Sustainable Design

How We Can Give More Back to the Environment than We Take

by William McDonough

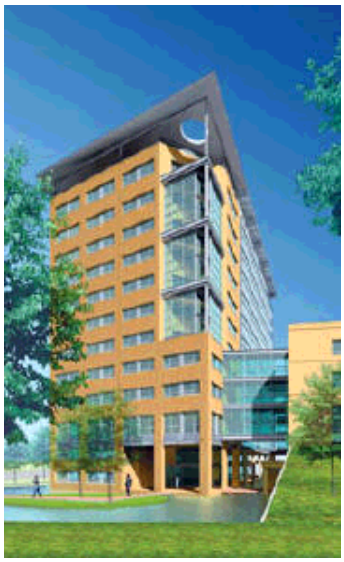
March/April 2003

Art Papers

The following article is an edited transcript of a lecture that William McDonough gave at the Georgia Institute of Technology in Fall 2002. The editors wish to thank Sara Riney of the Atlanta International Museum of Art and Design for her help in realizing this feature.

Design is the first signal of human intention, so designing means examining our intentions. Because if we take the industrial revolution as a design assignment, we have to ask ourselves if we accept and engage with it. Do we delight in a system that measures prosperity by how much natural capital gets cut down, dug up, buried, burned or otherwise destroyed; measures progress by the number of smokestacks; measures productivity by how few people are working; destroys biological and cultural diversity, seeking one-size-fits-all solutions globally; requires thousands of complex regulations to keep us from killing each other too quickly; and, along the way, produces a few things so toxic that thousands of generations will need to maintain constant vigilance while living in fear.

Design is also inherently optimistic. Designers operate from the premise that their work might improve the world. However, they also feel they're facing a crisis because the "ecological footprint" of our race has become so large and damaging that we feel we have to reduce it even though in nature an ecological footprint should be positive. Perhaps now, when humans manage ninety-nine percent of the large mammals, the idea of a world dominated by humans or under its stewardship is specious because it presupposes that we can have dominion over something that we've killed, and have stewardship over something we can't dominate.



IBM's Amsterdam offices. The glass curtain walls use new coatings that reduce heat gain while providing greater visibility, to optimize interior daylight (all pictures courtesy William McDonough + Partners)

This paradox means that a better question might be: when do we find ourselves, once again, "native" to this place? And this question forces us also to ask what it means to be a native person. Primarily, it means changing our mindset from dominion or stewardship to kinship. What we call natural resources, native people call relatives. At the Hanford nuclear plant, which makes plutonium for bombs and missiles, some scientists got together to discuss how to mark the ground where

they stored the plutonium so that even an extra-terrestrial five thousand years from now wouldn't dare to dig. As it happened, some Yakima people were at Hanford for another meeting and when they found out what the scientists were doing, they said, "Don't worry. We'll tell them where it is." They weren't leaving. And that brings up a profound issue: what happens when you're not leaving?

The first question we ask when designing anything -- from the molecular level to the country level -- is a question of intention, which is a question of love: how do we love all of the children of all of the species for all time? And this question makes us realize the following paradox: although the world envies us, if everyone lived the way we do, we'd need more than one planet. And that conundrum suggests that capitalism's basic question has to reverse itself from "How much can I get for how little I give?" to "How much can I give for all that I get?"

In other words, our current system of production is strategically tragic, which means we need to consider a strategy of change. And this idea requires great humility, because we don't know what to do, since we've never done it before. Unfortunately, though, we don't often see the word "humility" in the same paragraph as "design" or "architecture." However, the fact that we took five thousand years to put wheels on our luggage suggests that humans, and designers, are not so smart. Reflecting on this possibility might allow us a strategy of change.

In thinking about this strategy of change, it's worth remembering that Thomas Jefferson requested only three achievements be listed on his tomb, and they all were design accomplishments: author of the *Declaration of American Independence*; author of the *Virginia Statute for Religious Freedom* (which matured into the *Bill of Rights*); and father of the University of Virginia. He recorded his legacies rather than his activities, which is why he doesn't mention being Governor, Secretary of State, Minister to France, or twice President of the United States. However, our method of measuring Gross Domestic Product records activity, not legacy. For every case of leukemia that we create with our misguided products, we create ten jobs. Is this our job creation program? When the Exxon Valdez goes down in Prince William Sound, the GDP of Alaska goes up, because the clean up requires so many people. Is this how we record our progress?

