

Environmental Degradation: Our Failing Earth

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EXECUTIVE SUMMARY

Changes in our natural environment have a profound impact, yet as elements of business planning, they have been largely overlooked. Gradual developments easily go unnoticed, but there is still time to act on negative trends, turning them to business advantages while healing our planet for everyone's benefit.

12 TRENDS changing the world

A five-year research project reveals that the future of commerce worldwide will be greatly influenced by a dozen "global tectonics" that will affect business leaders across all industries:

1. Biotechnology
2. Nanotechnology
3. Information technology
4. Population
5. Urbanization
6. Disease and globalization
7. Resource management
- 8. Environmental degradation**
9. Knowledge dissemination
10. Economic integration
11. Conflict
12. Governance

Much like the earth's tectonic plates, global trends are shifting the ground beneath our feet and transforming our industrial and societal topography. Every business, regardless of its size or industry, must view day-to-day operations in light of these large-scale developments.

Shifts in our natural environment have proven to be one of the most often overlooked global tectonics affecting the decision-making processes of business leaders. Gradual developments can go unnoticed, but we have both the ability and the responsibility to foresee, to understand, and to act as these trends unfold.

Throughout human history, our relationship with the environment has been a dichotomous one. We have tried either to control it in an attempt to decrease the risks caused by its natural processes or else we have lived in a primitive state in equanimity with nature. Instead of viewing our environment as a hostile force that needs to be tamed or something we must just succumb to, we now have the opportunity to understand its profound influence and to bring about improved balance.

This new way of seeing the environment can not only lead to a healthier planet, but it can also provide great opportunity and competitive advantage for business.

With the awareness that environmental degradation was a key global issue, the United Nations organized the Conference on the Human Environment in 1972 in Stockholm, Sweden. The result of the conference was the production of a declaration of 26 principles and an action plan of 109 recommendations.

This conference can be seen as the starting point for a new way for business to interact with the environment. But to begin this process, a thorough understanding of environmental degradation and how it affects all of us is required.

Many national and international

laws and agreements on environmental safety have been passed since the Stockholm conference. From these laws and agreements, eight interrelated components of the environment that prove most problematic for businesses and humankind can be identified: fresh water, coastal and marine areas, atmosphere, land, forest, biodiversity, urban areas, and natural disasters.

Sustainable development requires the interrelationship of business goals with environmental considerations. It means that we have to work to keep the ecological system balanced for purposes of increasing land quality, cleaning up the atmosphere, maintaining biological diversity, stopping deforestation, and reducing the number of natural disasters.

The degradation of one of these eight environmental elements causes degradation of others, ultimately creating a global ripple effect. Even though each corner of the planet is unique, any environmental loss has a global impact. A better understanding of environmental degradation can be reached by exploring each of these components.

Fresh water

Water is the lifeblood of the planet, delivering necessary ingredients for life. The presence of water is the primary indicator of life — even possible life on Mars is discussed in terms of its relation to the presence of water on the planet's surface. Earth has total water resources of about 1.4 billion square kilometers, of which 2.5 percent (35 million square kilometers), is fresh water. But less than 1 percent of all fresh water is available for use.

The uneven distribution of fresh-water resources on the planet is the basis of water stress. Yet water use rates will continue to increase. By the year 2025, 2.8 billion people will live in water-stress conditions, and by 2050 that number will increase to 4 billion people — 40 percent of the global population.

It is not only the challenge of the quantity and adequate distribution of fresh water but also the quality of that source that plagues the world. Globally, only 82 percent of the population (4.9 billion people) has access to an improved water supply system, while another 1.1 billion people lack access to potable water. More than 60 percent of the world risks being infected with water-related diseases. Such diseases cause the death of 5 million people each year — 10 times the number of people killed in wars.

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The complexity of a sustainable fresh water supply lies in the formidable task of a globally pervasive delivery method and in the improvement of its overall quality. There are some obvious possibilities for business in the areas of developing technologies to capture rainwater, purify current water sources, devise efficient storage facilities, and desalinate marine water.

