

**NATURAL CAPITALISM:  
THE NEXT INDUSTRIAL REVOLUTION**

**by**

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I have nothing against Harry Potter, but I wish people were standing in line to buy Natural Capitalism, the title of what I think will prove to be one of the most important books of the new millennium. Its authors are Amory and Hunter Lovins and Paul Hawken, and it was published a couple of years ago by Little, Brown and Company in New York. I know some of you have already read it. Those of you haven't, please do so. If you can't find it in your local bookstore, you can order it at [www.natcap.org](http://www.natcap.org).

The authors begin by emphasizing that our home is the earth. It is not Richland County or South Carolina or the United States. We cannot ignore the condition of the rest of the world. We cannot ignore that the population of the world has increased from one billion in 1900 to six billion in 2000 and continues to

grow at the rate of 10,000 people per hour, and that one-third of the world's population lives in abject poverty.

Yes, we should be proud of the improvements we have made in the United States under the Clean Air Act and the Clean Water Act and the Resource Conservation and Recovery Act, but we cannot ignore the fact that every living system on the planet is declining at an unprecedented rate. In the past 50 years, we have lost one fourth of the planet's top soil and one third of its forest cover. And this loss continues at the rate of 750 metric tons of topsoil per second and 5,000 acres of forest cover per hour.

At the present rate of destruction, we will lose 70 per cent of the world's coral reefs in our lifetime. In the past 30 years, we have consumed one-third of the planet's resources, its

natural capital. We are witnessing a massive extinction of plant and animal species--at the rate of 27,000 per year.

The authors write: “Humankind has inherited a 3.8 billion year store of natural capital. At present rates of use and degradation, there will be little left by the end of [this] century.”

Why is this happening? Why are we allowing the depletion and destruction of the very systems on which life depends? One major reason is that capitalism, as now practiced, assigns little or no value to natural systems and fails to account for the impact of production on those systems. Take the example of the Philippine fisherman who tosses a stick of dynamite into coral reefs and harvests the stunned fish for local markets and the broken pieces of coral for the pharmaceutical industry. He takes these items to the market and receives cash.

Under generally accepted accounting methods, the only costs considered relevant on this transaction are the cost of the dynamite and the cost of the labor.

But we know that is wrong. We know that the net present value of the coral reef habitat as a future home for fish far outweighs the revenues received from its destruction. Similarly, we know that the cost of draining or filling a wetland, the cost of overpumping an aquifer, the cost of paving over huge areas of a watershed, the cost of building on flood plains, the cost of applying pesticides, and on and on includes more than just the cost of the material and the labor----much, much more. Sadly, our present system of accounting tells us the price of everything, but the cost of nothing.

But Natural Capitalism is not a book about doom and

gloom. Its message is one of hope for the future, faith in human ingenuity, and confidence in the competitive market.

Its central premise is that the next industrial revolution, based on the principles of Natural Capitalism, can reverse these trends, restore and protect the earth, and make more money for business. Yes, *we can have it both ways--a restored and protected environment and larger profits for business*. Even if a company could care less about protecting the environment, Natural Capitalism should be of great interest to its shareholders because it means that the company will make more money.

For example, on the issue of global warming, the authors say it really doesn't matter whether business believes climate change is a problem or not. It should take the steps to protect the climate because it will improve the bottom line.

How does Natural Capitalism work? There are four central principles: radically increased resource productivity; service and flow economy; reinvesting in natural capital; and biomimicry. They are discussed at length in the book. I will just touch on the highlights of each.

The first principle, radically increased resource productivity, is based on making natural resources----metals, minerals, water and forests----work five, ten, even one hundred times harder than they do today. The book is full of examples where this kind of productivity is actually being achieved. At Interface's carpet manufacturing plant, a system of big and straight pipes and small pumps instead of the traditional small and crooked pipes and big pumps was not only cheaper to build but resulted in a 92 per cent reduction in energy costs.

Improvements in design have radically improved the energy efficiency of refrigerators, which use about 75 per cent less energy than they did in 1972. A firm in Denmark has designed a refrigerator that uses 99 per cent less energy, does a better job, and costs the same as models now on the market.

Astonishing results are being achieved with so-called “green buildings” which use 70 to 90 per cent less energy, sell and lease faster and at higher prices, and reduce employee absenteeism by over 15 per cent because they are such nice places to work. And they are also nice places to learn. A recent study showed that with all other factors being equal, natural daylighting in schools improved student performance on math tests by 20 per cent and on reading tests by 26 per cent.

The authors write in Natural Capitalism: “Green buildings do not poison the air with fumes nor the soul with artificiality. Instead, they create delight when entered, serenity and health when occupied, and regret when departed.”

