Natural Capitalism on the U.S.-Mexican Border

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Some commentators argue that the driving force behind the booming U.S.-Mexican border economy is cheap labor and lax environmental controls. If they are correct—and there's much evidence to support their claims—the resulting distress rampant on the border would argue that an alternative is needed. The good news is that there is an approach that can provide the economic vitality without creating unmanageable problems. The rapidly emerging practice of Natural Capitalism offers a new approach to business and economic development that improves profits and competitiveness while protecting living systems and the future.

Simple changes to the way businesses are run, built on advanced techniques for using resources more productively, can yield startling benefits both for today's shareholders and for future generations. Also, straightforward changes to the way community decisions are made, based on realistic examination of the full range of benefits and costs, can result in greater social equity, environmental restoration, and economic prosperity.

This new approach is called Natural Capitalism because it's what capitalism becomes when businesses behave as if its largest category of capital—Nature's ecosystem services—were properly valued. Everyone knows that living systems provide us with indispensable *products*—such natural resources as oil, water, trees, fish, soil, and air. Less obvious is that they also provide us with such equally essential *services* as storage and cycling of fresh water, flood control, climatic stability and detoxification of human and industrial waste. Though these services are fundamental to business and to human life, along the border many are declining, some rapidly. Worse, many have no known substitutes at any price. Unfortunately, the cost of destroying ecosystem services may become apparent only when the services break down, such as the devastating l993 Tijuana flood.

Fortunately, the practice of Natural Capitalism can protect living systems while offering superior opportunities. It involves four shifts in the way business and economic development is conducted:

First, dramatically increase the productivity with which resources are used: Through fundamental changes in both technology and production design, farsighted companies are implementing ways to make energy, water and materials stretch many times further than they do today. Such savings pay for themselves and often yield higher profits. Similar increases in resource productivity also build local economies, but in ways that distribute benefits widely in the community, by increasing self-reliance and reducing family costs. The very fabric of a local economy can become more productive and generate more wealth through such efforts as vendor matching, business mentoring, import substitution, increasing local business ownership, and managing growth.

The second shift in practice is to biologically inspired production models,

not only to reduce waste, but to eliminate the very concept of waste. In the closed-loop production systems of industrial ecology, every output either is returned to the ecosystem as a nutrient or becomes an input to manufacturing another product. Such systems often can be designed to eliminate the use of toxic materials. As waste and toxics are reduced and eliminated, so are costs. Similarly, communities can identify business opportunities in local material, energy, and waste streams; and match those opportunities with local businesses. Benefits include more jobs, lower costs, prolonged landfill life, and reduced pollution. Biological systems are powerful models for programs to retain and expand business, salvage buildings, design growth correctly, and control growth.

The third shift toward Natural Capitalism is to adopt a solutions-based business model. The traditional manufacturing model rests on the sale of goods. In the new model, value is instead delivered as a continuous flow of services. Companies that are part of the "solutions economy" provide what customers truly want: quality, utility, and continuous performance instead of just more goods. For example, most offices buy copying services, not copiers. Creative communities will begin to assist local businesses in shifting from product sales to service leasing.

In the fourth shift, business and communities reinvest in natural capital to restore and sustain ecosystems so that they can produce both vital life-support services and biological resources. The future's strongest competitors will be communities and businesses that recognize their success is based on a full complement of ecosystem services.

Pressures to move toward Natural Capitalism are mounting, as human needs expand, the costs engendered by deteriorating ecosystems rise and the environmental awareness of consumers increases. This is not philosophical speculation, but the reality facing most major businesses. For example, consumer perceptions of company environmental practices are today dramatically effecting the market position of major companies and their supplier.

As parts of international supply chains, industries along the U.S.-Mexican border are no exception. Regardless of whether local environmental regulations are lenient or poorly enforced, many of these suppliers will be required by their buyers to continuously improve their environmental practices. One principal mission of engineers and middle managers in the most innovative multi-national companies is to anticipate regulations and consumer perceptions worldwide, to redesign products and processes accordingly, and to notify suppliers that they also must change.

Suppliers that have improved their practices ahead of these changes will be far better positioned in the world economy. They know that defining problems narrowly, without identifying their deeper causes or connections merely shifts problems and obscures solutions. They are systems thinkers who uncover lasting, elegantly frugal solutions with multiple benefits, including strengthened competitiveness.

Natural Capitalist economic development links people from industry, the local government and the neighborhood. It optimizes the local wealth creating capacity of the whole community. It doesn't merely seek to

spin the local economy as fast as possible. Rather, it builds a web of business relationships to create more jobs, income, and savings; cleaner air and water; and a more equitable distribution of the fruits of local labor.

Supply Chains and Consumer Perceptions

It is fashionable for corporate leaders to believe that their future is in their hands. All they have to do is run a tight ship, deliver value to their shareholders and they will prosper. The concerns of others outside the company are irrelevant to their job.

Such a belief is increasingly risky. In fact the future of any company depends not only on the ability to sell its product for less than it costs to make it, but on how its customers and others perceive the behavior of the company. Increasingly customers are scrutinizing the environmental performance of companies. Thus, any company that wishes to remain competitive in global trade, even a small supplier located where environmental regulations are lenient or poorly enforced, is subject to rigorous environmental policies.

