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Sustainable Communities Review

Merging Traditional Concerns
for the Environment
with the Social and Cultural Aspects
of Community Life

Sustainable Communities Review

Sustainable Communities Review (ISSN 1094-835X) merges traditional concerns for the environment with the social and cultural aspects of community life. The *Review* seeks to broaden the traditional focus of sustainable development to include other dimensions of community life that promote sustainability, such as empowerment, education, enterprise, and environment. The *Review* features cutting edge thinking in a reader-friendly style. We welcome articles, commentaries, and news about ways to engage all citizens in sustaining quality community life and healthy environments to be submitted for consideration for publication. Subscriptions are $10 per year for individuals and $25 per year for institutions. Send check or money order, made out to Center for Public Service/UNT, to University of North Texas, Center for Public Service, Sustainable Communities Review, P.O. Box 310919, Denton, Texas 76203-0919. Back issues of the *Review* can be accessed at www.unt.edu/untcps/agingpubs.htm. The publisher, the University of North Texas, and the sponsors assume no responsibility for any statements of fact or opinion expressed in the published papers or advertisments.

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Stan Ingman and a group of workers on a field trip to fix a roof at a house in the mountains above Dos Aguas in Mexico.

Article

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Cultivating Sustainability in Cuba

Claude D. Johnson and Joyce M. Kramer

From a sustainability perspective, Cuba is now conducting the most important experiment that the "modern world" has ever known. Although this was not totally a matter of choice, Cuba's experiment in sustainable agriculture will be of utmost importance to all the fossil energy guzzling agricultural systems around the world, particularly the North American system, which is the most energy intensive and non-sustainable.

The Cuban experiment was brought on by two main factors: the United States' economic embargo on Cuba since 1961 and the collapse of trading relations with the Soviet Bloc in 1990. During the intervening years, Cuban agriculture evolved into a large-scale, monoculture of sugar cane that was very dependent on petroleum, commercial fertilizers, and pesticides. With the collapse of trading with the Soviet Bloc, imports of fertilizer dropped by 77%, pesticides by 60%, and petroleum for agriculture by 50%. In addition, Cuba was heavily dependent on imported hybrid seeds, machinery, and even food to the extent that about 57% of the calories in the Cuban diet came from imports. Then, this all changed when food imports declined by more than 50% (Rosset and Benjamin, 1994). When these changes occurred, Cuba had little choice but to make a drastic transition toward a more sustainable agriculture and food production system.

Historical Events Leading to the Current Situation

Beginning with the Spanish occupation of the Island, Cuba's history has been fraught with conflict, conquerors, and colonists. The invaders came with the same objective, and that was to exploit. Following the War of Independence and the creation of the United States, around 1783, Cuba replaced the British colony of Jamaica as the principal supplier of sugar to the United States. Even then, letters written by Benjamin Franklin and John Adams considered the advisability of the United States taking Cuba from Spain. By the 1820s, Cuba had become the world's largest producer of sugar, and by 1880 Cuba's sugar production accounted for one-third of the world's total. The slave-owning planters expelled small farmers from their lands and cleared the island's cedar, ebony, and mahogany forests. Over half of the sugar was sold to the U.S., which had become Cuba's largest trading partner. Repeated efforts were made by the United States to purchase Cuba from Spain, but the offers were refused. On February 24, 1895, a rebellion against Spain was initiated by Jose Marti and Antonio Maceo. In 1898, off the coast of Cuba in a still unexplained event, the American battleship Maine mysteriously exploded. This provided the United States with an excuse to become

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involved; the United States immediately declared war on Spain. However, in the U.S. declaration of the Spanish-American War, an amendment was introduced by Senator Teller that required the United States to respect Cuban self-determination. Following the war, American military occupation of Cuba finally ended in 1902, but not before the U.S. Congress passed legislation imposing the Platt Amendment on the proposed Cuban constitution, that extended to the U.S. the so called "right" to militarily intervene in Cuba's affairs whenever it thought necessary. With little choice, Cuba accepted the Platt Amendment, which was then used by the United States to establish the Guantanamo Bay Naval Base, which exists to this day. Subsequently, under the guise of the Platt Amendment, the United States military repeatedly intervened in Cuba's internal affairs, making certain that elections were managed so as to turn out as the United States specified. By 1920, about 67% of the mines and farmland in Cuba were owned by U.S. companies. The sugar industry flourished during the 1920s while the U.S. was under alcohol prohibition, and Cuba became a haven for nightlife, rum, gambling, and prostitution (Stanley, 1997).

During the Great Depression, a general strike toppled the government of Cuba, and on September 4, 1933, Fulgencio Batista, a Cuban army sergeant took power in a coup. Batista was in and out of power for two decades, staging another coup along the way when he was about to suffer an election defeat. By this time, over half of the industry, land, and services were owned by foreigners, and the powerful in the Batista dictatorship had looked after themselves by taking plenty of bribes (Stanley, 1997).

On July 26, 1953, the Cuban Revolution was launched against Batista's regime. The war continued for six years and was victorious in 1959. During the Revolution, agrarian reform had been promised; in 1959, all private and corporate plantations over 400 hectares were nationalized, including those of U.S. corporations such as the United Fruit Company. In the meantime, U.S.-Cuban relations deteriorated, and many Cubans who did not agree with the directions of the new Cuban society, such as managers and professionals, went into exile in Miami. Because of the strained relations with the United States that caused the Cuban Government to feel vulnerable and threatened, Castro began having discussions with the Soviet Union about providing assistance and some security. Relations with the United States continued to deteriorate, and in January, 1961, the United States severed diplomatic relations with Cuba. This was followed in April, 1961, by the infamous U.S. CIA orchestrated "Bay of Pigs Invasion," when a mercenary army of over 800 people was defeated by Cuba in 72 hours. Shortly after the Bay of Pigs fiasco, the U.S. initiated a strong economic, financial, and commercial embargo against Cuba, which continues to this day.

Negotiations between Cuba and the Soviet Union secured desperately needed food as well as security for Cuba, because the Cuban Government feared a possible U.S. invasion. The Soviet Union initiated the instillation of medium-range missiles in Cuba that would have had the capability of striking anywhere within the continental United States. It should be noted that the United States had surrounded the Soviet Union with far more powerful missiles following World War II. Nevertheless, on October 22, 1962, President Kennedy ordered the United States Navy to stop Soviet ships that were bound for Cuba so as to search for missiles. That brought the world to the brink of nuclear war. The "Missile Crisis" was defused only after Kennedy secretly assured Khrushchev that the United States would not invade Cuba. As a result Khrushchev ordered the missile sites dismantled on October 28, 1962.

Subsequently, the United States has not directly invaded Cuba, but the ongoing embargo has been only one of many schemes to eliminate Castro and his government. Franklin (1998) has documented ongoing efforts of covert actions by the CIA and various other suspected government and non-government agencies in the U.S. to harass Cuba and to inflict damage on their sugar crop and food production system through the use of such things as chemical and biological agents. The ongoing embargo is referred to in Cuba as the "silent bomb" and has resulted in considerable suffering, particularly due to the increased cost of shipping and lack of medical supplies (Alfonso-Hernandez, 1997: 40–41). But even so, Cuba is in the process of conducting numerous experiments involving change, that is, change to a more sustainable model. This is particularly so in many areas of agriculture. But before reviewing Cuba's transition to sustainable agriculture, let us outline the elements of North American agriculture as they exist today at dawn of the new millennium.

