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EARTH, INC.

using nature's rules to build sustainable profits

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Using Nature's Rules to Build

Sustainable Profits

GREGORY UNRUH

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Introduction

Look deep into nature, and then you will
understand everything better.
—Albert Einstein

"Business sustainability? Embed it and forget it." As soon as I said it, the journalist furrowed his brow. I knew the inevitable follow-up was coming. "Embed sustainability and forget it? How can you say that? Sustainability is a huge problem for business managers. You can't just tell them to solve it and forget it." Yes, you can. And that's what this book is about.

Most executives have come to frame sustainability as a "journey," a potentially endless expedition of incremental improvement. In my 2008 *Harvard Business Review* article, I argued that while achieving sustainability requires time and often incremental improvement, sustainability is a known destination.[1] We know exactly what sustainability looks like because we interact with a sustainable production system every day. And the system is time and battle tested; it's been running continuously for millennia. Refined through billions of years of trial and error, our

sustainability model is the Earth's biosphere. We'll reach the sustainability destination when we embed the principles that account for the biosphere's sustainability to business practice in profitable ways. Embed it and forget it.

If you have picked up this book, you are probably already sold on the larger "business case for sustainability." You most likely know that the benefits of greening and greater social responsibility have been largely demonstrated in theory and practice. (See Further Reading for previous publications that develop the larger business case for sustainability and its benefits.) I am not going to rehash the basic evidence that has been covered elsewhere (although a crib sheet is offered in table I-1 that managers can use to think through the potential gains). Granted, none of the observed benefits of greening are automatic. Like all good strategies, success depends on competent execution and rapid learning from missteps. However, when done right, sustainability pays. Likewise, when neglected, sustainability can cost you. Just ask Royal Dutch Shell managers who were famously blindsided by the twin Brent Spar and Nigerian crises in 1995. Or General Electric's decades-long entanglement over asbestos and PCB-related cleanups. Or Mattel managers who faced a 2007 firestorm for selling toys coated with poisonous lead paint. Or the hundreds of retailers furiously yanking products containing bisphenol A from their shelves in 2008. Or Florida home-builders pressured to remove corrosive drywall from customer's homes in 2009. Undoubtedly, many companies have similar sustainability time bombs waiting for the prying eyes of activists or the press to set them off.

While answering the big question of the "business case" is absolutely necessary for managers to gain buy-in and budget to launch sustainability initiatives, it is insufficient. I'm not writing this book to create another "me too" argument for the big-picture

benefits of sustainability. I'm writing because the question I now hear most often from managers trying to implement sustainability initiatives is not, "Why should we be sustainable?" but "So what do we do?"

This is a "how-to" book of environmental sustainability. That is, how companies can align their operations, products, and processes with ecology in a lasting way that not only resolves environmental conflicts, but creates value for the enterprise. Profitability is a key part of sustainability. Business initiatives that fail to deliver profit—that is, create value in excess of costs—are unsustainable, regardless of how ecofriendly they are. Luckily for profit-seeking managers, the biosphere is a value-creating, value-multiplying, and value-accumulating machine, which bodes well for companies seeking to tap into its secrets.

Where the Biosphere and Industry Diverge

The best way to understand the difference between the biosphere and industry is to look at the model managers use to strategize about production: the *value chain* (see figure I-1). The value chain

FIGURE I-1

The value chain

Supporting activities (HR, R&D, infrastructure)

Inbound logistics › Operations › Outbound logistics › Sales and marketing › Service — Margin — Margin

Value-adding steps ⟶
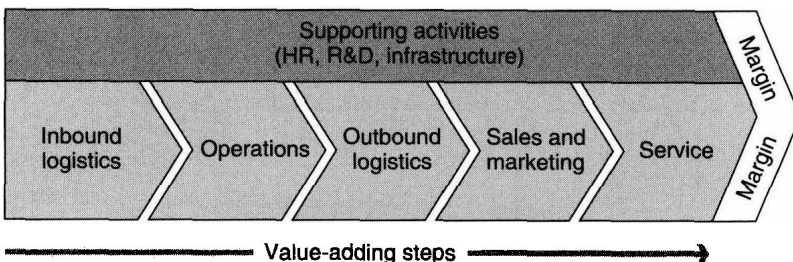
represents the manufacturing steps that take a low-value raw material like iron ore and turn it into a high-value product, like a Mercedes-Benz S-Class luxury sedan. It's been called the "value chain" ever since Harvard professor Michael Porter coined the term in his 1985 bestseller *Competitive Advantage.* In Porter's world, the chain hopefully ends with a satisfied customer.[2] What Porter's model leaves out, unfortunately, is what happens when the value chain interacts with the biosphere.