Case in point: The Monsanto corporation bet very heavily that its future profits would derive from creating genetically modified organisms (GMO). In particular it produced GMO corn and soybeans, which are ingredients in a vast array of consumer products. It regarded resulting increases in agricultural output as good for business and consistent with its policy of environmental sustainability. Monsanto thought it was doing the right thing.

But a handful of consumers, especially in Europe, organized on the Internet to oppose GMOs. Many were mothers concerned about baby food who communicated with Gerber and Heinz, who then banned GMOs from their products.

Simultaneously, major grocery chains in Great Britain had become targets of customers demanding GMO labeling. The stores had no easy way of knowing the GMO content of their foods, but consumers were embarrassing them by spot testing products from their shelves and exposing their GMO content. The grocers' only defense was to require their suppliers to eliminate GMOs. Soon, non-GMO products were trading at a premium, while GMO-content foods were trading at a discount. Within a year, the German national bank in an influential report titled "GMOs Are Dead," advised its investors to sell any stock they owned in companies promoting genetic engineering. The technology that was supposed to be a boon for U.S. agriculture actually cost it $1 billion in lost exports in 1999, exacerbating a farm crisis that led to a $7 billion congressional bailout.

In December 1999, the Wall Street Journal reported that Monsanto's leadership in this field had caused its share price to plummet and forced it into a shotgun merger with Pharmacia and Upjohn. The merger terms imply a valuation of Monsanto's biotech division at zero. Shareholders took a bath, and the CEO announced his retirement. European giants Novartis and AstraZenica likewise combined their biotech divisions into a single unit to be sold, "effectively washing their hands of crop biotechnology," according to the Wall Street Journal.

This cautionary tale is just the latest example of the peril faced by a company that ignores the discipline of the market. Millions of consumers, whose perceptions about environmental and

health issues differ from corporate conventional wisdom, can impose precipitous changes in the fortunes of major multi-national corporations.

The nearly 3,000 maquiladoras along the U.S.-Mexican border could hardly be faulted for thinking that they are immune from such pressures. They appear to be anonymous links in international supply chains. But, like the British grocery stores, each chain is vulnerable to public perceptions of any link in that chain.

Recently, Rocky Mountain Institute was invited to help a team of engineers and middle managers from a major multi-national electronics firm. Central to their daily work is anticipating regulations and consumer perceptions across this continent and Europe. When they see a change coming—a potential new regulation or a change in consumer perception—they look for ways to accommodate that change early, on their terms and less expensively than a new regulation might require. They know that if they wait until a regulation is instituted or a boycott is mounted, company risk and costs will multiply. Therefore, their mission is finding ways to constantly improve company processes. Their latest challenge is to implement the concepts of environmental sustainability across their company, not because they are environmentalists but because they believe that this will underpin the company's future profits.

One of their chief responsibilities is notifying their suppliers that they also must change. Most suppliers have developed little or no capacity to improve their environmental performance, regardless of regulations. Such companies can suddenly find themselves in big trouble, scurrying to build capacity to respond. If they fail, they will most likely be cut from the supply chain.

This phenomenon is not a fad that will blow over. Ten years ago, *Business Week* reported that many corporations now regard pollution limits as minimums. Such companies seek to exceed minimal compliance levels and position themselves for future changes in policy.[1] Six years ago, *The Economist* argued that society is entering "the era of corporate image, in which consumers will increasingly make purchases on the basis of a firm's whole role in society: how it treats employees, shareholders, and local neighborhoods" [2]

The message is being carried by many powerful voices. For example, GM, Ford, Nike and IBM are pressuring upstream companies to "get greener." GM's 1998 Environmental, Health and Safety Report says, "The same issues recognized within GM must be recognized throughout the supply chain: continuous improvement, eco-efficiency, reducing waste in material, energy and resource usage, design for the environment, and recyclability." Even the U.S. Department of Defense will require its suppliers to comply with ISO 14001 certification.

Sooner or later, maquiladoras and other suppliers along the border will be required by their buyers to comply with environmental conditions that are independent of, and often tougher than, governmental regulations. Suppliers who anticipate these requirements can implement them on their own terms, less expensively and without disrupting their operations. Smart companies are finding that this process also affords ways of increasing the efficiency and profitability of their operations. Industry can do much to head off government regulation and enforcement, little to

prevent rapid shifts in consumer perceptions.

Even industry giants are subject to this phenomenon. Like Monsanto, a large company that is stunningly influential in several countries, may find that it has little influence in other countries that are home to thousands, even millions, of its consumers. If that second group of countries develops a strict new regulation, the company realistically can't redesign its products for only that portion of its market. It must either give up that market or change its products for all consumers. This can happen even within countries. When California instituted energy-efficiency requirements for refrigerators, manufactures were compelled to redesign all their products, not just those headed for the West Coast.

So, what might buyers require border suppliers to do? If reports of border conditions are correct, it's good bet that many actions will be required. For example, companies will be forced to find safe ways to store or dispose hazardous materials. They will have to demonstrate that they will no longer pollute the air, rivers, and ground water. They may be forced to stop using hazardous materials entirely.