North American Agriculture

In many ways, the transition being made in Cuba is like stepping back in time, back to a system that is not as dependent on many of the unnatural ingredients used in "modern" agriculture. To cast some light on this transition,

consider North American agriculture today. If the fossil energy was removed from North American agriculture, the system would virtually collapse. This is or should be worrisome to people dependent on the system for their food, but such does not seem to be the case, because North America is predominately an urban society unconcerned about where its food comes from or how it is produced. Agricultural systems like that in North America and the Cuban system which had developed before the transition have basically replaced labor with machines and fossil energy. They are dependent on fossil energy to power the large machinery used for cultivating, seeding, irrigating, and harvesting the crops, and to produce commercial fertilizers, herbicides, and pesticides. Once such "modern" systems are in place and crops are planted continuously year after year on the same land, the soil becomes degraded and exhausted to the extent that it is unable to grow anything in the short term unless the process is continued. In fact, to maintain production levels some farmers have to compensate for the degradation by increasing the amounts of fertilizer and pesticide. In the longer term, the soil becomes over-compacted and vulnerable to wind and water erosion, and with poor irrigation practices, land also becomes saline and unproductive. Insects and crop diseases gradually develop a resistance to the chemical sprays and pesticides, and then different more potent chemical concoctions are required.

Many farmers in North America have been educated with this unnatural non-sustainable approach to agriculture, and they are so locked into the system that they are oblivious to the harm being done. They also are not really conscious of their fossil fuel dependency, and like other North Americans, they have a gluttonous appetite for oil. Farmers who are aware of these shortcomings are seriously constrained by the economic system and the competition from corporate agriculture. The inexpensive petroleum available today is essentially subsidizing modern agriculture.

It should be noted that there are only about 30 to 50 years of oil left on this planet at the rate it is being consumed (Pimentel et al., 1994b). The United States, with less than 5% of the global population, consumes 25% of the fossil fuels used annually (Pimentel et al., 1994a) and at least 35% of the global oil (API, 1989). It now imports over 50% of its oil, and within 10 to 12 years, it will probably have to import nearly 100% (Pimentel et al., 1994a), exploiting the oil resources of the rest of the world.

Agriculture worldwide also uses 69% of the fresh water annually. To supply this water in the United States, for example, groundwater is being extracted at an average rate that is 25% above natural replacement. The large Ogallala aquifer, which underlies much of the midwestern United States, is now being exhausted at 130 to 160% above replacement. This important aquifer, which irrigates 14.8 million acres (6 million hectares) in six states, is expected to be depleted in about 40 years. Besides, "modern" agricultural practices are responsible for 70% of all water pollution in the United States. Animal wastes, chemicals, and sediment from present farming methods, animal feedlots, and poultry raising facilities have fouled more than 177,000 miles (285,000 kilometres) of U.S. waterways (Population Information Program, 1998; Soule and Piper, 1992).

The Situation That Existed

When Cuba was presented with its crisis in 1990, many of these same non-sustainable practices existed on the production side of agriculture. Cubans did not, however, exhibit the extreme consumerism that is particularly rampant in North American society. But some things about the Cuban agricultural system were even worse. Cuba had developed a monocultural system of agriculture to the extent that 60% of the cultivated land, not including pasture, was devoted to sugarcane. Eighty percent of the agricultural land was under a system of large state farms, and the rural economy was dominated by export commodities. Although extremely important for food production, only 20% of the agricultural lands were farmed by peasants and cooperatives. The mechanization of agriculture had created a society in which 69% of the population was urbanized. In addition, in the late 1980s, Cuba was very dependent upon imports. For example, it was importing from 94 to 98% of the materials used to make the fertilizers, herbicides, and pesticides it needed to support its "modern" agricultural system. It was also importing 95% of its cereal grains used for human consumption. Besides large quantities of powdered milk, even baby chickens and meat were imported. So when the crisis hit, food commodities such as bread, milk, cheese, butter, chicken, eggs, and beef became in short supply or not available, requiring the immediate implementation of a strict food rationing system. For 30 years, Cuba was the only country in Latin America that had eliminated hunger. This severe crisis began to reverse all that. Soon, inadequate nutritional intake was reported for

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children and adults alike. The export crop that supported all this was sugar, which made up 75% of Cuba's exports. Over 80% of this sugar went to the USSR and other Eastern Bloc countries, mostly as raw sugar. During the 1980s, Cuba received an average price for its sugar from the Soviet Union that was 5.4 times higher than sugar prices on the world market. In turn, Cuba purchased oil from the Soviet Union (Rosset and Benjamin, 1994).

Confronting the Situation

Fortunately for Cuba, some of its leaders during the 1980s became concerned about the agricultural system that had developed and their dependency on the Soviet Bloc. Young scientists with the Agricultural Ministry and in the universities began to criticize this "modern" agricultural system because it was so dependent on imports and because it caused environmental degradation due to pesticide usage and soil erosion. Most important was the redirection of their research toward more sustainable farming alternatives, including biological insect control methods. When the 1990 crisis began, Cuba was very fortunate to have this talent bank waiting to be taken seriously; they were ready to develop innovative alternatives that combined environmentally appropriate farming methods with biological alternatives. The challenge was great considering that agriculture had to be reoriented toward the production of sufficient food, but at the same time the export crop had to be maintained so as not to intensify the foreign exchange crisis. In addition, this had to be accomplished without chemicals and with a huge reduction in oil, which curtailed the use of tractors and irrigation in many situations (Rosset and Benjamin, 1994). In the meantime, there were still the people to feed, and there was still the U.S. embargo to endure. However, these challenges are also indicative of the uniqueness of the situation and the reason that the Cuban response is an experiment that the whole world is watching.

Problems confronted the transition on every front. Farming methods that had previously used large mechanical equipment had to be converted to methods using animal power. This meant that even the machinery had to be redesigned and manufactured. Also, there were far fewer beasts of burden available than the number required to make the transition. This meant that an extensive program of oxen breeding and training had to be undertaken. Fortunately, 100,000 oxen had survived Cuba's farm mechanization program, and since that time, the number has been increased to 400,000. Cuba also began establishing CREEs, Centers for the Reproduction of Entomophages and Entomopathogens, for producing biological, nontoxic pest control; at least 230 of these are now in operation. These centers produce insects that are parasites of other insects or their larva or eggs, and also bacteria, viruses, and fungi that cause insect diseases. All are used in biological pest control. Cuba is far more advanced in these nontoxic methods of pest control than any other country, and the efforts are producing positive results. In addition, Cuba has reverted back to mixed farming techniques, similar to those once used in North America before the time of machine powered agriculture. Under the principles that agricultural diversity of mixed crops and animal husbandry will lead to stability, researchers are investigating the best ratio of horticulture and livestock per acre, rather than using the inhumane North American animal factory approach practised by many farmers and corporations alike. Of course other important methods for soil rejuvenation, erosion protection, and weed control are being introduced, such as crop rotation, reduced tillage, intercropping, and the use of green manures. Composting of various materials such as crop residuals and animal wastes is common, and the composting of municipal garbage and human waste is being investigated. At least one hundred thousand tons of vermicompost or fertilizer are being produced each year. This compost, which is produced from using worms, manure, and agricultural bi-products, is ready in about three months. It is rich in nitrogen and does not leave unhealthy chemical residuals in the produce. Projects also being explored are swine production with zero waste discharge and pasture management for cattle raising where no grain supplements are needed (Harris, 1998; Rosset and Benjamin, 1994).