The same principles apply to the development of the land surrounding buildings. The conventional approach to development is to prepare the design first and then "make it fit" the site. This often means massive grading of the property, the flattening of hills, and the obliteration of trees. The philosophy of green development is just the opposite: The natural conditions of the site are given paramount consideration in designing the development. As a result, there is usually little or no impact on the significant resources and features of the property.

The benefits to this approach are both economic and environmental. Studies have shown that homes surrounded or bordered by green space sell for more and appreciate in value faster than the typical cookie-cutter homes. A study done as part of the Charleston Harbor project showed that the infrastructure costs for a “clustered subdivision” with ample green space were one-half of the costs in a cookie cutter subdivision. On the environmental side, there was three times more sediment, 43 per cent more runoff, and 60 per cent more chemical oxygen demand from the cookie cutter development than from the clustered one. Lower costs for the developer and less impact on the environment—the classic “win-win.”

The book has a fascinating chapter called “Aqueous Solutions” that discusses many examples of greatly improved

water efficiency.

Two-thirds of the freshwater withdrawn for human use worldwide is for irrigation, and 93 per cent of irrigation is done through flooding, the least efficient method of delivery. If subsurface drip technology were used on just half of these acres, that would save enough water to provide the irrigation needed to feed the 2.6 billion new people expected by the year 2025.

Other examples include using the creation of elegant and water-efficient landscapes; the Pacific Coca-Cola plant which has reduced its need for rinsewater by 79 per cent by using air instead of water to clean the insides of cans before filling; Armco's Kansas City steel mill which uses its water at least 16 times over, reducing its demand from 58 million gallons per day to 3.6 million gallons per day; the roof of Mike MeElveen's

house in Austin Texas, which collects all of the rainfall into two 8,400 gallon tanks and has supplied all of his water needs since 1988, even during a three-year drought; the use of so-called “graywater” from showers, sinks, tubs and washing machines for subsurface irrigation; New York City’s rebate program to install 1.6 gallon per flush toilets which has reduced water demand and wastewater flow by 90 million gallons per day, resulting in a net savings of \$605 million.

And speaking of toilets, the authors have some harsh words about these devices, calling it one of the most stupid technologies of all time. The toilet mixes pathogen-bearing solid waste with relatively clean urine, then dilutes that slurry with 100 times its volume in pure drinking water, then further mixes that with industrial toxins in the sewer system, turning an

excellent fertilizer and soil conditioner into a serious, far-reaching and extremely costly disposal problem.

A much more sensible design is the modern Swedish toilet which features a two-compartment bowl to separate the urine from the solid waste. As the authors say, “The two leave the body separately and should be disposed of that way.” It is then a straightforward procedure to collect and sell the urine as a valuable fertilizer and to compost or otherwise treat the solid waste. Can you imagine the savings in the cost of sewage collection and treatment if the Swedish toilet became a standard fixture in American homes?

The authors write: “Improvements in U.S. vehicles, buildings, factories, and uses of materials, fiber, and water...could probably save upwards of *a trillion dollars per*

*year*. These efficiency gains are available and highly profitable but haven't yet been captured.” (p.265)

The second principle--a service and flow economy--is based on consumers obtaining services by leasing or renting goods rather than buying them outright. For example, instead of purchasing a washing machine, the consumer would pay a monthly fee for the service of having their clothes cleaned. The washing machine would remain the property of the manufacturer who would be responsible for replacing and repairing it. The concept could apply to computers, cars, VCRs, refrigerators, and almost every durable product that people now buy, use up, and ultimately throw away. Products would be returned to the manufacturer for continuous repair, reuse and remanufacturing--a true “cradle to cradle” process.

The service model has been successfully adopted by several businesses. Under its “Evergreen lease,” Interface no longer sells carpets but rather leases a floor-covering service for a monthly fee. When the carpet is worn out, Interface picks it up, puts in a new carpet, and recycles the old one. The result: the customer gets cheaper and better services that cost the supplier far less to produce.

Other examples include Schindler, which prefers leasing vertical transportation services to selling elevators; Dow Chemical, which leases dissolving services because they can reuse the same solvent scores of times; United Technologies, which is shifting its mission from selling air conditioning to leasing comfort.

The third principle is reinvesting in natural capital. The

foundation of textbook capitalism is the prudent reinvestment of earnings in productive capital. Natural Capitalism works the same way--we must reinvest in, restore and sustain the ecosystems that provide the services on which industry and life depend. That means changing industrial processes so that they actually replenish and magnify the stock of natural capital.

It is not only the right thing to do, but it can be extremely profitable because nature handles the production. For example, in California, the Sacramento valley rice fields are now flooded after harvest rather than burned. The result: seasonal wetlands for wildlife; replenished groundwater; improved fertility; and no more air pollution. And of course, the subject of this conference is a wonderful example of natural capitalism in action.