Managers of some border industries will probably regard such environmental pressures as threats. But managers who have long experience with these questions would disagree. Many companies with whom RMI consults regard environmental policies as opportunities, ways for their companies to improve competitiveness, upgrade products, and increase profits. And they are not alone. In *Costing the Earth: The challenge for governments, the opportunities for business,* Frances Cairncross, editor of *The Economist*, demonstrates that the rise of environmental concern is "perhaps the biggest opportunity for enterprise and invention the industrial world has ever seen."[3]

Essential Services from Living Systems

One business opportunity arises from recognition that long-term competitiveness depends upon the viability not only of manufactured and financial capital, but equally importantly of natural capital. Everyone knows that living systems provide us with indispensable *products*—such natural resources as oil, water, trees, fish, soil, and air. But this is only half of what makes up natural capital. Less obvious is that it also provides us with such equally essential ecosystem *services* as:

- Storage and cycling of fresh water
- Cooling from shade trees
- Flood control by root systems.
- Purification of water through wetlands
- Purification of air by leaves
- Storage and recycling of nutrients in roots
- Sequestration and detoxification of human and industrial waste through wetlands and ground filtration
- Pest and disease control by insects, birds, bats, and other organisms
- Formation of topsoil and maintenance of soil fertility

Most of these services underpin the ability of business to exist and of the maintenance of human life. Unfortunately, along the border many of these services are declining, some rapidly. Worse, many have no known substitutes at any price. The only

businesses that don't share the risk of loosing these services are those that intend to simply move and leave their mess behind. And such behavior makes a company vulnerable to the market forces described above.

Unfortunately, the cost of destroying ecosystem services may become apparent only when the services break down. For example, in l993 a flood devastated parts of Tijuana. On its face, such an event may seem like just another natural disaster. But how natural was it? The area has been subject to occasional downpours for centuries. This time the volume of rainfall was more than typically falls. As the climate is further destabilized, such floods will become more common. And the result was more disastrous than in the past because cattle ranching, dry farming, sand and gravel mining, and haphazard urbanization had removed natural vegetation that previously had captured runoff upstream. The loss of life and property resulted because of the loss of ecosystem services. With good intentions, people planted crops, raised livestock, mined and built modest dwellings to improve their lives. However, while the value of these activities was obvious, the value of declining vital ecosystem services was not considered. Because the value of the ecosystem services is not counted on any balance sheet, each person optimizing his or her part of the larger system, ignoring the overall system. Ignoring the whole system is bad for people and bad for business.

Note: The list of ecosystem services above does not include such services as noise abatement and peaceful sanctuary because some may regard them as non-essential. Neither does it include such services as protection against harmful cosmic radiation, distribution of fresh water, and regulation of the chemical composition of the atmosphere because some may argue that the depletion of these services is caused by factors too distant for community action. This was also the belief of many businesses about the loss of climatic stability. An increasing number of businesses, however, are implementing policies to make themselves "climate neutral." Doing so will save them money and enhance shareholder value. Collectively, such efforts by businesses are the best way to tackle such large problems and increase competitiveness. See www.coolcompanies.org

Natural Capitalism

The rapidly emerging practice of Natural Capitalism offers a new approach for enhancing business profitability, while protecting ecosystem services and the future. Because it improves profits and competitiveness, it's attractive to those who've not yet recognized the value of ecosystem services. Simple changes to the way businesses are run, built on advanced techniques for using resources more productively, can yield startling benefits both for today's shareholders and for future generations.

This approach is called Natural Capitalism because it enables companies to behave as if the largest category of capital—nature's ecosystem services—is properly valued. The journey to natural capitalism involves four strongly intertwined and synergistic shifts in business practices: Dramatically increase the productivity of natural capital, shift to biologically inspired production models, move to a solutions-based business model, and reinvest in natural capital.

1. **Dramatically increase the productivity of natural capital.**

Reducing the wasteful and destructive flow of resources represents a major business opportunity. Through fundamental changes in both production and technology design, farsighted

companies are developing ways to make such natural resources as energy, minerals, water and forests stretch five, ten, even 100 times further than they do today. These major resource savings often yield higher profits than small resource savings do. Such investments are not only paid for over time from the saved resources but also in many cases may actually reduce initial capital investment. A few examples:

- Sony's Video Tec de Mexico plant in Tijuana reduced the size of a component of one of their TVs, substantially reducing plastic material use, material costs and wastes.[4]
- A new building in Bangkok was designed to save 90% of its air-conditioning costs at no extra cost.
- Cost-effective retrofits to a California office saved 97% of its air-conditioning costs.
- A comprehensive efficiency retrofit of electrical motors typically saves about half their energy consumption and pays back in around 16 months.
- An innovative design developed by Davis Energy Group uses engineered wood products to reduce the amount of wood needed in a stud wall by 70%. The walls are stronger, cheaper, more stable, and insulated twice as well, enabling the elimination of cooling equipment in a climate that reaches 1130F.
- Skilled retrofits have saved 70-95% of office, warehouse, and retail lighting energy, yet the light quality is more attractive and the occupants can see better. Such measures typically increase labor productivity by 6 to 16%
- Pacific Coca-Cola reduced a can line's need for rinse water by 79% by using air instead of water to clean the insides of cans before filling.
- A North German manufacturer of paper products almost eliminated its water use by completely recycling its base supply in a sophisticated process that successfully sediments, floats, and filters, the fiber and particulate loads from the water.
- Gillette reduced the water used to make razor blades by 97%, and that used to make pens by 90%.