Converting to a Sustainable Food Supply System

To begin to address the food shortage problems of the early 1990s, in 1993 the inefficient state farm system was effectively abandoned and replaced by a system of cooperative farms. These cooperatives were formed by groups of former state employees who now lease the land rent-free from the state. Now, about 5000 are in operation. The state farms that remain control only 25% of Cuban agriculture, in contrast to 80% in 1993. In this cooperative system, part of the production goes to the state as taxes but the rest can be sold for profit. This

profit incentive has increased the food supply and dropped prices by 50%. Farmers' markets have also helped (*Linking People to the Land,* 1998; Symmes, 1996).

To further address the critical problem of food production, Cuba has developed an extensive system of urban agriculture. Estimates vary considerably depending on classifications, but Havana alone has some 27 to 30 thousand community gardens of various types. Nationwide, there are estimated to be more than a million in this country of 11 million people. In addition to household gardens, there are some 8,000 city farms, which occupy over 37,000 acres (15,000 hectares) of land in the Havana region. As with other forms of agriculture in Cuba today, agro-ecological principles are being used in Cuba's urban agriculture. With this sustainable approach, chemical fertilizers and pesticides are eliminated. Instead, composting, recycling of local resources and diversification of crops are emphasized. Urban agricultural success in Cuba is a result of integrating economic, social, and environmental concerns with the need for food security. Besides the ecological factors mentioned earlier, locating food sources near the cities eliminates many transportation demands, which of course reduces fossil fuel consumption. Also, in this system, unsightly urban areas have been converted to healthy productive environments, urban waste streams can be recycled for agricultural production, and urban dwellers are put in a situation of regaining a respectful understanding of where their food comes from and what it takes to produce it (Altieri et al., 1999; Collier, 1998; Global Exchange, 1997). This is an important consideration that has been all but lost in much of North America where some 80 to 85% of the population are urban dwellers.

An extensive new report by Catherine Murphy (1999) on urban agriculture in Cuba is now available from the Food First Institute for Food and Development Policy.

Difficulties on Many Fronts

There have also been economic impediments and the weather to deal with along the way. For the years 1994 through 1996, Cuba's Gross National Product (GNP) rose each year, reaching the impressive growth rate of 7.8% in 1996. This growth gave Cubans a feeling of optimism that the special austerity period was over, but in 1997, the growth rate began to slow down. Part of the decline was due to the passage of the Helms-Burton Law in the United States, which effectively introduced even more punitive measures into the U.S. embargo on Cuba. This law is designed to penalize companies and their managers who are doing business in Cuba on projects that involve land or businesses which were expropriated after the Cuban revolution from American owners. As a result of the Helms-Burton Law, many foreign companies began to curtail their cooperation and investments in Cuba. To further aggravate Cuba's problems, the world markets contain a glut of subsidized sugar, and so the price has fallen considerably. In 1997, Cuba's sugar production began to fall again. The sugar harvest dropped to 4.2 million tons, compared to 4.5 million tons in 1996. In 1997–98, because of drought, storms, and other extreme weather conditions, including the El Niño effect and hurricane Georges, the yield predicted by the sugar ministry was lowered to 3.2 million tons, but some say that it might have been even lower. This is about the level of the harvest of 1993 and substantially below the 6 to 8 million ton harvests of the pre-transition years (Walzer, 1997;

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"In early 1999, a delegation of 25 from the U.S. and Canada organized by Food First in San Francisco went to Cuba; they did not find the Cuban people starving, contrary to so many U.S. media reports. . . . Peter Rosset, who has traveled to Cuba many times in recent years is quoted as saying, 'People were so thin in '93 and '94, almost emaciated. But now, everybody's weight is more or less back to normal, and some people have their paunches again.' Of course, there are still many problems to overcome."

Knox, 1998; MADRE, 1998; *The Economist*, 1998a; *The Economist*, 1998b). Of course, during the transition to a more sustainable system, some land was diverted from sugar production to food production.

Overall, there is little doubt that Cuba's social safety net, which included high quality education and health care systems, is tattered, but it is still intact. Although the system is hard pressed because of shortages of all types of basic drugs, medications, and medical supplies, human services are still at levels that are unknown in most of the developing world. Cuba's life expectancy is at 75 years, only one year less than the U.S. average and better than areas of Washington, DC. Cuba's infant-mortality rate overall is the same as that of the U.S. but half that of Washington, DC, and only one-sixth that of other neighboring Latin American countries (Symmes, 1996; Moore, 1998). The problems with basic medical supplies and drugs are related to the fact that large U.S.-owned pharmaceutical companies have been taking over European medical companies and others around the world, which effectively prevents Cuba from accessing any medical and pharmaceutical supplies that are produced by these international corporations. However, "from the perspective of a dirt shack in Chiapas or a Haitian shanty, the Cuban system looks like an egalitarian success. . . . Cuba has—unlike, say, Mexico—shared its meager resources equally and thus diluted the internal unrest that would threaten stability" (Symmes, 1996).

In early 1999, a delegation of 25 from the U.S. and Canada organized by Food First in San Francisco went to Cuba; they did not find the Cuban people starving, contrary to so many U.S. media reports (Gutierrez, Kate, 1999). Peter Rosset, Executive Director of Food First, who has traveled to Cuba many times in recent years is quoted as saying, "People were so thin in '93 and '94, almost emaciated. But now, everybody's weight is more or less back to normal, and some people have their paunches again" (Collier, 1998). Of course, there are still many problems to overcome.

North American Attitudes

Although a number of groups of farmers and agricultural researchers from the United States who have gone to Cuba have generally concluded that agriculture in Cuba is now demonstrating an environmentally friendly approach and that this is the best way to provide Cuba's food needs, they seem to have a great deal of difficulty with the concept of using beasts of burden and human labor in place of their heavily mechanized, fossil fuel intensive approach to farming. One group made the statement that "the cost to Cuba is excessive human labor. But if the nation is fed and Cuba survives, it is labor well spent. No one expects that oxen will remain the permanent source of Cuba's farm energy, but as a temporary measure for survival as long as normal channels are closed due to the criminal embargo, it stands as witness to the fierce determination of a nation to remain free from foreign domination" (Harris, 1998). It is rather ironic that farmers and researchers who are interested in sustainable agriculture are missing the most important point. They don't seem to be able to fathom a world without big machinery and fossil energy. Like it or not, the use of beasts of burden and more human labor reduces the dependency of agriculture on oil!

Others Are Urged To Follow

Countries around the world should be following Cuba's lead and begin the conversion process to a more appropriate form of agriculture. To do this, a well-thought-out plan should be devised with sufficient subsidies incorporated to maintain income levels during the conversion for a period long enough that participating farmers can recover reasonable production levels. Such subsidies would provide incentive, enabling farmers to take the risk of converting. However, in North America, it may be that we have become so urbanized that it will be difficult to find labor willing to do the work. In formulating a conversion plan, many questions will arise immediately, such as how much mechanization should be permitted and whether urban consumers will be willing to accept produce that is not totally blemish free, even though the blemish free alternative contains potentially toxic pesticide and herbicide residuals.