Jefferson understood these problems, which is why he believed a federal bond should have a term of one generation, reasoning that "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, the world would belong to the dead. As Rachel Carson noted forty years ago in *Silent Spring*, the founding fathers did not prohibit releasing neurotoxins into the environment because they never thought that anyone would do such a thing.

That's why a regulation is a signal of design failure. The state is saying, "We never gave you the right to kill. We'll tell you at what rate you can dispense death." Our language betrays this strategy. What do we say when someone is beating a regulation and getting away with it? We say they're getting away with murder. Perhaps today Jefferson would write a *Declaration of Interdependence* and a *Bill of Responsibilities* because, despite how recent our rights are, we've moved from thinking of them in relation to a handful of people to considering them in relation to the environment: we're only seven generations away from

feudalism. The *Declaration of American Independence* enshrines the rights of white, land owning, Protestant males of a certain age -- only six percent of the population. Then came emancipation, followed by suffrage in 1922, the vote for Native Americans in 1923, and the civil rights act in the 1960s. Then, in 1973, for the first time, something other than a human being is given the right to even exist with the *Endangered Species Act* . Today, our discussions have moved on to endangered ecosystems. What are designers doing about endangered ecosystems? What responsibilities must designers assume if they wish to have these rights?

Part of answering this question involves imagining what our relationship to nature will be and realizing it has changed. In 1838, Ralph Waldo Emerson argued that nature is "the unchangeable essences": the river, the mountain, the leaf. But we realize now that these things are mutable, that we can affect them, and that we do so by design.

In 1831, when his wife died, Emerson went to Europe in a sailboat and returned on a steamship. In other words, he went over in a solar-powered, recyclable craft operated by craftspeople practicing ancient arts in the open air, and returned in a steel rust bucket putting smoke into the sky and oil onto the water operated by people working in the dark shoveling fossil fuel into boilers. Amazingly, we haven't advanced beyond that. Rather than sit outside, people gather in darkened rooms producing global warming and nuclear isotopes to discuss global warming and nuclear isotopes. Evidently, we need a new design.

The lobby for IBM's Amsterdam offices. The glass curtain walls use new coatings that reduce heat gain while providing greater visibility, to optimize interior daylight (all pictures courtesy William McDonough + Partners)

The leadership and execution needed for such change requires sincerity, resources and competence. The world can take care of the last two, but each of us is responsible for our own sincerity. Resources aren't a problem, as long as we start to think about nature's laws. For example, as an architect, I have to follow the law of gravity. And nature has other laws for us. For example, waste equals food, so eliminate waste. Not minimize or reduce waste, but eliminate the entire concept of waste. Secondly, use current solar income. Following this law will solve our energy problem, because about five thousand times more solar energy strikes the earth than twelve billion humans could ever need. But what we don't have is mass income. And if we persistently toxify the mass, if we take the chromium out of South Africa, embed it in all of our products and then spread those products into little holes all over the planet, future generations will look back and say, "What were you thinking? You've depleted the chromium, which could have been useful for billions of people, and you've toxified the planet."

The earth loves diversity and closed cycles. These affinities mean that materials should be within metabolisms, since if waste equals food, then everything's a nutrient. So things should go back to either biological nutrition to rebuild soils, or back to industry, and become nutrition for technology. That's why our book *Cradle to Cradle* is made from recycled

plastic. It's a technical nutrient. We didn't cut down any trees, because we wanted to convey the idea that, if it took us five thousand years to put wheels on our luggage, perhaps there are other things we should re-examine. For example, five thousand years ago, Egyptians figured out that if they smashed papyrus and stretched it out, they could write on it. And we're still doing the same thing, only now we're using three hundred year old spruce trees from British Columbia. As Margaret Atwood says, we are now writing our history on the skin of fish, with the blood of bears.

For a different model of how a civilization can relate to nature, I think back to a job I had right after college as the field representative for the Jordanian government's plan to settle the Bedouins in the Jordan Valley. When I arrived, the temperature was one hundred and twenty degrees, there was no shade, and the Bedouins were sitting in a black tent -- which made me think they were crazy. But the tent roof was fashioned from a coarse weave of black goat's hair, so that the sun striking it caused the air to rise, creating a breeze that cooled the interior by about twenty-five degrees. Even better, the material swells when it gets wet, making the roof watertight when there's rain. And, best of all, the factory that makes it walks behind you eating everything you can't and gives you cheese, butter, flesh and fur. The experience made me wonder how a city could become its place, become native to its place? What if a city was an organism? What if a city was a biological artifact of human creativity?