Advanced resource productivity is driven by the same logic as the first Industrial Revolution. Early capitalism substituted the use of ecosystem services and machines to make people 100 times more productive because the relative scarcity of people was limiting progress. Today the pattern of scarcity has shifted to just the opposite—abundant people and scarce natural capital. Profit maximizing capitalists will now economize on the scarce resource—namely, natural capital.

2. **Shift to biologically inspired production models**.

Natural capitalism seeks not merely to reduce waste but to eliminate the very concept of it. In closed-loop production systems modeled on nature's designs, every output either is returned harmlessly to the ecosystem as a nutrient, like compost, or becomes an input to manufacturing another product. Such systems often can be advantageously designed to eliminate the use of toxic materials, which hamper nature's ability to reprocess materials.

- Hasbro Manufacturing Services, Juguetrenes plant in Tijuana

saved $230,000 per year by classifying, regrinding, and selling plastic wastes to recyclers.[5]

- Sony's Video Tec de Mexico plant in Tijuana has increased is volume of recycled material by 45% annually since 1993. Combined revenue and cost avoidance in 1995 was $500,000.[6]
- Interface's Solenium carpet lasts four times longer and uses 40% less material than ordinary carpet, reducing its materials intensity by 86%; and it doesn't contain the toxic materials normally found in carpet. Sixty seven million dollars of the companies 1994-1998 revenue increase is directly attributable to its 60% reduction in landfill waste. Interface intends to eliminate all waste in its traditionally waste-intensive business, power its factories with renewable energy, and get its feedstock from renewable materials.
- Productos de Consumo Electrónicos Philips in Ciudad Juárez donates wooden and metal pallets, wood from the crates, cardboard from packaging and styrofoam to needy families for use in home building. Philips employees donate their time to help build the structures.[7]
- The U.S. remanufacturing industry in 1996 reported revenues of $53 billion, more than consumer durables manufacturing. (appliances; furniture; audio, video, farm and garden equipment.)

The emerging discipline of industrial ecology is closed-loop production applied at the scale of a facility or an industrial park.

- The zero-emissions brewery in Namibia is a facility-scale industrial ecosystem that employs four times the people and produces seven times the food, fuel, and fertilizer of conventional operations. It sells not only beer, but mushrooms grown on spent fermentation grain, and chickens fed on earthworms in what had previously been waste grain. The fermentation process is fired by methane generated by a chicken-waste digester. The "brewery" also sells eight varieties of fish fed by digester waste and reared in ponds filled with brewery wastewater.
- Kalundborg, Denmark is the leading example of an industrial ecosystem park consisting of several businesses in one community, each of which uses the waste from another business. It's being imitated in places such as Londonderry, New Hampshire; Chattanooga, Tennessee; and Monterrey, Mexico.

One can't help but wonder what business opportunities lie in the waste and hazardous materials now being dumped along the border?

3. **Move to a solutions-based business model**.

The business model of traditional manufacturing rests on the sale of goods. In the new Natural Capitalist model, businesses instead deliver a continuous flow of services—such as providing

illumination rather than selling light bulbs. Services are delivered, too, within a relationship that aligns the interests of providers and customers in ways that reward them for continuous improvement in implementing the first two innovations of natural capitalism—resource productivity and closed-loop manufacturing.

Companies that are part of such a "solutions economy" provide what customers truly want: quality, utility, and continuous performance instead of just more goods. For example, most offices buy copying services, not copiers.

- Instead of selling elevators, Schindler leases vertical transportation services
- Under its Evergreen lease, Interface no longer sells carpets but rather leases a floor covering service for a monthly fee, accepting responsibility for keeping the carpet fresh and clean. Monthly inspections detect and replace worn carpet tiles. Since at most 20% of an area typically show at least 80% of the wear, replacing worn tiles reduces the consumption of materials by 80%. Combined with savings through its Solenium product, Interface achieves a 35-fold reduction in the flow of materials, reducing extraction of virgin materials and production of vast quantities of waste.

The solutions model doesn't suggest that durable goods will no longer be produced. On the contrary, in the solutions economy, goods are so durable and valuable that companies prefer to keep and lease them, rather than sell them. Smart companies will adopt this approach ahead of the sort of legislation now entering law in Germany and Japan that requires manufacturers to take back their products after their useful life and recycle or remanufacture them.

When a company shifts from selling to leasing a product, it then owns the product throughout its lifecycle. As a result, its relationship to the materials in that product shifts too. Durability, reusability, and non-toxicity become attractive attributes that enhance profitability.

4. **Reinvest in natural capital.**

In some circles, damage to the environment is regarded only as a loss of non-essential amenities, luxuries that are insignificant compared to the benefits of business and economic development. Efforts to protect these "luxuries" have been characterized as elitist and as unrealistic constraints on business. However, while some environmental concerns may be aesthetic, the depletion of natural capital is increasing being recognizes as limiting factor on future economic productivity.

Along the border, air and water pollution, and the accumulation of hazardous materials negatively effect human, business, and living systems. As any prudent capitalist would do, business must reinvest in restoring and enhancing the natural capital so that it can produce both vital life-support services and biological resources even more abundantly. Pressures to do so are mounting, as human needs expand, the costs engendered by deteriorating ecosystems rise and the environmental awareness of consumers increases. Fortunately, these pressures all create business value. Some examples:

- Thousands of ranchers are improving both their range and

their profits, using a grazing technique developed by Allan Savory of the Center for Holistic Management in Albuquerque, New Mexico. Savory's approach raises the carrying capacity of rangelands, which have often been degraded not by overgrazing but by undergrazing and incorrect grazing. It keeps the cattle moving from place to place, grazing intensively but briefly at one site, so that they mimic the dense but constantly moving herds of native grazing animals that co-evolved with the grasslands.