Beginning a conversion process that will decrease the addiction of agriculture to fossil energy would be an extremely wise investment for the future so that enough of the conversion has been completed before the oil runs out. However, the short term thinking that drives most of the urban-industrialized world seems to require a crisis to initiate a needed change in direction, a crisis like the one that confronted Cuba. Without prudent planning and preparation, the urban-industrialized nations are doomed to face an inevitable oil crisis and, like Cuba, they will have to do it "cold turkey."

Article

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Living with Nature:

*Lessons from Two Indigenous Cultures**

Kwadwo Konadu-Agyemang

Although the last forty years have witnessed many debates on environmental issues, due, among other things, to an increasing population, depletion of nonrenewable resources, pollution, destruction of the ozone layer and the like, the ideals of conservation remain elusive. This paper includes a partial survey of the literature on the debate, which began early in the 1900s, but its emphasis is on the past 40 years and the perspectives of both the pessimists and optimists about the future. While the Pessimists feared a possible exhaustion of the earth's finite resources due primarily to overexploitation and overuse, the Optimists argued that the price mechanism and man's ingenuity would ensure that enough resources will be available to meet the needs of all generations. In the heat of the debates or when new perspectives on the issues were presented, people seemed to show concern but returned to business as usual after no consensus on the issues emerged. Debates over the finite nature of the earth resources will not cause people to change their attitudes toward excessive resource use, and thereby conserve resources and protect the environment, unless they develop, or are taught to develop, a conscience that makes them see themselves as custodians of the earth and its resources for posterity. Lessons can be drawn from two indigenous cultures—the Australian Aborigines and the Akans of West Africa—to illustrate how such an attitude, which attaches people to rather than detaches them from the earth and its environment, would enable humankind to help preserve our resources not just for the present generation but, more important, for posterity.

The Resource Debate: From Malthus to the Brundtland Report

The inseparable issues of finite resources, conservation, and sustainable development have been discussed over and over again, but they are issues that will continue to haunt every generation as it attempts to improve its standard of living above that of its predecessors. The need for effective approaches to resource conservation takes on special significance as the world enters the new millennium with finite and depleting resources, and a population base of nearly 6 billion people that is expected to increase by 1 billion every decade (PRB, 1998). Conservation is variously used to denote: (a) protection of the environment,

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*An earlier version of this paper was presented at the East Lakes Division of the AAG Meeting in Lansing, MI in October 1997. I am grateful to Dr. Allen Noble for his useful comments.

especially preservation in its natural state, or (b) elimination of waste, or (c) abstaining from using resources to enhance their availability at a later date. All three meanings are implied in this discussion. Correspondingly, conservationists are those who advocate an increase in the degree of conservation.

Since Thomas Malthus published his *Essay on Population* (1798), in which he pointed to the catastrophic result of geometric population growth outstripping arithmetic growth in food production, the relationship between the earth's finite resources, population growth, conservation, and sustainability has generated controversial debates. Although history proved Malthus wrong, due primarily to the ability of England to import food and raw materials from other lands and technological development that he did not foresee, his views still contribute to current ecological analysis; his ghost still haunts many developing countries whose rate of population growth is putting stress on their environment and resources.

Following the footsteps of Malthus several futurologists, sensing the unsustainability of lifestyles that seemed to care little about the future, have described dire scenarios based upon the inevitability of the earth's resources becoming exhausted if the current rate of use and a high population growth continue. One example is Hotelling's compelling article "The Economics of Exhaustible Resources" (1931). Not only was he interested in the policy outcomes of the conservation debate, but he also sought to develop a theory of natural resources because of the inadequacy of static equilibrium economic theory. In the 1960s, publications dealing with the theory of exhaustible natural resources, such as Polak's *The Image of the Future* (1961) and Mishan's *The Cost of Economic Growth* (1967), were influential in drawing attention to the dangers associated with careless use of our finite resources. Kenneth Boulding, in his *Economics of the Coming Spaceship Earth* (1966), also described the doomsday scenario ahead, if existing levels of resource and environmental abuse continued. He lashed out at the folly of not considering the interest of posterity and our saying to ourselves, "let us eat, drink, spend, extract and pollute, and be as merry as we can and let posterity worry about the spaceship earth."

Then came the Club of Rome Report (Meadows et al., 1972), which used large-scale computer models to demonstrate the possibility of the global economy reaching the limit of economic growth within 100 years or so. The report generated an extensive debate. Other writers within this Pessimist School in the 1970s included Common and Pearce (1973); Commoner (1971); and the Ehrlichs (1970), all of whom wrote about an impending doomsday. All of the Pessimists stressed the finiteness of the world's resources and the limits this placed on economic output. They emphasized the fact that many nonrenewable resources were approaching exhaustion while renewable resources were being fully used or overused. Many of the Pessimist theorists also advocated an across-the-board approach (e.g., zero economic growth) to conserving the environment and its resources. They blamed the materialistic and expansionist ethics of capitalist and communist societies, and the false optimism of the opposing camp for avoiding the necessary measures to avert disaster. Some were skeptical of the power of technology to obviate or even postpone the impending doomsday, while others blamed technology for hastening and aggravating the crisis. All emphasized the central role of population growth in aggravating the resource crisis while attacking such factors as materialism, rapid change, advertising, large impersonal work places, and urbanization as contributors to disastrous social problems (Lecomber, 1979).

Opposed to the Pessimists were the "hopesayers" or Optimists like Barnett and Morse (1963), Beckerman (1972), Cole (1973), Kay and Mirless (1975), and Maddox (1972), who admitted the physical finiteness of the world, but rejected its significance and questioned the credibility of the measures of scarcity frequently quoted by the Pessimists. They pointed out that historically man's technical advancement and ingenuity had averted resource scarcity. Moreover, the Optimists scorned many of the approaches of the Pessimists to resource scarcity, particularly zero economic growth, emphasizing the central role of the price mechanism in stimulating the necessary adjustments and allocating resource use reasonably and efficiently between different time periods. "Optimist" writers, like Kahn et al. (1976), went further by presenting an alternative vision to the Club of Rome's doomsday model. In *The Next 200 Years: A Scenario for America and the World*, the basic theme is that

> 200 years ago almost everywhere human beings were comparatively few, poor and at the mercy of the forces of nature, and 200 years from now, we expect, almost everywhere they will be numerous, rich and in control of the forces of nature.

The Optimists presented counter theories to water down what they saw as scare-mongering tactics by misguided scientists and environmentalists. Due to the

comfort and apparent strength of the counter-stream theme offered, the world returned to consuming as much as possible, degrading the environment and undertaking desirable but unsustainable development.

The debate that started in the 1960s continued throughout the 1970s and 1980s, and in 1987 a highly billed document, *Our Common Future* (WCED, 1987), also known as the Brundtland Report, was presented by the World Commission on the Environment and Development, a body that had been established by the United Nations General Assembly in 1983. The report promoted the concept of sustainable development: meeting the needs and aspirations of present generations without compromising the ability of those of future generations to have access to adequate resources for their survival. The report called for environmental policies and strategies which recognized that ecological and economic interrelationships mean that no country can develop in isolation. The report also identified several objectives for environmental and development policies that follow from the concept of sustainable development:

- Reviving growth while respecting environmental constraints
- Changing quality of growth
- Meeting essential needs for jobs, food, energy, water, and sanitation
- Ensuring a sustainable level of population
- Conserving and enhancing the resource base
- Reorienting technology and managing risk
- Merging environment and economics in decision-making.

