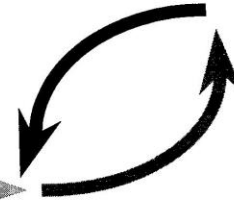


# The Systems Thinker™



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## Rebuilding the Commons: Envisioning a Sustainable Economy

by Kellie T. Wardman

*"Who is going to search for ways to solve these environmental problems? Not the academics. They are people of ideas and data, not usually thought of as decision-makers. Not the environmental activists. They are raising the alarm and pushing for solutions, but many of their solutions will be too simplistic. Not the politicians, for we have learned that politicians follow voters. That leaves businesspeople, the educated decision-makers of North American business and industry, because they are the people who take action."*

—Dr. Alan G. Whitney, president of Pacific Synergies Ltd., Vancouver

Companies are cleaning up. During the past 20 years, many businesses challenged the environmental movement, minimally met pollution

controls, fought stricter standards, and resisted costly cleanups. Today, however, changing consumers and a changing economy are demanding that industries take action.

"Twenty years ago, corporate leaders had to be dragged into pollution control," state Emily T. Smith and Vicki Cahan of *Business Week*.

planet would be reached sometime within the next 100 years—and it created a furor.

Debated, criticized, and praised, the book went on to sell 9 million copies in 29 languages. Many readers questioned the validity of the model, while others claimed the book was making unjust predictions about

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***"Over the last 20 years, as environmental limits have become more apparent, communities, businesses and governments have started to take action."***

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"Today, a minority are taking up the cause of pollution prevention, for good reasons.... Accidents such as the one that killed 2300 people at Union Carbide Corporation's plant in Bhopal, India in 1984 drove corporate credibility on the environment to an all-time low." ("The Greening of Corporate America." *Business Week*, April 23, 1990, p. 96).

### Questioning Growth

One of the engines of change has been the publication of *The Limits to Growth* in 1972. This book was based on a two-year study at the Massachusetts Institute of Technology in which a system dynamics model was built to explore the long-term consequences of growth in population, industrial capital, food capacity, resource consumption, and pollution. It warned that if current growth trends continued unchecked, the limits to growth on the

growth. Perhaps the most controversial aspect of the book was that it challenged the belief that continual material growth is desirable. The book's message was an uncomfortable one—it called for fundamental changes in beliefs and actions in order to create a sustainable future.

Over the last 20 years, as environmental limits have become more apparent, communities, businesses, and governments have started to take action. Research to control pollution emission has led to stricter emission standards and the exploration of alternative energy and power sources. Pollution control and cleanup has become an over \$100 billion market, and it is still increasing as the demand for cleaner technologies and products grows. Criminal fines for polluters violating federal laws increased over

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80% percent in 1989 alone. Companies have found that eliminating toxic wastes and pollution can actually save money in resources and energy as well as waste disposal.

So where do we stand now, 20 years later, in relation to the earth's limits? How can we work toward creating a sustainable economy that will not overshoot its limits? And what are the future implications for business? These are the questions addressed by a follow-up to *The Limits to Growth* that was published just last month—a book that is likely to prompt more debate and awareness as well as more action.

### **Growth: A Tragedy of the Commons**

*Beyond the Limits: Confronting Global Collapse and Envisioning a Sustainable Future*, is an attempt by three of the original authors (Donella Meadows, Dennis Meadows, and Jørgen Randers) to re-evaluate the earth's sustainability and society's impact upon it, given the present conditions. What they found is sobering: despite the world's improved technologies, greater awareness, and stronger environmental policies, many resource and pollution flows have grown beyond their sustainable limits. How did this happen?

According to *Beyond the Limits*, the limits to growth on our planet are equal to the limits of the planet's ability to provide materials and energy, as well as the ability of the planet to absorb pollution and waste (see "Environmental Sources and Sinks"). Since 1973,

the earth's population has risen from 3.6 billion to 5.4 billion. As this ever-increasing population demands more resources to support it, the subsequent strain upon the earth's resources has also grown exponentially. The result is a "Tragedy of the Commons" situation, where actions taken for individual gain are collectively overtaxing the earth's resources.