- John Todd's biological "Living Machines" turn sewage and septage into exceptionally clean water, plus valuable flowers, an attractive tourist venue, and other byproducts, with no toxicity, no odor, and reduced capital costs.
- A half century ago, Port Angeles, Washington, like many towns seeking development built a seawall along the beaches, rocks and wetlands that face the Strait of Juan de Fuca. Behind the seawall, an industrial site was created, which became home to a timber mill and its mill pond, among other facilities. For years, rafts of cedar logs were towed to Port Angeles and into the mill pond. But a few years back, the mill switched its raw material to cottonwood, which sinks. As trucks and forklifts inefficiently skirted the millpond, it became a $150,000 annual liability.
But Port Authority officials got a bright idea: excavate a portion of the industrial site near the pond where there had once been an estuary; dump the material in the millpond; and restore the estuary. The mill happily invested $180,000 moving the fill. Then townspeople and the U.S. Forest Service restored the estuary. By reinvesting in natural capital, everyone won. The mill received a return on its investment of around 300%, while creating land for an $8 million expansion, which created 30 permanent jobs. The restored estuary is not only a vital natural habitat, it's a town park and a buffer between the growing tourism of downtown and the industrial site

Systems Thinking

At the heart of Natural Capitalism is an approach to problem-solving called "whole systems thinking". Designers and decision-makers too often define problems narrowly, without identifying their deeper causes or connections. This merely shifts or multiplies problems and obscures solutions. In contrast, systems thinking typically reveals lasting, elegantly frugal solutions with multiple benefits, which enable decision-makers to transcend ideological battles, cross the boundaries of occupation and discipline, and unite all parties around shared goals.

Port Angeles officials could have narrowly focused their tasks on optimizing the Port's market position. But as systems thinkers, they sought ways to optimize the whole system and, in doing so, developed a brilliant, yet simple solution that made all parties winners and restored an eco-system.

Systems thinkers are found at Interface too. They could do their business the way it's always been done: sell carpet and make money. Instead, they are exploring the entire value chain

of carpet production, from virgin materials through to discarded materials. Instead of regarding the tons of carpet that usually ends up in the landfill as some one else's problem, they embrace it, and many other problems in their value chain, as business opportunities. The outcome: more profit and a healthier environment.

Development and Expansion

Growth and industrial recruitment are the usual strategies chosen for economic development on the U.S.-Mexican Border. Jobs are considered the measure of success. While these strategies succeed in some circumstances, in others they generate substantial uncounted costs, for example, pollution and loss in vitality of ecosystem services. Though these costs can undermine economic prosperity, they are seldom considered in decision making.

Even the creation of some new jobs may generate a net economic loss. According to one analyst, "Entry level [jobs] often require more in government services than they contribute in taxes." Conventional strategies virtually never attempt to optimize the whole community as a system to be sustained over the long run.[8]

Systems thinking can inform this dilemma. It's just as applicable to a community's economy as it is to industrial processes. Unfortunately, like old industrial thinking, the conventional approach to economic development is to optimize an individual piece of the system, for example, to focus narrowly on recruiting a new company regardless of its effects on the community.

This is not to suggest that business recruitment is always disadvantageous to a community. On the contrary, it has been, and can continue to be beneficial in many circumstances. But when tax breaks, land, and infrastructure are offered with the sole purpose of securing jobs and without considering costs, the long-term community and environmental consequences can be serious.

One area of confusion in the U.S.-wide growth debate is the word itself. "Growth" actually has meanings. Discussion about growth issues can proceed intelligently only when those two meanings are distinguished. For the sake of this paper, the words assigned to those meanings are "expansion" and "development." Physical enlargement—more people, infrastructure, buildings, subdivisions, malls, etc., which may or may not benefit the community—is called "expansion." In contrast, "development" means betterment: living wage jobs, increased income, greater savings and excellent quality of life. Ganster, Sweedler and Clement distinguish between these two concepts in their paper, *Development, Growth, and the Future of the Border Environment.*

Throughput

One concept that helps to clarify the distinction between expansion and development, and the health of such large systems as companies, ecosystems, and communities is that of "throughput." To help understand how it informs issues of development and expansion, consider the story of the recently unemployed engineer:

Undaunted by the downsizing, he buys a truck and a load of vegetables to sell by the highway. After a terrific day, he's sold out. Back home, he gushes to his wife about his success.

"How much," she asks, "did you earn?"

"Eighteen hundred bucks," he crows.

"And how much did you pay for the veggies?"

Punching his calculator, he hesitantly announces, "Two thousand."

"Hmm," she says, "there seems to be a problem."

Dreamily, he says, "Yeah, I need a bigger truck."

He's intoxicated by revenue. But veteran businesspeople know that what counts is profit. Increasing revenue is fine, until it's outweighed by costs.