The Brundtland Report was well received by the environmental movements, UN agencies, and several governments, and culminated in the UN Conference on Environment and Development held in Brazil in 1992. The largest of its kind ever, this Earth Summit attracted 116 heads of governments and was attended by delegates from 172 countries. The summit adopted three documents:

a. Agenda 21: 120 initiatives to be implemented by the year 2000. These included measures on energy conservation, sustainable agriculture, toxic waste control and protection of ocean resources

b. The Rio Declaration: Calls for poverty eradication; establishes the principle of "polluter-pay"

c. Statement of Principles on the Forests

Its wide acceptance notwithstanding, some countries, organizations, and individuals expressed reservations concerning some aspects of the Report. Its discussion of energy was particularly contentious, and the ability of countries to achieve both sustainability and positive growth at the same time was also challenged. Despite its shortcomings, the WCED report is one of the most influential documents on the earth's future ever produced and if the principles of sustainable development outlined in the report

"The largest of its kind ever, this Earth Summit attracted 116 heads of governments and was attended by delegates from 172 countries."

are adhered to, it would go a long way to prevent or at least postpone doomsday.

The 1996 UN conference in Istanbul that focused on sustainable human settlements development and the 1997 conference of world leaders in Kyoto, Japan, that wrote a treaty on emission gases, also underscored the importance of conservation, preservation, sustainable development, and pollution control to the world community.

In spite of all the numerous debates, conferences, and publications, the earth and its resources are still under constant attack. Energy consumption has increased in the past 40 years (World Development Reports, 1998). Deforestation and desertification have also continued unabated. The environment and its resources are still to a large extent treated in a way similar to what Harding called the "Tragedy of the Commons" (1968). Harding used the commons system of land utilization, which existed in English villages centuries ago as an analogy. Under this system, a village pasture was held under communal ownership subject to two basic rules:

1. Each herdsman of the village could graze as many cattle as he wished.

2. The gains resulting from grazing the cattle accrued entirely to the individual herdsman.

The commons approach to resource use is quite satisfactory until the pasture reaches its full capacity. After that, any additional cattle grazed constitutes overgrazing. But given the fact that the pay-off from each extra animal accrued exclusively to the owner whereas the whole community shared the cost of overgrazing, individuals tended to graze more animals. This attitude of "what is everybody's property is nobody's property" has led to current tragic use of the planet's resources.

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Since the 1970s the conservation movement has been stepping up its activities to help save our planet from unscrupulous individuals and organizations whose activities border on the "who cares" philosophy. The movement originated with the realization that the economic doctrine of *laissez-faire* and quick profit—whether from forest, farm, or oil field—was resulting in tremendous waste that was socially harmful, even if it seemed to be good business. Indeed, it has become widely recognized that combining economic development with a measure of preservation of resources of the biosphere is an essential contributor to the quality of human life (Carlisle, 1974; Dalton, 1993; Paniccia, 1996). While the conservation movement has attempted to stem this tide by using approaches such as lobbying, demonstrations, and environmental action, several governments, through their action or inaction, appear to be endorsing the carefree use of resources and the destruction of the environment. Although available evidence suggests that most people regard conservation as a good thing, it is not reflected in their attitude to resource use and the environment and therefore it seems to accept business as usual. The world's consumption of nonrenewable energy resources (especially in the western world), deforestation, the rate of destruction of the ozone layer, desertification, environmental pollution, and the like have all increased in the last four decades.

While energy consumption has gone up world wide, the developed countries, which have less than 25% of the world population, still consume close to 80% of the world's resources. As shown in Table 1, energy consumption has increased at a higher rate in low-income countries than it did in the west, but still represents less than a third of the world per capita consumption. Indeed, in 1996 per capita consumption in the USA, Canada, and Germany was respectively 20.5, 20.8, and 10.5 times the rate for the low-income countries. The average North American or European uses, directly or indirectly, 16 times as much of the world's energy, food, and material resources as his or her counterpart in the developing world (Todaro, 1997; World Bank, 1999). Thousands of square kilometers of forests have been lost to many countries, especially during the last two decades. Brazil's tropical rain forests, for instance,

Table 1: Energy Consumption Per Capita (kilos of oil or equivalent), by Income Level and Selected Nations 1965–1994

Income Level/ Nation	1965	1989	1994	%Change 1965–1994	Ratios in 1994 World*	Ratios in 1994 LIC**
Low income (LIC)	125	330	384	207	0.3	-
Middle income	663	1242	1593	140	1.1	4.2
High income	3641	4867	5168	42	3.6	13.6
Canada	6007	9959	7998	33	5.6	20.8
Australia	3287	5291	5173	57	3.6	13.5
USA	6535	7794	7905	21	5.5	20.5
Germany	3197	4383	4097	28	2.9	10.7
United Kingdom	3481	3624	754	08	2.6	09.8
World Per capita				1434		

Notes:
* Expresses the ratio between energy use in economic groups/countries with world average in 1994. World Average (1434kilos) =1
**Expresses ratio between consumption in the countries and the average for Low Income countries.

Source: World Bank (1991; 1997; 1999) World Development Report.

decreased by 37,000 sq. km annually between 1980 and 1990, and 25,544 sq. km from 1990 to 1995. Mexico lost 68,000 sq. km and 5080 square km, respectively, over the two periods (World Development Report, 1998; 1999) (Table 2). Table 2 also indicates that all of these countries have nationally protected forests. However, apart from South Africa and Venezuela, all the countries are protecting less than 20% of their total available forests.

We have not succeeded in conserving the earth's resources in spite of all the debates, policies, lobbying, and conferences. Clearly, we need a different approach.

Wanted: A New Attitude to Resource and Environmental Conservation

To be successful conservation will have to receive impetus from the awareness of an obligation to future generations, and nowhere is this conscience as deeply rooted as in indigenous cultures and religions. The earth and its resources cannot be protected and the interest of posterity ensured without the value traditional cultures place on the environment, including both plants and animals. As Cohen (1988) observes, traditional peoples have knowledge of nature and natural systems that is often missing in conservation discussions. This intimate knowledge has been shaped by centuries of religio-cultural-traditions that regard the earth as sacred. The streams, the sea, fauna, and flora are all considered sacred objects, which must be treated with respect since they form the basis of all life. This attitude was sometimes taken a step further by designating specific areas as "sacred space," space which often became the focal point of religious ceremonies and rituals, recognized by individuals or groups within the community and even by strangers who entered the community as worthy of devotion. These sacred spaces could include forests or part thereof, specific species of trees, and the areas where they are situated.