The environmental scientist's equivalent to the value chain is called a Linear Type 1 ecology, colloquially known as a "take-make-waste" system. As figure I-2 shows, this model takes into account the value chain's interactions with the natural world. The production process takes resources from the environment, makes them into products but also creates waste—including the product itself at the end of its life—and sends all this waste to the landfill. To demonstrate the inefficiency of this system, Insead Business School professor Robert Ayres once calculated that over 95 percent of all resources extracted from the environment become waste within six months from harvest.[3] The pharmaceutical industry is a good example: a ton of salable pills requires well over 150 tons of raw

FIGURE I-2

The value chain in its biospheric context
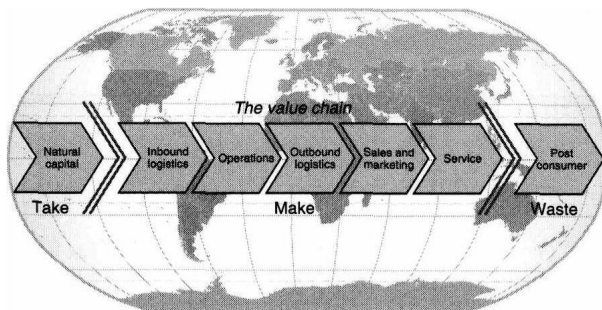
materials.[4] The energy industry profile is similar. Coal-fired electric power stations waste two-thirds of their input energy before the first electron zips out of the plant.

I encountered the environmental consequences of the value chain as an environmental consultant in the1980s, remediating the toxic waste problems of companies like Shell, Chevron, Hewlett-Packard, and Apple. I started my job with typical post-college enthusiasm, expecting that my work would change the way businesses did theirs. After the first few projects, however, it became clear that my job more resembled that of a housekeeper than a revolutionary. Though we used the technical term *remediation*, I was really there to clean up messes, like chasing down toxic chemicals that had escaped from a company's containment lagoon.

After a year or two of remediation work, I realized I was working at the wrong end of the value chain. I began arguing to my bosses that we should get out of remediation and into the business of *pre*mediation, which is preventing the spills in the first place by redesigning the products, process, and behaviors that caused them. Instead, when I argued to an operations manager at a chemical plant that he should premediate his facility by doing away with toxic chemicals, he said, "Changing the process isn't worth it. We're just going to install a filter on the end of the waste line and pull all the toxic stuff into a leakproof containment system." He seemed to be oblivious to the fact that we were there dealing with the aftermath of the last "leakproof" system.

Frustrated, I went back to graduate school in search of a better answer. What I discovered was the emerging discipline of *industrial ecology*, an approach that envisioned industry as ecosystems of interdependent facilities, trading wastes in sustainable ways. The more recent development of *biomimicry* is a

sophisticated offshoot of industrial ecology thinking. Among the many tools developed by industrial ecologists, one was especially good at clarifying the environmental problems with value chain thinking: *life cycle assessment*. Known to practitioners as the "LCA," life cycle assessment measures a product's environmental impacts through the entire value chain, from cradle to grave.

LCAs were done on a range of products, from cars to diapers, and proved excellent at pointing out where the environmental insults were. Most companies then went after the identified problems using a strategy of *eco-efficiency*, popularized by the Switzerland-based World Business Council for Sustainable Development (WBCSD). Eco-efficiency puts the value chain on a diet, with the goal of producing more outputs with less waste. Because eco-efficiency could produce an environmental and economic win-win, many companies rightfully welcomed it. It was obviously not the end game, however. Eco-efficiency just slows the extraction of resources and production of wastes; it doesn't eliminate them. It's the equivalent of cutting back from two packs of cigarettes a day to one. Industrial ecologists recognized this but had a hard time convincing business and governmental decision makers to adopt the more radical vision of eliminating waste.

At this point, I was fortunate to meet William McDonough, an architect and designer who had helped a number of companies implement what he and his partner Michael Braungart called the "cradle-to-cradle" protocol. Like industrial ecology thinking, the fundamental principle of cradle-to-cradle is that in nature one creature's waste is another's food. By building closed-loop systems, companies could entirely eliminate what we think of as waste. McDonough's clients had been convinced to apply his ideas mostly because he is a very convincing guy. I wanted to

know if such efforts would be profitable, in other words, if they would survive and thrive in the marketplace without McDonough's considerable charisma. So he and I cofounded the Center for Eco-Intelligent Management at the IE Business School in Spain to better understand the business case for sustainability initiatives.