Ironically, the same smart businesspeople often neglect to calculate net gain when promoting economic development. They seek to spin the economy as fast as possible—harvesting more grain or trees, making more widgets, building more subdivisions, attracting more tourists. These are ways to increase throughput, the rate at which goods and services flow through an economy, and the rate at which resources are turned into waste. But increasing throughput does not necessarily lead to development, to community prosperity and quality of life.

Community leaders should ask themselves if increased throughput provides a net gain—that is, does it increase the well being of citizens and strengthen the community? And does continuously increasing throughput leave a viable economy for their grandchildren, or is it an illusion that, like selling more veggies, feels good in the short term but hurts later on? These are not simple questions. But answers can be found by soberly comparing the economic, community and environmental costs with the benefits of specific growth proposals.

Unfortunately, community and environmental factors are seldom considered. Intoxicated by the prospect of an increase in throughput, growth boosters often ignore such costs as traffic congestion, declining schools and other public services, increasing taxes, groundwater pollution, depleted soils, and housing that residents can no longer afford. In a mature economy, *each additional unit of industrial production can create a net loss that boosters assume will be made up in volume.*

Natural Capitalist Development

The distinction between expansion and development, and the concept of throughput are important for two reason: First, as mentioned, many *expansion* options increase throughput but don't improve the community or its environment. Second and less obvious, many *development* opportunities require little or no expansion. Those opportunities are part of Natural Capitalist Development.

Natural Capitalism offers a unique way to bring a community together. It's attractive to business people because it offers ways to strengthen competitiveness, while enhancing livability and reducing environmental impacts. Innovative businesses can lead communities in adopting these principles and setting examples.

Natural Capitalism is a powerful strategy for economic development—a route to increased jobs, income, commerce, savings, equity, and community well being that doesn't necessarily require community expansion. Because this kind of development proceeds independent of increases in the size of a community, it's attractive to both booming and declining communities. Unlike conventional expansion schemes that concentrate benefits in one or two places under the theory that benefits will trickle down to everyone, Natural Capitalist

Development distributes benefits widely across the community.

The journey to Natural Capitalist Development involves four interrelated shifts in community decision making, similar those described above for Natural Capitalist businesses. Listed under each are several representative community activities or programs. Many are well known, others innovative. Most of the listed activities require little or no community expansion. While not all apply to every community on the border, the length of this list indicates the untapped wealth-generation potential in virtually every community.

1. **Invest in Resource Productivity**

A local economy is like a bucket that the community would like to keep full. Growth and business recruitment are attempts to pour more money into the bucket. But focusing entirely on more ways to fill the bucket ignores vast opportunities. Economic buckets invariably have holes in them through which dollars leak. Inefficiently using local resources—human, natural and business—enlarges those holes.

Strategies that plug these leaks also increase self-reliance. They reduce the costs of doing business, but they also cut the costs of supplying the basic necessities, thereby becoming especially valuable in areas with large numbers of low-income people. Notice that leaks identified here are far more extensive than the narrowly defined "retail leakage."

Smart communities seek profitable ways to keep the bucket full by plugging unnecessary leaks in one of more of the following ways:

- Water efficiency: Los Angeles water officials had run out of new sources. They had to find ways to squeeze more work out of the amount of water they had. So they worked with the grassroots Mothers of East LA who marketed a low-flush-toilet retrofit program that installed 270,000 toilets in three years, returned $4 million to the neighborhoods in jobs, water-bill savings, and community programs, and saves over 3.4 billion gallons of water every year. Efficiency programs don't curtail use, they make existing uses smarter. Well-designed community efficiency programs can cost-effectively reduce water use by as much as 40%. The border is ripe for efficiency investments. Del Rio, Texas, recently discovered that approximately half of it water was lost between the source and the household tap.
- Energy efficiency programs will create local jobs and save millions of dollars in any community. Sacramento CA, invested $59 million to save electricity. This enabled utility customers to save nearly that same amount. The program created 880 direct jobs, and increased regional income by $124 million. Though energy is a small portion of total costs, saving energy will provide a significant contribution to company profits and community economic progress. As energy shortages develop in Mexico's northern border cities and as rates increase dramatically, maquiladoras will realize big cost savings by investment in energy efficiency programs.

- Local business ownership increases the wealth-creating power of each transaction. Land trusts and community stock corporations can ensure permanent local ownership of businesses by buying local buildings and renting only to residents (at cost). Example: The Green Bay Packers are owned by a corporation whose majority stockholders are from Wisconsin and who would never sell the Packers to another city.
- Import substitution replaces "imports" with local products and services. Example: Seeking ideas for a business start-up, high school students in tiny Tropic UT, noticed tourists buying bottled water from France. That observation became a local product replacing imports when they bottled local spring water and labeled it with a photo of nearby Bryce Canyon.
- Vendor matching links local-business buyers with local suppliers. Such a program in Eugene OR, created 100 jobs in its first year without any physical expansion of the city.
- Microcredit: Many low-income or impoverished people have the skills, but lack the credit to start a business. Tailored to very small, often home-based, start-up businesses; micro-loans aren't given by most conventional banks because each transaction is too small to be profitable. Usually offered by nonprofit organizations in conjunction with basic business training, microcredit often provides a way out of poverty and off of welfare.
- Downtown revitalization reduces economic leakage, builds pride, encourages infill development, preserves culture, celebrates history, reuses resources, and reduces traffic.
- Community supported agriculture: CSAs contract directly with their customers who then are repaid through shares in that year's produce. Such programs provide capital to preserve local farms, increase productivity, and reduce costs.
- Business mentoring: Veteran business people "adopt" start-up businesses, giving rookie proprietors someone to talk with when things go wrong, helping them understand and avoid pitfalls. Such programs significantly reduce the high failure rate of start-ups.
- Community development corporations employ business skills and tools to benefit the overall community by, for example, developing affordable housing.
- Business "visitation" programs enlist local leaders to visit businesses to determine needs and concerns. Proprietors get the chance to offer suggestions to local governments and organizations regarding policy changes that could benefit local business.
- Growth management: In the U.S., tax revenues collected from subdivisions in previously undeveloped areas are virtually never sufficient to pay for the public services demanded by those subdivisions. As a result, taxpayers in expanding