Unlike the Judeo-Christian and Islamic traditions which generate a view of the universe that sharply separates humanity and nature, and by so doing encourages conquest and exploitation of nature, the traditional religions of most indigenous people situate God in nature and see a deity in every object (Magesa, 1997). Because of this pantheistic view, indigenous peoples developed a kind of reverence for nature not found in the monotheistic religions. If God was really to be found in nature, then destroying the environ-

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Table 2: Deforestation in Selected Countries, 1980–1990

Country	Total forest 000 sq. km	Annual Deforestation 1980–1990 000 sq. km	% Total	Protected 000 sq. km	% Protected Nationally
BRAZIL	5611	36.7	0.7	321	3.8
MALAYSIA	176	4	2.3	14.9	4
COLUMBIA	541	3.7	0.7	93.6	8.2
AUSTRALIA	1456	0	0	935.5	12
USA	2960	3.2	0.1	1042.4	11.1
VENEZUELA	457	6	1.3	263.2	28.9
MEXICO	486	6.8	1.4	97.3	5
PNG	360	1.1	0.3	0.8	0.2
FRANCE	135	-0.01	-0.1	56	10.2
MYANMAR	289	4	1.4	1.7	0.3
GHANA	96	1.4	1.4	11	4.6
SOUTH AFRICA	45	-0.4	-0.4	69.3	5.7

Source: World Bank (1998) World Development Report

ment was tantamount to sacrilege. North American native Indians, for example, "revere the world in its entity. Every part of nature contains sacred knowledge, and the relationship of man to every creature and place is one of kinship. The entire earth is sacred; it is the source of life" (Barsh, 1986; Callicott, 1982). Many other indigenous societies share these beliefs which made it possible for them to live in harmony with nature for centuries before the Europeans descended upon them.

Associated with these beliefs is the need to respect and worship the spirits of dead ancestors who are regarded as intermediaries between the gods, the living, and the unborn generations. To these people, the lands they now occupy belong to a great army of people, many of whom are dead, a few of whom are living, and countless millions of whom are yet to be born. The earth and its resources have been lent by the gods to humanity through ancestors and living leaders on the condition that it must be kept in good order, used to promote life, and to be preserved for posterity (Magesa, 1997: 63). Thus, the living are stewards who have the responsibility to care for the land to hold it in sacred trust for posterity. From this perspective, all societies and individuals are accountable to the preeminent natural law, which provides a code of ethics and a guide for living on and relating to the land (LaDuke, 1992).

If, as is often contended, the imposition of Judeo-Christian and Islamic traditions upon these indigenous people has "freed" them from "bondage to heathen ideas," it has also resulted in a watering down or burying of the ancient beliefs that made responsible human-environment relationships routine. The destruction of the environment cannot be stopped unless we go back to study the successful conservation measures, which have been part and parcel of the cultures and religions of these people for thousands of years. While environmentalists lament the destruction of tropical rain forests, indigenous cultural groups and their knowledge, which might hold the key to preservation, are disappearing as modern economies drive them to extinction. These indigenous cultures and their environment must be preserved if we are to learn from them (Cohen, 1988; Bennett, 1992).

The beliefs of the Australian aborigines and the Akans of Ghana, which are summarized below, can be used as case studies to elucidate how indigenous property laws, cultures, and religions can help to shape our attitudes toward our environment and thereby help us to save the earth for future generations.

The Australian Aborigine: Kinship with the Environment

The Australian Aborigines believe that the land supports and nurtures them as a mother. Their relationship with the earth is therefore grounded in a complex spiritual association established in the "Dream Time" when the world was created (Hughes, 1996: 185), and all became "one flesh, one spirit, one dreaming" (Stanner, 1979: 129). This attitude to the land, natural resources, and the environment, which is shaped by their beliefs and sees the origin and destiny of all living creatures as being intrinsically enjoined to one another, is succinctly summarized by David Mowaljarlai:

> One of the most important things to understand about aboriginal Culture is that Wandjina created everything. It is difficult for me to explain in English what Wandjina is. Anthropologists say Wandjina was an Ancestral Spirit. To us *Wandjina* is *Wandjina*. *Wandjina* came from the wind, and traveled the land and made this earth, and sea, and the mountains, the rivers, the waterholes, the trees, the plants, the animals, the language and then the people. *Wandjina* made everything. *Wandjina* then gave us the law to follow and gave us the land. Wandjina say we must keep this tribal land. . . . To *Wandjina* all our lands are just like a tiny speck so they see all things at all times no matter where we are on the land. All that they created is *Ungud*: spiritual, and possessing powerful energy. *Ungud* is also Mama, that is to say, it is untouchable. *Wandjina*'s spiritual presence is in all things living; in the land itself and in the universe. (Mowaljarlai, 1992: 179; Quoted in De Lacy and Lawson, 1996: 159)

Because these beliefs formed the basis of their attitude to resource use, for over 60,000 years, the Australian Aborigines moved not in a mere landscape but in a humanized realm saturated with significance (Stanner, 1979: 131). The religion of the people, which was fashioned upon these beliefs, was intrinsically tied to the land (Mowaljarlai, 1992). Therefore, whether burning the country at prescribed times of the year; performing ceremonies to ensure the well-being of sites and species; controlling access to, and exploitation of land resources, or ensuring that cultural obligations were maintained in respect of hunting practices, food taboos, and the passing of knowledge to younger generations (Smith, 1992; quoted in De Lacy and Lawson, 1996), the Australian Aborigine saw himself as a custodian

with the sacred responsibility of protecting the land and its resources for the Creator and future generations.

The Akan People of Ghana: Resources Belong to the Dead, the Living, and Those Yet To Be Born

Land, its resources, and the environment in Akan and other West African cultural traditions are shrouded in spiritual and religious myths, and the concept of the Earth/Land as a goddess—*Asaase Yaa* in Akan—appears to be universal in the sub-region (Rattray, 1929; Lloyd, 1962; Obi, 1963; Meyerowitz, 1964). Because the ancestors shed their blood in fighting for and preserving the land and its resources for posterity, those living at present are only custodians for the dead ancestors and those yet to be born. As one traditional ruler, Nana Ofori Attah, put it, land [and its resources] in Akan custom is thought of as belonging to a vast family of whom many are dead, a few are living, and a countless host are still unborn (Cited in Elias, 1956; and Ollenu, 1962, p. 4). This idea is emphasized by Asante (1975, p. 25), who argues that the communal ownership of land was seen as performing three major functions: to ensure the security of generations unborn, thus ensuring them against poverty and destitution, to uphold the honor of ancestors, and to ensure the prosperity of the kin group.

According to Busia (1958), the belief that land and its resources belonged to the ancestors made the Akan unwilling to sell his land or destroy the environment for there was always the dread that the ancestors would summon him to account for such conduct. Thus the traditional society fundamentally revered ancient customs, especially in the belief that the spirits of the dead ancestors are still active and superintending over the activities of the living (Meyerowitz, 1964). Those living according to the wishes of the spirits are rewarded with prosperity and good health while recalcitrant ones are punished. Conscious of the attitude of the spirits, the traditional society ensured that the communal ownership was preserved and that the environment was protected against unscrupulous persons. Rattray (1929, p. 360) points out that the West African loves and respects land and considers it the essence of all power:

> To him its spiritual, no less than its material significance was, in the past very great. . . . The tribe was well aware in the past, and older people still fully realize, how their very existence depended on the possession of land. The legal system which they evolved with regard to its tenure was formed, in the light of experience, in attempt to obtain maximum guarantee that so far as the tribe existed, it could never, under normal circumstances, come to want.

Major ethnic groups like the Yorubas and Ibo of Nigeria have similar beliefs (Lloyd, 1962; Obi, 1963). These beliefs and attitudes have to some extent shown resilience to change but have not been able to completely withstand the pressures from the modern nation states that require land and the exploitation of natural resources for their development.