Coastal and marine areas

Coastal zones are the intertidal and subtidal areas above the continental shelf (to a depth of 200 meters) and adjacent land area up to 100 kilometers inland. In other words, they constitute the border between land and sea.

The coastal zones are home to almost 40 percent of the global population, with millions more visiting these regions. The marine and coastal areas provide significant economic benefits: coastal tourism garners \$161 billion, trade and shipping represents \$155 billion in industry, offshore areas provide 20 percent of the world's oil and gas worth \$132 billion, and fisheries take in \$80 billion.

In general, the coastal ecosystems are an important element of the environment because of their role in absorbing and destroying inland pollutants as well as protecting shorelines from storms.

The specific causes of coastal and marine degradation are numerous and

interrelated. They include pollution, habitat loss, global climate change, exploitation and other effects of fishing, eutrophication (the process of receiving excess nutrients that stimulate excessive plant growth), non-native species invasion, watershed alteration and physical alterations of coasts, tourism, and marine litter. Each and every one of these factors is interrelated. Together, they have a synergistic effect.

We have only to look at the impact that Hurricane Katrina had on the Gulf Coast to see the effects of coastal wetland loss. The social and economic costs associated with this one very visible event will be felt for generations. It is frightening to then consider that during the past 40 years, the United States has lost about 80 percent of its coastal wetlands.

The exciting news is that the most effective way to prevent further pollution of coastal and marine areas is to develop technologies that will allow us to use some of the previously explored pollutants as raw material. Given the public's justifiable concern over air and water pollution, companies that want to maintain an edge in their industry should follow these environmental trends carefully.

Atmosphere

The atmosphere is composed of gases that cover the planet's surface to a height of 560 kilometers. The atmosphere protects all live organisms from ultraviolet solar radiation, prevents extreme climate fluctuations, and recycles water and chemicals.

The economic growth after the second World War produced mass emissions of hazardous industrial gases. For the first time in history, we saw tremendous amounts of such gases as chlorofluorocarbons, sulphur dioxide, and carbon monoxide entering the environment. The pollution of anthropogenic gases into the atmosphere propels its degradation with the following specific threats for the planet: air

pollution, acid rain, contamination by toxic chemicals, and destruction of the ozone layer.

Solving the problem of air pollution is not easy because so many human activities contribute to it, such as cooking, vehicle emissions, industrial pollution, and agriculture. It seems only sensible to develop technologies that will not only decrease pollution but also clean the existing air. The United States has already demonstrated that, with a concerted effort, it is possible to reduce atmospheric degradation.

Land

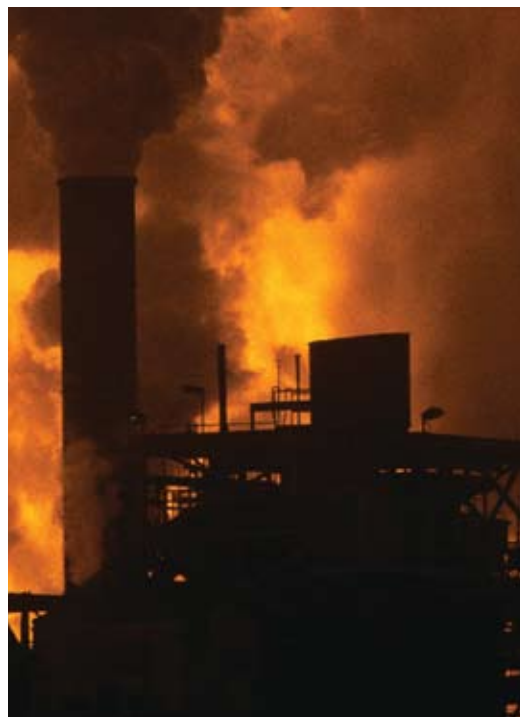
Land typically refers to all elements of the earth's terrestrial surface. For our purposes here, we will focus on land degradation as it directly relates to soil.

Soil as a fertile land surface varies in quality and thickness, with the major indicators of quality being the presence of organic matter and its composition. Soil is considered the major determinant of fertile land quality.