communities unknowingly subsidize sprawl unless impact or user fees are charged to those newly developing areas. Local governments that don't charge for the full cost of expansion are degrading their economic future.

- Affordable housing built through private, public, and nonprofit means and by requiring it as a large portion of every development proposal.
- Local currency: Ithaca's currency is accepted by 1,200 business and can't be spent outside this New York town. Such programs encourage residents to support their local businesses and recycle dollars in the community.
- Community cash flow can also be captured through such community enterprise as locally based credit cards, debit cards and phone service.

2. Shift to Biologically Inspired Economic Models (Biomimicry)

To be competitive, communities must pursue development strategies that analyze local material, energy, and waste streams; identify business opportunities; and match those opportunities with local businesses. Multiple benefits include more businesses and jobs, reduced resource inputs (and, therefore, lower costs), prolonged life of the local landfill, and reduced pollution. The transition to bio-entrepreneurship has begun:

- Waste-matching: In addition to the examples noted earlier, the industrial ecology concept can be applied also at the regional scale. Computer networks can make "virtual" industrial ecosystems by matching wastes with potential buyers; examples under development include state programs in New Hampshire and Michigan. Efforts by the Environmental Defense Fund in Ciudad Juarez and Brownsville/Matamoros seek "to develop a workable community of manufacturing and service businesses that promotes economic efficiency by facilitating interchanges of by-products and wastes which one company discards but another can use as a production input." Another excellent border effort is the Waste Wise program in Tijuana/San Diego.
- Building salvage: Rather than demolish a building, dismantle and reuse its components. Southern California Gas saved $3.2 million or 30% of construction costs on an office and education building by partly dismantling and reusing an existing building. The finished building was 80% made of recycled materials, keeping 350 tons of material out of the landfill. The Environmental Services Department of the City of San Diego was salvaged and is now a green building.
- Advanced business retention and expansion programs mimic biological systems by enhancing adaptation, competition, inter-relationships, and information flow. Littleton, Colorado's program created jobs at six times the rate of its earlier business recruitment efforts by offering such services as problem research, competitor analysis, industry trend monitoring, video

conferencing, training, and market mapping. Such local policies enhance quality of life and intellectual infrastructure.

- Flexible business networks: Several small businesses partner on contracts too big for any one of them, not unlike coyotes who usually hunt on their own, but run in packs when seeking larger game.

Successful community design mimics biological systems:

- Design community expansion correctly by mixing compatible land-uses, clustering development, and infilling rather than allowing sprawling community expansion. Also, use traditional community design, multiple transportation modes and natural infrastructure (*e.g.* for drainage and sewage). These strategies are especially crucial in such rapidly expanding communities as those along the border because they will reduce infrastructure costs by requiring fewer extensions. In requiring fewer road extensions, infill can also reduce air pollution.
- Storm-water capture saves money, recharges groundwater, and reduces flooding and pollution by developing many kinds of structures to help rain soak in the ground where it falls rather than collecting it into expensive centralized systems, which, in some areas, overwhelms sanitary sewage systems resulting in significant pollution. Examples include permeable parking lot surfacing, natural swales and reversing the channelization of streams. Phoenix AZ, redesigned urban watercourses with earth berms and natural vegetation to maximize ground water recharge while controlling floods. A similar proposal is being considered for the Rio Alamar in urban Tijuana.
- Restrict community expansion through such means as tough zoning, urban growth boundaries, subdivision allotment systems (that control growth rate), and community land trusts. Failure to do this results in unmanageable, unfinancible megacities.

3. **Join the Solutions Economy**

This fundamental change in the relationship between producer and consumer boosts competitiveness by more directly addressing customer needs. It also reduces materials input and pollution output, enables the provider to make more money, and the customer to save money. Waste is reduced, and fewer raw resources are required.

Though the solutions economy is well underway, vast markets remain unexplored. Exciting opportunities remain available to smart communities that understand this new economy and assist appropriate local businesses in shifting from product sales to service leasing. These communities will offer incentives and research support and they'll identify and overcome public and private sector barriers that keep local businesses from making the shift to selling solutions instead of products.

4. Reinvest in Natural Capital

The future's strongest competitors will be communities that recognize they require a full complement of ecosystem

services. The Tijuana flood is an example of a community that suffered tragically, in part, due to the loss of crucial ecosystem services.