The concept of the earth as a goddess who needs to be revered also shapes the attitude of the West African toward rivers, streams, the sea, forests, and other natural resources. For instance, foreign objects such as dead bodies or human remains should not be thrown into a river

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or stream since each river or stream is an individual who has a personal name. This safeguards the rivers from pollution. Should the river be offended, it will have to be appeased by way of sacrifice, otherwise he or she could bring calamity upon the community. The coastal Akans and those who earned their living by fishing the sea, lakes, and rivers also refrained from going fishing on certain days that were considered sacred for the spirits of the sea and rivers. These "sacred" non-fishing days conserved fish.

The forests, which provided the community with their medicinal requirements, materials for construction, and food also had to be used with care. Taboos surrounded the cutting down of certain trees such as the silk cotton, mahogany, and certain rare species, which were considered the abodes of the spirits. If it became necessary for them to be felled, libation had to be poured and sacrifices made to appease the gods. Some forest areas were also set aside as groves for worship purposes, but it was also a mechanism for conserving valuable flora.

As with the Australian Aborigines, the ultimate principle underlying the use of resources, according to Akan

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tradition, was that the living are stewards and custodians for the ancestors and for the generations yet to be born. Consequently the typical Akan felt obliged to ensure that any action taken in his lifetime did not incur the displeasure of the ancestors and did not jeopardize or compromise the benefits of future generations. By shrouding the land, rivers, lakes, and the forests in religious and spiritual myths, the Akans managed to create a culture of respect and care for the land that preserved the natural environment. Unfortunately, the imposition of Western culture patterns and beliefs has almost succeeded in destroying these religious attitudes, which I believe hold the key for instilling a sense of responsibility toward future generations in the United States.

Americans: Part of the Problem and Part of the Solution?

While no single country can take the blame for the rapid destruction of the environment and the accelerated consumption of the earth's resources at the expense of posterity, one can say with certainty that the United States has perhaps contributed more to the problem in recent years than any other society (President's Council on Sustainable Development, 1997). In addition to creating the largest and most voracious consumer society in the world, U.S. companies have led the bandwagon in "coca colonizing" the world, a euphemism for affluence, mass consumption, and unsustainable lifestyles. As the glamor of the American* way of life and popular culture are ubiquitously shown in the in the living rooms of even the poorest households around the world via the news media and Hollywood movies, not only do many poor people see the image of their own future in the affluent life-style, but American consumerism also becomes the standard that the poor people of the world aspire to. Their image of the United States is a land of abundance, sprawling cities full of detached homes with two-car garages sitting on one-acre lots, unlimited paved highways, teenagers cruising at high speed in shiny cars, etc. This so-called standard, however, has been achieved by destroying more than 4 million acres of farmland per year, consuming more than 25% of the world's resources, and contributing 22% of global annual greenhouse emissions. Indeed, United States consumption is unparalleled anywhere at anytime. If the rest of the world were to live like Americans, the world's ecosystem would collapse on the present generation.

To reverse this trend the United States, as the only super power, the largest peddler of popular culture and the glamorous life-style, and as the source of extensive media surveying, must take the lead in protecting the earth by reducing its own resource use and propagating the idea of conservation and sustainable development through the media. The same zeal with which U.S. companies have managed to "cocacolonize" the world should also be used to sensitize the world population to the forthcoming catastrophe if the present levels of consumption continue. Americans themselves must be taught from the cradle that each generation is entitled to the interest on the natural capital bequeathed to us by our ancestors, but the principle should be handed unimpaired to the next generation (Roseland, 1992: 5).

Although some Americans are now recycling paper, bottles, and aluminum cans, and trying to be as environmental friendly as possible, this is only chipping at the tip of the iceberg. Americans need a change in attitude and to take active steps toward redressing many decades of irresponsible and careless use of the earth and its resources. They need to see themselves as part of the problem of destroying the world's environment, and therefore, as an important part of the solution by finding ways and means of creating a sustainable environment and resource use regime. Above all, Americans need to realize that showing good stewardship and helping put the world on a path of sustainable development is not only good for the world, but is the only way by which they can enjoy a high quality of life and guarantee a comparable standard of living for posterity.

Are Americans ready for the change? I say yes and no. Yes, if the vision statement of the of the President's Council on Sustainable Development is considered to be an indication of the emerging trends in American attitudes:

> Our vision is of a life sustaining earth. We are committed to the achievement of a dignified, peaceful, and equitable existence. A sustainable U.S. will have a growing economy that provides equitable opportunities for satisfying livelihoods and a safe, healthy, high quality of life for current and future generations. Our nation will protect its environment, its natural resource base, and the functions and viability of natural systems on which all life depends. (President's Council on Sustainable Development, 1999, 1)

*American is used a synonym for the United States in this section.

No, if Americans continue to believe that it is their birthright to maintain their current standard of living by consuming resources at the present rate and letting tomorrow take care of itself.

Conclusion

This paper has briefly surveyed some of the literature on the conservation debate. It has argued that while all the debates, conferences, summits, books, and the like that aim at helping the environment are important, there is a missing link that needs to be reintroduced. That link is the traditional knowledge, principles, and beliefs of the indigenous peoples around the world, examples of which have been cited from Australia and West Africa. It is becoming increasingly clear that the march to conservation and sustainable development will benefit from the traditions and religions of indigenous cultures. As Stevens (1996) has written:

> Indigenous peoples' knowledge, conservation beliefs and values, environmentally adaptive and sensitive land use, resource management and practices, and determined defense of territory and natural resources have enabled many of them to inhabit their homelands for centuries without devastating their ecosystems and biodiversity.

The urgency of turning to indigenous cultures appears to be receiving some attention. At a symposium of culture and environment held in Washington, DC, in April 1988, a constantly reoccurring theme was the importance of understanding the cultures of indigenous peoples and learning from them (Cohen, 1988). While it will be a mistake to assume that all indigenous peoples are exemplary conservationists (Stevens, 1996) or are more conservation minded than other people elsewhere, the principles that guided their human-environment interaction and enabled them to conserve their environment for several millennia need to be revisited. The fact that the world's population has been increasing by 90 million annually, and already exceeds 6 billion, makes the need more urgent because it exerts more pressure on the world's environment and finite resources. "The connections between culture and development, between culture and nature, and between development and conservation are the keys to understanding and preserving the natural world today" (Robert McCormiack Adam, Sec. Smithsonian Institution, and Washington. Quoted in Cohn, 1988: 450).

The United States is part of the problem of unsustainable consumption of resources at the expense of posterity and must be part of the solution. Its challenge is to change attitudes toward consumption at home and to use its leadership role and media dominance to help create a sustainable development pattern abroad.

Building Sustainable Communities in Mexico

The proposed project is an effort to further USA-Mexico collaboration by establishing biannual conferences on sustainable communities in the Guadalajara area. Since 1996 the Center for Public Service (CPS) at the University of North Texas has sponsored field schools throughout Mexico (Cuidad Guzman, Guadalajara, Puerto Vallarta, Mazamitla, etc.) and has organized sustainable community conferences in Dallas and Denton, Texas and Guadalajara, Mexico. A professional exchange took place in which colleagues from Mexico participated in Texas conferences, and leadership and community experts from UNT facilitated sessions at the conference in Mexico. Through this partnership, CPS has recruited five Mexican graduate students to serve on a community development team in low-income Denton neighborhoods. In the summer of 2001, UNT faculty will lead student groups to Mazamitla to develop rehabilitation programs for disabled children and provide environmental education to its citizens. CPS will also sponsor the first Senior Environmental Corps in Mexico this summer. A Conference is necessary every six months to celebrate successes, exchange ideas, assign and train community development specialists to mentor local leaders, and to expand capacity to foster sustainable communities. Contact Editor to learn more and participate.