As Garrett Hardin described this phenomena in a 1968 essay, imagine a pasture (like the Commons in an English village) that is open to all townspeople. Each villager is allowed to graze as many cattle as he or she desires—the more cattle they graze, the better their profits. But if too many cattle are added, the whole commons could become overgrazed, depriving the entire villages' cattle of food. Despite the threat overgrazing presents to each villager, the "Tragedy of the Commons" structure encourages the villagers to each add to their own herd to increase profits ("Tragedy of the Commons: All for One and None for All," Vol. 2, No. 6). Eventually, the pastures can become so depleted that even the grass roots disappear, permanently destroying the pasture itself. As a result, each individual pursuing actions in his or her own best interest creates an outcome that is worse for everyone.

To compare this scenario with the exponentially growing world population and industrial base, imagine that not only the number of cattle (resource drains and pollutants) are growing, but that the neighboring townspeople have all heard of the beautiful, spacious pastureland and want to use the commons for grazing. So the number of

cattleherders (people, companies, industrialized countries) increases as well. Not only will the group reach the pastureland's limits, but they will reach them more quickly. That, according to *Beyond the Limits*, is the situation we face as a world population.

### **Reaching the Limits**

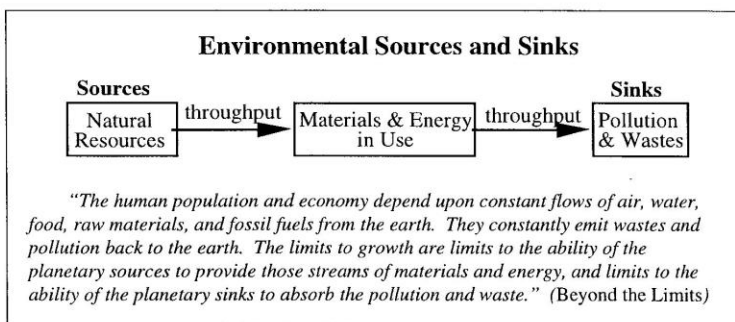
What will happen as we reach the earth's limits? There are four possible outcomes (see "Approaching the Limits: Four Possibilities"):

1. If the limit is very distant or growing faster than the demand, growth can continue without interruption.
2. Growth can approach the limits smoothly and then level off when it reaches those limits.
3. It can gradually come into balance by overshooting the limits, coming back down, and shooting back up again (much like how a thermostat adjusts the temperature in a room).
4. It can overshoot the limits, destroy the resource base, and subsequently collapse.

One of the most common arguments for continued industrial growth is that better technology will find solutions to the problems we are creating. This argument supports the first possible outcome—it says that by continually pushing back the limits, we will allow continued growth.

Structurally, however, the rate at which growth is occurring is too fast for correction. Due to the layering nature of limits, the number of limits we will run into is increasing as well—once we remove one limit, we often encounter another one. Technological advancements that remove one limit can create additional limits: nuclear power plants, for example, have helped replace fossil fuel usage, but their by-products are choking landfills with toxic waste.

The example of emission control for cars illustrates the structural difficulties inherent in trying to use technology to manage the dynamics of exponential growth. Even if we can cut pollution emission by 50, 60, or even 90%, if the number of cars is always increasing exponentially, the amount of pollution will also continue to grow exponentially. After a certain



point, reducing the emission levels will prove too costly for any technology.

### The Danger of Overshoot

Systemically, the only way for an exponentially growing human economy to prevent reaching a planet's physical limitations is to balance its inflows and outflows. This requires two actions: (1) reducing usage of nonrenewable resources to the rate at which renewable resources can be substituted for them, and (2) reducing the rate of renewable resource use to equal regeneration rates. Likewise, the emission rates for pollutants need to be brought down to equal the rate at which they can be absorbed, recycled, or rendered harmless.