As I studied different companies that were implementing varieties of sustainability initiatives, common threads began to emerge. But these threads were not just shared by businesses that were profiting from sustainability. They were remarkably similar to the principles that make the biosphere sustainable. The biosphere, like a corporation, is a profit-making venture. Value in nature continuously accumulates through innovation. But in order to be sustainable on the finite planet Earth, innovation is paradoxically constrained.

When I tell managers and experts this, they inevitably recoil. "Constrain innovation?" they say. "But everyone knows that business growth depends on innovation!" While I agree, and I am not talking about constraining growth, the managers' reaction comes from a widely shared misconception. The response is a gut reaction from the legacy of the environmental debate and the "limits to growth" discourse that has roots in the ideas of the eighteenth-century economist Thomas Malthus. Malthusians argue that the Earth's carrying capacity is limited, and to ensure we don't overshoot the limits, humans need to limit or constrain economic growth. This antigrowth agenda is obviously an anathema to most executives when shareholders demand increases in sales and earnings each quarter.

While innovation in the biosphere *is* constrained in very special ways, the growth and wealth of the biosphere have not suffered. With millions of different species, it's clear that the restrictions do

not limit the profuse creativity of nature. These constraints have not prevented the creation of a vast number of technological innovations that humble our best scientists and engineers. The biosphere's constraints do not exist to limit growth. They serve to ensure that short-term growth doesn't threaten the long-term health of the planet. Likewise, by implementing the appropriate constraints, innovative business growth should also be able to continue without jeopardizing the planet's future.

In examining the biosphere, what becomes immediately obvious is that there is no linear value chain extracting resources and spewing out wastes. Instead there is a *value cycle* (see figure I-3). Within nature's value cycle, a select number of raw materials are constantly reused—and never lose value. They are literally rein-

FIGURE I-3

An industrial adaptation of nature's value cycle
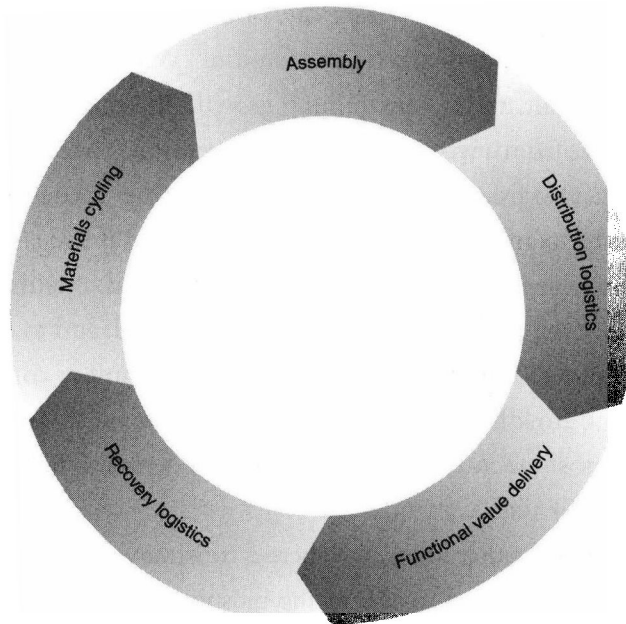
carnated cyclically into new beings. Nature's material assets are churned over and over in a process of never-ending propagation. And the system never stands still. It is constantly innovating and evolving to become more complex, specialized, and effective. Managers who hope to improve productivity and bolster growth can certainly learn a few things from nature.

Creating a value cycle is at the core of business sustainability strategy. But companies cannot build a value cycle by merely taking their existing value chain and bending it back on itself. Doing so will only create a costly mess. To be economically viable, a series of methodical, enabling steps have to be taken first. Like premediation, these steps can be considered "precycling." Before a profitable value cycle can start churning, the conditions for success have to be put in place. Precycling is therefore something that occurs first in the heads of new product designers, operations managers, and strategic executives. Precycling is a managerial mind-set that replaces the value chain model with value cycle thinking.

Taken together, I call the precycling steps the biosphere rules. They serve as a framework to help managers figure out the specific actions they can take to make their products and their organizations more sustainable. Of course, every business is different, and so no one can create a one-size-fits-all sustainability to-do list. Although the steps are not strictly linear, most organizations will be more successful by following them in order through a single product or through the entire company. In later chapters, we'll look at a few examples of massive initiatives that failed because the companies took the steps out of order. What the biosphere rules provide is a systematic approach to thinking about sustainability in your organization, allowing you to create a customized and practical to-do list for your company.