“Total Maximum Daily Load” is a concept under the Clean

Water Act that is attracting a lot of attention these days and causing much anguish and controversy. It involves, of course, basically trying to figure out how much pollution a river can stand and then allocating that total amount among all the polluting sources. But what if there were no polluting sources? What if there was no load to allocate? These are serious questions.

I firmly believe that by embracing and following the principles of Natural Capitalism, we can achieve zero waste. We can avoid the agonizing disputes, such as the one going on right now at the Cooper River, over what exactly is the maximum load and how should it be allocated.

The final principle--biomimicry--is based on doing it the way nature does it. A tree turns sunlight, water and air into a

wonderful material called wood and produces no waste. Why can't industry manufacture its products the same way?

That is a perfectly serious question and one that more and more companies are asking and addressing.

I am absolutely convinced that we are now in the beginning stages of a truly revolutionary change in our economy—from one based on fossil fuels to one based on hydrogen. Hydrogen is the most abundant element in the universe and can be extracted from water through electrolysis, so the supply is unlimited. It has the highest energy per unit of weight of any chemical fuel. It is wondrously clean, emitting only water vapor when burned.

Hydrogen allows us to have our cake and eat it too. The vast majority of Americans describe themselves as

environmentalists, yet how many of us put on a sweater, a la Jimmy Carter, rather than turn up the thermostat? How many of us limit our showers in the morning to two minutes? How many of us leave our cars at home and use public transportation? How many of us carpool?

Conservation of energy makes so much sense, and it is absolutely the right thing to do, but it is not a practical solution to our energy crisis. Americans want to have it both ways. With hydrogen, they can.

There is no better evidence of the reality of the coming hydrogen economy than the actions of the oil companies and automobile manufacturers. None other than Bill Ford, Henry Ford's great grandson, said, "The hydrogen fuel cell will finally end the 100-year reign of the internal combustion engine."

Daimler-Chrysler has spent hundreds of millions toward its goal of rolling out hydrogen fuel cell cars by 2004. General Motors has increased its research budget for hydrogen fuel cells from \$1 million per year in 1990 to \$100 million this year.

Jules Verne knew what he was talking about.

What should DHEC's role be in the next industrial revolution? I believe that ultimately all industry will realize that it is in their economic best interests to employ the principles of Natural Capitalism, whether or not they are concerned about the quality of the environment. But in the meantime, I think DHEC has a role in encouraging and promoting the revolution.

Toward that end, I am delighted to report that an important initiative of the agency has become law---the South Carolina Environmental Innovation Act. The new law is based in large

part on programs in the German province of Bavaria and Wisconsin in which the environmental agency grants relief from certain regulatory requirements, relating primarily to paperwork, in exchange for the company agreeing to take steps that go beyond the regulations, such as reducing the amount of waste being sent to the landfill by a specified percentage. The programs have been well received and highly successful in Bavaria and Wisconsin. One potential obstacle is EPA, because you are talking about waiving regulations that are typically based on federal law, but EPA signed off on the program in Wisconsin, and they had no objection to the legislation in South Carolina.

The new law authorizes DHEC to establish a pilot program in which up to ten agreements may be entered into with eligible

participants to evaluate the effectiveness of this approach in our state. It is a great opportunity to promote the principles of natural capitalism.

South Carolina is at a critical point in its history. Our population now exceeds 4 million and, in less than 15 years, there will be another 700,000 of us. Our population is growing at the rate of 137 people per day. That is the equivalent of about 15,000 gallons of new wastewater every day that has to be properly handled.

One of our state's greatest challenges in the new millennium is to ensure that our booming growth does not impair the quality of our magnificent resources and environment. To meet that challenge, it can no longer be "business as usual." We need more "thinking outside the box,"

like the new South Carolina Environmental Innovation Act.

The time has come for a new way of doing business, new methods of production that respect and protect nature, a new philosophy that Wendell Berry has described as follows:

“We have lived by the assumption that what was good for us was good for the world. We have been wrong. We must change our lives so that it will be possible to live by the contrary assumption that what is good for the world will be good for us. And that requires that we must make an effort to know the world and to learn what is good for it. We must learn to cooperate in its processes, and to yield to its limits. But even more important, we must learn to acknowledge that the creation

is full of mystery; we will never clearly understand it. We must abandon arrogance and stand in awe. We must recover the sense of the majesty of the creation, and the ability to be worshipful in its presence. For it is only on the condition of the humility and reverence before the world that our species will be able to remain in it.”

Thank you. It has been a pleasure being with you.