The difficulty in smoothly balancing the inflows and outflows lies in the time delays involved. Anything that is growing will stop at its limits only if it recognizes that it is reaching those limits and responds quickly. Due to the inherent delays in the global system, it is almost impossible to get accurate and timely feedback on the impact of industrial growth on the environment. For example, in the case of the impact of chlorofluorocarbons on the ozone layer, there is a long delay between the release of a CFC molecule into the air and the subsequent destruction of ozone. Because of the long delays, even if all the CFC releases into the air

were stopped today, ozone depletion would continue for at least a century.

The result is that in most "Tragedy of the Commons" structures, the system shoots beyond its limits before it gets the signal that it has gone too far. That, in effect, is what has happened already, according to the World3 model used in *Beyond the Limits*—we have already overshoot many of the earth's limits.

Whether or not we will ease back down below the limits (by bringing the inflows and outflows in line), or destroy the resource base and experience a collapse, depends on the quality and timeliness of our response to the challenges we face as a planet.

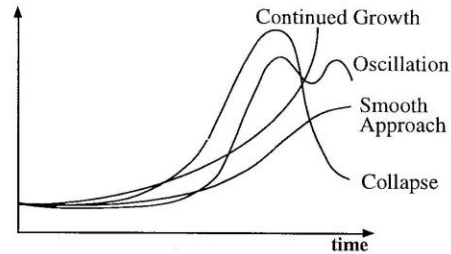
### Implications for Business

The basic message in *Beyond the Limits* is that the pressures created by growth are not going to disappear—there are fundamental structural reasons why they must be addressed sooner or later. The situation is analogous to the case of our trade debt and federal debt—we have been

borrowing from the future in order to live better today. In the same sense, we have also been accruing an *environmental debt* without knowing what the true cost of borrowing is nor what the payback schedule is going to be. A systematic plan to begin paying back our environmental debt needs to be put in place before we reach the limits of nature's reserves.

In presenting World3's findings, *Beyond the Limits*

### Approaching the Limits: Four Possibilities



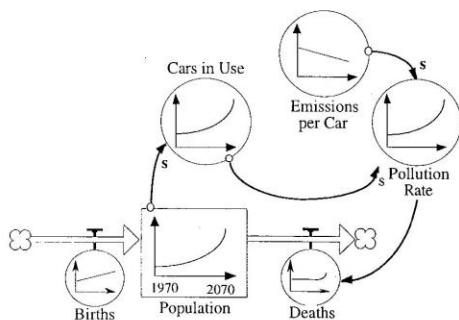
*There are four possible outcomes as we approach the world's limits: growth can continue without interruption; it can level off as it approaches the limits; it can overshoot the limits and recover (oscillation); or it can overshoot and collapse.*

challenges companies to examine long-term investment and future limitations rather than gauging success based on short-term profits. Art Kleiner, in a recent article in the *Harvard Business Review*, stressed that such changes are crucial: "Industry (and nations, for that matter) cannot thrive if they sacrifice future quality of life for present economic gain" ("What does it Mean to be Green?" July-August, 1991, p. 38). Keeping within the earth's limits and working toward a sustainable society will require fundamental changes in the way our organizations' goals and incentives are structured. For example, the following will need to be addressed:

- **Product Lifecycle Waste Management.** Every ton of garbage at the consumer end has already produced 5 tons of waste at the manufacturing stage and 20 tons of waste at the initial site of mining, pumping, logging, or farming. As recycling and conservation efforts increase at the consumer level, pressure for pollution cleanup and prevention upstream in the manufacturing process is likely to increase.
- **Total Package and Product Redesign.** Current packaging methods produce a large amount of non-recyclable waste. Companies that invest in changing the way they manufacture, package, sell, and dispose of their products can be more competitive in the emerging environmentally-

*Continued on next page*

### Emission Control for Cars



*Emission controls reduce the amount of emissions per car, and presumably will decrease pollution. However, if the number of cars is increasing (due to an increasing population that is becoming more industrialized), further cutbacks in emissions per car will do little to reduce overall pollution.*

*Continued from previous page*

conscious marketplace. Some car manufacturers, for example, are experimenting with new designs that will allow for easy dismantling so that each part can be recycled.