The Biosphere Rules

The biosphere rules are five deep-seated principles inspired by the value cycle operations of the biosphere. These principles were perfected over three-and-a-half billion years ago and encoded into every living thing on the planet long before humans existed, much less created such things as writing, agriculture, commerce, modern industry, and the information revolution. These five principles or rules are:

1 *Materials parsimony.* Minimize the types of materials used in products with a focus on materials that are life-friendly and economically recyclable.
2 *Power autonomy.* Maximize the power autonomy of products and processes so they can function on renewable energy.
3 *Value cycles.* Recover and reincarnate materials from end-of-use goods into new value-added products.
4 *Sustainable product platforms.* Leverage your value cycle as a product platform for profitable scale, scope, and knowledge economies.
5 *Function over form.* Fulfill customers' functional needs in ways that sustain the value cycle.

The rules are simple, but interpreting and integrating them into a company's business model take care and attention. And of course, the biosphere and business are not exact analogues, so the rules also require adaptation to an individual business's context and situation. Again, they provide a framework for identifying not why to do sustainability, but what to do and in what order, to reach the destination of sustainability.

Each of the rules serves as the basis for the chapters that follow, where we'll look at how the rule works in nature, how the business world works today, strategies for change, case studies of leaders, and how to confront implementation challenges.

Easing Implementation

Sustainability innovation is obviously a big challenge for most companies. It is a long-term effort requiring long-term strategic investment. These realities will quickly run up against the short-term managerial demands to produce financial results on a quarterly basis. Furthermore, the near-term costs of change are far more tangible and easy to quantify than the contingent far-off benefits. I rephrase the title of a *Harvard Business Review* article by Harvard professor Robert Kaplan, "Must sustainability investment be justified by faith alone?" Following Kaplan's logic, the tangible and intangible business benefits may be difficult to quantify, but they are not zero (see table I-1). And when conservative managers assign a value of zero, they are choosing to be "precisely wrong" rather than "vaguely right."[5] In the end, management will have to make a determination on the value and need for such sustainability investments. That requires complex judgment on what the future holds that cannot be reduced to a simple "business case." In recognition of the uncertainty, the biosphere rules presented here are designed to be implemented in sequence in order to minimize initial investment, reduce initial risks, and lower the organizational barriers to change.

In some companies, trying to implement the biosphere rules in one fell swoop is a recipe for violent backlash. For this reason, the rules are organized as steps, each producing its own near-term

TABLE I-1

The business benefits of implementing the biosphere rules

Biosphere rule	Business benefit
Materials parsimony	Reduced supplier complexity
	Reduced production complexity
	Reduced toxics risk
	Reduced compliance costs
	Volume purchase discounts
	Improved health and safety
	Improved worker productivity
	Improved product attributes
	Improved environmental performance
Power autonomy	Reduced energy costs
	Reduced compliance costs
	Reduced processing costs
	Improved environmental performance
	Improved customer performance
	Optimized for renewable energy
Value cycles	Input cost savings
	Reduced processing costs
	Reduced supplier risk
	Increased control over brand and reputation
	Improved asset management
	Improved customer information
Sustainable product platforms	Compound above benefits through scale
	Compound above benefits through scope
	Foundation to accumulate learning by doing
	Build robust cross-industry platform demand

TABLE I-1 (*continued*)

Function over form	Generate ongoing revenue stream
	Greater customer knowledge
	Increase control over asset base
	Convergence into expanded offerings

win. But while the biosphere rules are broken into largely self-contained steps, it must be remembered that they work together as parts of an integrated sustainable business system. This requires that managers conceive of their business as a larger system, a system that incorporates not just their own operations, but also their suppliers and customers. This extended view of the company is an important shift in managerial mindset. But by implementing all of the biosphere rules, companies can reach a state of *embedded sustainability* where sustainable practice is internalized into a company's products and processes and vanishes as a managerial concern. Managers often view this as a far-reaching, futuristic goal, but they are wrong. Embedded sustainability is completely achievable with current technology and today's know-how. Anyone who doubts it need only go outside and be awed by the productivity of nature. A snail doesn't wake up and ask, "How will I be sustainable today?" When the biosphere rules are successfully implemented, managers won't have to either.

In the chapters that follow, we'll look at each of the biosphere rules in terms of business need and business benefit, examine cases of companies that are already profitably implementing the rule (and occasionally peek at initiatives that failed so mistakes can be avoided), and look at practical steps for implementing the rule. You might note that among many stories of cutting-edge innovations I've included some examples that might seem