Ten percent of the land surface of the earth is made up of soil. Half of the earth's land surface is desert, polar regions, or mountainous areas where extreme climate conditions do not allow crop cultivation, and the remaining 40 percent is severely limited by terrain, fertility, or excessive rainfall to support food production.

The major employment of soil is agricultural, with the need for food being the biggest factor affecting its use. While world population has doubled since 1960, prices of major agricultural commodities such as wheat and maize have fallen by 60 percent. Supply has outstripped demand mostly due to new and improved methods to increase yield as well as some increase in land availability in certain regions. Even with such growth in food production, 1 billion people suffer from lack of food due to political instability and poor logistics.

Even with a projected increase in



availability of land for food production, there still remains the issue of current and future land degradation as well as the significant costs involved in the assimilation and development of new land for agricultural purposes.

There is a huge need to develop mechanisms to prevent land degradation and for investment in land improvement.

While we see that future agricultural technologies have the potential to prevent land degradation, neither adequate land availability nor technological progress guarantees the preservation of land quality. In developing countries, it is still more efficient to introduce new land into rotation or to use environmentally aggressive technologies than to improve the quality of the arable land. There is a huge need to develop mechanisms to prevent land degradation and for investment in land improvement.

We are able to develop new agricultural technologies that help prevent degradation and even increase fertility. For example, zero tillage and direct seeding result in a decrease in the mechanical disturbing of soil and allows an increase in the number of plants and microorganisms per unit of soil. This, in turn, prevents erosion and naturally increases organic matter,

which is an important soil component.

To prevent further soil degradation of the land, we need only look to all of the preceding data to guide us in the development of new agricultural methods and technology. We already know of many natural processes to combat soil degradation such as the stimulation of naturally occurring nutrients and organic matter, zero tillage systems, crop rotation, and the regulation of drainage to decrease water erosion. It is up to us to use the challenges presented here to help guide us in aligning our business goals to interact with the environment in a better way.

Forests

Forests represent another unique ecosystem and an important component of the global environment. Even from a purely pragmatic standpoint, we can see some of the obvious functions that forests provide. In financial terms,

the total economic value assigned to forests and their products has been estimated at \$354 billion, or about 1.2 percent of the gross domestic product.

In developing countries, forests are a significant source of support for many of the people. Almost half a million people live in or near forests and depend upon them for food, fuel, fodder, timber, and income. Forest degradation can manifest itself as an overall decline in the quality of the forested area or, even more harmful, the disappearance of trees (deforestation). Deforestation usually occurs when land is used for agricultural purposes. Half of the world's original forested land has been destroyed during the past three decades, with most of the wood being used for cooking and heating.

The major factors that influence deforestation include conversion to other land uses (mainly agriculture), pests and diseases, fire, overexploita-



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tion of forest products, poor harvesting practices, overgrazing, air pollution, and storms.

The deforestation of tropical forests is the consequence of four main activities: clearing territory for farming (49 percent), wood harvesting (32 percent), cattle ranching (11 percent), and for the provision of infrastructure (8 percent). Tropical forests are typically found in developing countries where unsustainable agricultural practices are common, with the resulting need to reclaim more treed land for food production, which perpetuates the deleterious cycle. The slash-and-burn method has resulted in the loss of almost half of the original rainforest — 1.6 billion hectares, equal to the combined area of Washington, Idaho, California, Nevada, and Arizona.

If we heed the information we currently have and act on that information, the outlook is bright. New agricultural

technologies have been developed that, if fully implemented, will not cause future deforestation. Economic mechanisms to reduce poverty can also decrease the dependence on wood as a source of energy and heating.

If all of these devices are used, then by 2050, the new forest plantations can produce the same amount of wood as now, but from five times less territory. While we may not have to fear that forests will altogether disappear, concerted efforts between businesses and government can result in policies and practices beneficial to environmental protection and corporate viability.

Biodiversity

Biodiversity refers to the variety of life: plants, animals, microbes, fungi, genes, and the ecosystems of which they are a part. Biological diversity encompasses three varieties: species diversity, which characterizes all life



Free-flowing rivers disappearing

Most of the world's largest rivers are losing their connection to the sea, and nearly a quarter of those left risk being disconnected in the next 15 years.