- **Environmental Accounting.** Being able to track the costs associated with harmful by-products of manufacturing will become increasingly more important. While any good accounting system can report on the usual financial measures, new systems will be required to estimate environmental liabilities that may be growing beyond industry's means to deal with the future costs that are being accrued.

- **Shades of "Green."** There is now an opportunity to redefine the marketplace into shades of green consumers: from the "pale green" end where consumers will choose products that are environmentally friendly but require little effort or sacrifice on their part, to those who are "deep green" and will go out of their way to patronize companies whose products and services are deemed to be environmentally friendly. Companies who can appeal to the full spectrum of the green consumers are likely to be well positioned to compete in the new marketplace.

If there is anything to be learned from the last 20 years, it is that the environmental movement is not a passing fad but a permanent reality. There are genuine structural reasons why the issues will continue to grow in importance. The choice that companies must make is whether to be a leader in becoming more environmentally responsible, to be in the middle of the pack, or to be a laggard that kicks and fights inevitable changes at every step.

#### **Building a Sustainable Future**

"A sustainable society," according to the authors, "is one that can persist over generations, one that is far-seeing enough, flexible enough, and wise enough not to undermine either its physical or its social systems of support.... From a systems point of view a sustainable society is one that

has in place informational, social, and institutional mechanisms to keep in check the positive feedback loops that cause exponential population and capital growth."

Sustainability does not mean stagnation. A sustainable society is interested in qualitative development, not sheer physical growth. It requires that we begin to ask questions such as what the growth is for, who would benefit, what would it cost, how long would it last, and whether or not the planet's sources and sinks could accommodate it.

To achieve a sustainable economy, according to the authors, the most important change of all needs to take place individually, as we re-evaluate our mental models about consumption and waste. We must let go of the "sacred cow" that growth at all costs is desirable. People might have to change from a "have it all now" philosophy, valuing a high standard of living, to an attitude that values an improved quality of life for the present and the future. Asking ourselves about the actions we take and what their future effects will be—not just in terms of market share and profits, but in terms of future resource availability and environmental impact—will challenge us to make the right decisions for a shared world.

Businesses have the opportunity to make the greatest impact toward building a sustainable future. Activists

can educate, consumers can work on an individual level, and government can legislate—but businesses can *act*. Industry has the opportunity to innovate and create the changes that will push the environmental movement past the "hype" and into a world of genuine action.

As the economy tightens, some businesses and consumers may think they can't afford environmental improvements. But failing to protect the environment might end up costing far more than preserving it. Eastern Europe's current "ecotastrophe" is a case in point: Hungary's Deputy State Secretary estimated that health problems and loss of production due to pollution reduced their nation's gross domestic product more than 6%. ("Is the Planet on the Back Burner?", *Time*, Dec. 24, 1990, p. 48-50).

Making educated choices around such issues is the challenge of operating a business in today's world—the largest industrial group on the smallest overpopulated pastureland that has ever existed. But if businesses do not stop to challenge the choices they are making, they might discover they have travelled down the wrong path in the long run—the path of real economic loss and the destruction of vital resources. ↻

*Meadows, Donella, Dennis Meadows, and Jørgen Randers. Beyond the Limits. (Chelsea Green Publishing Company, 1992); Further Reading: Milbrath, Lester. Envisioning a Sustainable Society: Learning Our Way Out. (SUNY Press, Albany, 1989)*

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