunity, dignity, and hope. When it was time for the city to build a public library, instead of San Francisco's response—a central 100-million-dollar mausoleum for books—Curitiba's leaders asked themselves how they could provide library services for every single child in the city, including the impoverished ones in the favelas. They decided that with their limited budget, all they could afford was many tiny libraries, each the size of a small house.

In front of every library they put a "friendly beacon of knowledge," a brightly colored and illuminated lighthouse for visibility and security. A volunteer forester, teacher, or parent sits in a little room behind a window and watches the street, reads a book, and makes sure the children are safe going to and from the library. The library holds the reference books the children need for school, as well as books the poorest children can "buy" in exchange for compostable garbage. Curitiba's goal is to put one of these libraries in each neighborhood, within easy walking distance of every child in the city. The children will have all the books they need for school, and they'll also have access to the World Wide Web. That's how they decided to design a library in Curitiba.

How do you love all the children? Well, for one thing, imagine that your outlet pipes are immediately upstream of your inlet pipes, and you'll begin to understand. We have to take responsibility for all the children, for all the generations. We're all going to have to do this, not just those "in charge." It's going to require massive creativity—massive creativity. It's going to require a complete redesign of commerce itself.

Let's get creative and start redesigning a new kind of prosperity for ourselves, but let's make sure this prosperity includes everyone else, including our seventh generation to come. Design for all of our prosperity, not just your own prosperity. We can start by eliminating our destruction masquerading as consumption, and begin to enjoy the search for our rightful and responsible place in the natural world. Get prosperous. Get very prosperous, because then people will want to imitate you. But honor that thing in yourself, that creativity in your spirit and your place that is really the sacred trust for all generations. We need to design a system of production and consumption and a system of commerce that will allow everyone life, liberty, and the pursuit of happiness in their own place, free from remote tyranny—the remote tyranny that is us and our bad design.