According to a report by the World Wildlife Federation, only a third of the world's 177 large rivers (1,000 kilometers and longer) remain free-flowing, unimpeded by dams or other barriers. Only 21 of these actually run freely from source to sea; the other 43 are large tributaries of rivers such as the Congo, Amazon, and Lena.

The report shows that the increasing loss of free-flowing rivers threatens the supply of water for drinking, sanitation, agriculture, fish, and fishery products.

"With so few long free-flowing rivers left, we are on the brink of losing another natural phenomenon without fully understanding the costs of these losses before it's too late," says Ute Collier, WWF's dams and water infrastructure program manager and a co-author of the report.

According to WWF, large catfish populations in the Amazon and Mekong Basins, river dolphins in the Ganges Basin, and wildebeest in the Mara River are all under threat from the effects of man-made barriers on these rivers.

Dams can reduce the numbers of native fish in a river, directly affecting fisheries' productivity both upstream and downstream. Free-flowing rivers also regulate pollution and sediment levels, the lack of which was tragically highlighted by the flooding of New Orleans following Hurricane Katrina.

"Hurricane Katrina was a powerful reminder of the backlash from altered rivers such as the Mississippi," said Jamie Pittock, director of WWF's global fresh water program. "Loss of the sediment needed to sustain coastal wetlands due to upstream damming and canalization of the river is a major factor in the devastation and loss of life."

organisms; genetic diversity, which explains the differences between individuals of a species; and ecosystem diversity, which refers to the different ecosystems created by living and non-living elements of the environment.

As we have already noted with forests, the regions closest to the tropics show the greatest biodiversity. Thailand and France are roughly the same size, but Thailand has 251 species of mammals to France's 93. Even though certain regions have a wealth of biodiversity, other regions are the sole repositories of individual species. The Succulent Karoo region of southern Africa is home to 4,849 plant species, half of which live nowhere else in the world.

More than half of the plant-based calories in the human diet are supplied by four plant species (wheat, maize, rice, and potato), and 90 percent of the animal protein consumed globally is provided by a dozen animal species. This dependence on such a small handful of species can prove to be problematic for the quality, quantity, and future of our food supply. Conditions for crops and animals can change rapidly, and without

enough genetic diversity in these species, they can become unable to thrive.

Both wild and cultivated species are in decline, with about 75 percent of the genetic diversity in agricultural crops lost globally in the past century and 1,350 of 6,300 animal breeds lost. Much of this is due to loss of key habitats. Reduction of biodiversity entails a reduction of options for ensuring more diverse nutrition, enhancing food production, raising incomes, coping with environmental constraints, and managing ecosystems. Recognizing, safeguarding, and using the potential and diversity of nature is critical for food security and sustainable agriculture. The ensuing opportunities for business to pioneer new ground in these areas are infinite.

Business considerations

Every day, we assign economic values to our work and our labor, and then we use those values to make deci-

sions about our assets, such as what to buy and how much money to save. Similarly, the values we assign to ecosystem assets (goods and services such as pollination and water filtration) are an important factor in how we treat ecosystems. Yet because these goods and services are not routinely bought and sold in markets, there's no easy way to calculate their worth. Too often, decision makers and traditional economists simply ignore their value, essentially treating ecosystem goods and services as if they will always be in profuse supply.

A complete understanding of environmental degradation will allow us to predict future government policies as well as which markets will decrease and which will grow. It will allow us to foresee emerging trends in manufacturing processes and to identify new markets for business opportunity and new consumer sectors. Knowledge about the

environment is therefore critical for managerial and entrepreneurial decision making. This important global tectonic shift will determine whether industries have prepared for minor tremors or major earthquakes.

Regulatory changes, combined with consumer concern over our ecological security, have caused business to enter into the sphere of environmental issues.

After we have examined all of the data, there is no question as to the enormousness of the problem. Our environment is being degraded, and regardless of ideological position, we should be concerned. We can't continue to ignore the problem, nor should we. Business and individuals can play a vital role in pioneering an improved future for the planet. When the dust from this global tectonic settles, we will see which businesses have prepared for this imminent change. ❖

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