- Port Angeles is an example of industry, community and government working together to restore an ecosystem, and strengthen business competitiveness and the local economy.
- Such cities as Curitiba, Brazil are creating urban ecosystems in the form of bio-diverse parks that are home to birds, bats, and frogs that eat pesky insects. The parks also help cool the city.
- Arcata CA, restored a 154-acre wetland and used it to treat urban wastewater. The resulting marsh is now a wildlife habitat in which salmon are reared. It was created at a fraction of the cost of conventional energy-intensive wastewater-treatment systems. Other communities are protecting and enhancing vegetative cover, maintaining watersheds for flood control and drinking water, and protecting ground water from chemical contamination.

Building Community Capacity

How can a community implement Natural Capitalism? How does it start on the road to a more sustainable development strategy?

Effective leaders will help their communities take charge of the future and be a part of the new economy. In contrast, the "ol' boy" approach to local governance allows a small group to keep decisions to themselves, and ridicules people who discuss innovative ideas. Communities that cling to this outmoded approach will be tossed by the winds of rapid change. Those who choose the first option develop:

- Leadership and civic capacity: Through training, events, and organizations, every community should commit local resources to helping existing leaders understand new ideas and creative ways of making decisions. Also, existing leadership must nurture and train the next generation of leaders. For example, the Natural Capitalist approach outlined in this paper will soon be available as a curriculum for young business leaders through the Young Presidents Organization.
- Knowledgeable management: Leaders in rapidly expanding communities should respond as if they were running an expanding company: Seek creative advice and support; hire planning and management staff who have experience with rapid change. Resisting change by "doin' things the way we've always done 'em," will not forestall change. It just means that the community will be changed at the whim of outside forces.
- Collaborative decision making: Develop working relationships among public, private, and nonprofit sectors. Thoroughly involve people from all walks of life in shaping important decisions, not just commenting on decisions as they're about to be made.
- Alternative indicators of success: Rather than relying exclusively on such traditional economic measures as sales revenues and property values, develop

community and environmental indicators in order to understand fully the effects of decisions and the direction in which the community is headed. If such important community characteristics as the health of local ecosystem services, noise, air quality, or newborn birth-weight are not measured, they won't be fully considered in decisions. . The border environmental indicators work of the U.S. Environmental Protection Agency and SEMARNAP is a step in the right direction.

Conduits or Communities

Conditions on the border are an excellent example of incrementalization, described by the well-worn parable of the frog and the saucepan: Dropped into a pan of hot water, the frog instantly jumps out. But placed in cool water that's gradually heated, the frog remains passive until it boils. Not noticing gradual change, it is incrementalized to death.

Though expansion of communities at the border is rapid by every standard, the actual changes effect residents incrementally. For example, if traffic gets slightly worse each day, it's not enough to inspire drivers to organize to do something about it. Leaders in such communities are just letting the situation come to a boil.

Current conditions and trends suggest that many border towns are regarded by decision-makers as little more than conduits for international trade. Given current capacity and willingness to tackle difficult problems, the projected twenty-year population doubling will accumulate pollution and human misery to intolerable, but by then unmanageable levels.

Decision-makers can choose instead to respect border towns as real communities. This path, however, requires that important development decisions consider the whole system—communities, the environment and the whole economy—not just how to secure more jobs.

There are encouraging signs that such systemic thinking is beginning to take place. The last few years has seen significant improvements in cross-border cooperation regarding the environment. For example, the WasteWi$e program is reducing solid waste in the Tijuana-San Diego Border area with business assistance, training and outreach, particularly to maquiladoras, U.S. agencies are supporting and even funding environmental efforts in Mexico; U.S. and Canadian chemical engineers are reaching out to their colleagues in Mexico.

These efforts are moving beyond conventional pollution treatment measures. To reach full potential, they must include full collaboration among governments and industries, for example, to redesign all regional industrial processes as a whole system—to make one plant's waste another plant's feedstock—efforts such those in Juarez and Brownsville/Matamoros. Cooperation on all border issues must take place, not only across cultures and political jurisdictions, but across occupations and disciplines. Well organized and supported, such efforts will significantly reduce materials and energy inputs and waste output, and improve living conditions in industries' host communities.

While the approach discussed above will benefit any community, it has special relevance to the Border. Because the location of maquiladoras is based primarily on their relationship to the U.S. economy, many are poorly integrated into the local economies of their host communities. Their inputs come from outside the community; their outputs leave the community, which serves as a conduit rather than a partner. Though some newer plants are improving, many receive as low as 0.5% of their inputs from local sources.

In contrast, a Natural Capitalist, whole systems approach to local economic development would optimize the local wealth creating capacity of the whole community. Rather than simply adding one plant after another, it would integrate existing plants into the local economy. It would spin a web of business relationships through such efforts as vendor and waste matching, energy and water efficiency, import substitution, flexible business networks, advanced business retention and expansion programs, and increasing local ownership of plant suppliers. Each of these measures will create more jobs, income and savings, regardless of whether the community expands.

Natural Capitalist economic development dramatically increases community productivity. It creates more wealth per unit of throughput, creating more jobs and income for each widget produced by local industry, whether or nor it's a maquila. It builds the local community economy while minimizing and even reversing negative effects on the community and the environment. In its pure business form, it is considered by many business analysts as the future of industry. And it may be the only approach that can successfully tackle the magnitude of problems on the Border.

Many of the success stories sited are from two Rocky Mountain Institute books:

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- Hawken P, Lovins A., and Lovins H., . 1999. Natural Capitalism: Creating the Next Industrial Revolution, Little Brown. www.naturalcapitalism.org

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