Clearly, it would be very different than modern architecture. The first great modern building, John Paxton's Crystal Palace, shows that the large sheet of glass linked architecture to fossil fuels and made architects forget where the sun is. This combination of the large sheet of glass with cheap fossil fuels means that architects adopt a simple design premise, which appears throughout our culture: if brute force isn't working, apply more. This design is based not on love and giving, but on getting and taking. It forgets the environment that sustains us.

The sustainable strategy combines ecology, economy and equity to common purpose, delight and celebration. It's not about efficiency, though; Nature doesn't necessarily love efficiency. Look at how many blossoms a cherry tree produces in the spring. It's beautiful and effective, but it's not efficient. Sustainability, however, may not be ambitious enough, because it's just the edge between destruction and regeneration. So our current projects focus on a search for fecundity.

One example of this work is the Museum of Life and the Environment in York County, South Carolina, which is based on the observation that art museums and science museums celebrate human achievement, and natural history museums and aquaria celebrate Nature, but there aren't any museums that celebrate the idea that humans interact with Nature.

In response, this museum explores life and the environment. As visitors walk toward it, it will pick them up through sensors and know what they're interested in because they will have told the system, and will speak to them. Kids interested in trees will hear about the woods; people interested in geology or geomorphology will hear about the landscape. Visitors will walk first into the African Savannah and see all the species that evolved there, learning why biological diversity is worth celebrating. From there, visitors will move on to Las Vegas, an American suburb, and a rain forest, before arriving back at York County, and they will examine what it means to be in each place, and what its history is. For York County, for example, this examination means not only seeing all the species that have

evolved there, but also learning about the native people -- the Catawba -- the slaves, the Scotch-Irish and so on, as well as looking at the implications of developments like the 7-Eleven and the superhighway for South Carolina's environment.

William McDonough + Partners designed Ford's new Rouge River assembly plant with the world's largest green roof.

On a bigger scale, we're also working on an assembly plant for the Ford Motor Company, with the largest green roof in the world. The parameter was that we could do whatever we wanted as long as it worked for shareholder value. So this plant will have entirely new air handling systems that use the building as a duct, thus eliminating sheet metal. The roof is all habitat or solar collectors. The paving around the factories is porous and it's proven to be so effective and economical that Ford's adopted this system company-wide. The absorbed water goes into constructed wetlands, which purify it further, and then into swales made of habitat on its way back to the Rouge River. The water takes three days to get from the roof to the river, and is clean when it gets there. Moreover, contrary to the popular belief that environmentally conscious design costs more, this system cost thirteen million dollars -- but Ford had budgeted forty-eight million dollars for this aspect of the project. So not only did we eliminate the three treatment plants mounded with chemicals that Ford had planned, but we saved them thirty-five million dollars.

The Ford plant directly addresses the question of what it means to design a site that is native to its location, to decide, like the Yakima, that you're not leaving. Once Ford decided that, we explored what native songbirds flying overhead would want to see when they looked down. How about habitat? In other words, how do we make the act of architecture and design not about further dominion of the earth but about healing? It's time to enlarge the human footprint but let's leave behind wetlands instead of asphalt. We need to engage with all the children of all the species, by intention, on purpose, by design.

This strategy also can inform community projects. For example, some years ago, Jamie Lerner, the then-mayor of Curitiba in Brazil, decided his city needed a library. However, rather than building a one hundred and fifty million dollar mausoleum for books, as San Francisco just did, Curitiba split up their budget and put a little library within twelve minutes walking distance of every child in the city. Local contractors built the libraries, and each one had a lighthouse contributed by the city to identify it, and also so that a volunteer could sit there and make sure that the kids were safe. In addition, each library has a program through which poor kids can pick up garbage on their way to the library, turn it in, and get paid for it in books. So every child can afford all the books they need for school.

There was, though, one problem. The libraries were located on the edge of Curitiba, so children from outside the city were using them. As a result, some residents complained that people who weren't contributing to the tax base were using their libraries. But Lerner responded to those complaints by saying, "When you begin to love the children, you have to love all of the children. Because if the city doesn't love those children too, then those

children will grow up to hate the city. And if they hate the city, they'll destroy the city."

And as we look out into the world today, and imagine this manifestation of brute force that appears to be the fundamental strategy of our culture, we have started to see the evidence that when we don't love all of the children in the world, some of those children will grow to hate the world. And if they hate the world, they will destroy the world.

William McDonough is Principal and Founder of William McDonough + Partners , and Principal and Cofounder, with German chemist Michael Braungart, of McDonough Braungart Design Chemistry, LLC. His most recent book is *Cradle to Cradle: Remaking the Way We Make Things* (North Point, 2002), co-written with Michael Braungart.