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Translated by Veronique Ingman with assistance from Alberto Guzmán.

Sustainable Development:
Elements for Discussion

Jaime Morales Hernández

The goal of this paper is to analyze and discuss the contributions to sustainable development that are derived from educational processes, and the manner in which these contributions are applied to the construction of sustainable societies. This article begins by outlining the context in which sustainable development originates. This is a context which is embedded in the crisis of modernity. Accordingly, the article illustrates some of the relevant dimensions of sustainability, i.e., the political, epistemological, economic, and ecological.

The Context

The concept of development views urbanization and industrialization as goals and symbols of modernity, which, in turn, determines the relationships between various societies and nature. Nature in this context is understood as something alien to men and as the repository of limitless resources to be exploited. The results of this particular development concept are much debated today for their negative impact on the economic, social, cultural, and ecological spheres. They form a complex set of problems, which in itself is one more expression of the crisis of modernity.

Faced with this situation the proposal and practice of traditional dominant development—which today is in its neo-liberal phase—promotes as the sole option the intensification of the modernizing processes. They are considered as indispensable elements of the new world order that is based on economic globalization. This formulation of the problem furthermore includes the compatibility between present-day economic growth and natural resources. In this scenario the free market acts as a mechanism for the rational use of nature.

The modernity crisis has triggered an increased questioning—in the global sense of modern development and its neo-liberal phase and view as the only model. This questioning has generated an extensive quest for development alternatives involving a whole spectrum of actors and social movements. Despite the variety of conceptual and methodological elements used and the diversity of social contexts, there is a growing consensus about the necessity to specify and develop mental processes which view sustainability as an alternative to the dominant developmental model.

The worldwide application of this dominant model has triggered a global crisis whose dimensions span ecological, social, economic, and cultural issues. This intricate lattice characterizes modernity. In this meshing of contradictions that characterize the present western

world, three phenomena that could easily lead to a planetary nightmare stand out. The *first* refers to the expanding marginalization and poverty in southern nations as well as in the industrialized world, i.e., material poverty. The *second* deals with the crisis of the human condition in modern societies, i.e., existential misery. The *third* refers to the ecological crisis that today puts at risk the existence of mankind.

Even though the first two are operative, especially between social classes and between specific areas of certain countries and regions, the environmental crisis (as a result of the deterioration of material conditions of the planet and hence of societies and human beings) is a global phenomenon that affects the entirety of mankind, and as such presents an essential contradiction for present-day civilization and actually turns against the privileged elite of the world.

This crisis within the civilizing scheme of modernization challenges each one of the bases that support today's western civilization. It challenges the myth that economic development generates well-being as well as the economic theory that underlies it. It affects a society by increasing imbalances and inequalities that foster greater marginalization levels and structural violence. It also challenges two fundamental pillars of the modern world: the nation-state and the systems of formal democracy. It creates a western culture incapable of avoiding the values of consumption and its anthropocentric focus. Finally, it affects science through the collapse of traditional paradigms based in specialized and "split-up" knowledge.

The Dominant Development Model

The dominant developmental model shows several variants in their forms of application. Yet they share a common origin and series of elements. The common origin refers to the western civilizing scheme at whose center lies the modernizing ideal as the *raison d'être* for the developmental processes. Certain cultures are considered modern or developed, while other cultures are considered traditional—without development. The latter must then be modernized following the paths already taken by developed societies. It is as if modernity and development are converted on the one hand into practically identical concepts and, on the other hand, into the ideological bases of the only avenue for development where cultural diversity becomes an impediment rather than an asset.

The civilizing scheme materializes into the ideology and the practices of a developmental model, which in spite of differences in focus, shares some essential traits. According to Guillermo Bonfil (1994), the western civilizing scheme which is the only model, it is based upon the following assumptions: history is an infinite process of rectilinear progress; progress is achieved through science, which consists of the control over nature, and the capacity to exploit nature for the benefit of "man." The benefits derived from progress manifest themselves in ever-increasing consumption, and man's transcendence is achieved in this process.

The value scale and definitions of western civilization rest in these assumptions. Work is viewed as a necessary evil that should regress with historic progress; nature is viewed as an enemy to be vanquished through technology; greater production and the increased consumption of goods are considered absolute values that do not require any justification. For Victor Toledo (1992) the modernization scheme searches for the integration and ultimately for the dependency of all the natural and social spheres of the planet for which specialization is used (productive, cultural, and ecological). It transforms the present process essentially into one of homogeneity and of intolerance to any expression of cultural, ecological, and productive diversity.

From the perspective of this paper it is possible to single out the most relevant elements of the modernizing scheme: the relationship between society and nature; the notion of industrialization-urbanization; and the function of science and the issue of democracy. A summary of each one follows.

❖ *Society—Nature Relationship*

The vision that each society has of the world is a social and cultural construct that reflects the conception that a given society has of nature. The modernizing scheme includes in its notion of development an anthropocentric vision that legitimizes human manipulation to control and direct ecosystems. Hence development consists in utilizing the natural world to lend it greater value than the value it possessed in its original state. The relationships modern societies establish with their natural surroundings also include the perception of natural resources as infinite and disposable. This perception is further

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"If there is one characteristic that emerges from the present civilizing model, it is that of an omnipotent urban-industrial sector, essentially predatory, that is erected both on the ruins of rural societies—countries and regions—and on nature that was subjugated."

expanded through the notion that human beings are foreign to nature; hence everything occurring in nature is not the responsibility of human societies. Unlike other cultures the modernization scheme does not stress its relationships with nature in any ethical or philosophical aspects. Relationships are merely based on considerations of productivity.

❖ *Industrialization and Urbanization*

The process of the modernization development covers the path from rural to urban and from agricultural to industrial. Societies are said to become more developed as their economy stops being agrarian and moves toward industrialization. In this process human beings work and are concentrated in cities, giving up their rural status. If there is one characteristic that emerges from the present civilizing model, it is that of an omnipotent urban-industrial sector, essentially predatory, that is erected both on the ruins of rural societies—countries and regions—and on nature that was subjugated. A series of mechanisms that are not only economic but also political and cultural have emerged worldwide favoring the urban-industrial over the rural-nature model. These mechanisms tend to conceal the very high social and irreversible ecological costs involved in this process.

❖ *Economy and Nature*

The view of nature as something alien to human culture and the emphasis on industrialization are embedded in the mechanistic concept derived from classical economic thought. They form the crux of the perception of the economic action of the western civilizing scheme. This perspective creates an economic rationalism that views as the only factor the cycles of capital recuperation, even though the latter operates according to rhythms that differ from those dealing with the recuperation of natural resources. Similarly, economic rationalism does not attach any importance to the harm the productive process poses to the environment.

Hence the quest for productivity leads to the progressive utilization of materials and nonrenewable products through the intensive exploitation of nature. This productivity refuses to take into account the costs involved in the management and treatment of the waste thus generated. Underlying this combination of perceptions is the notion that production can satisfy the unlimited needs of humans so long as they are allowed to compete freely in the market.

The quest for maximum returns from capital and the rationalization of profits contained in the notion of production and wealth form the basis of modern economic thought and explains the unchecked growth of productive forces with nature viewed as a subordinate entity.

❖ *Science and Knowledge*

Modern thought born in eighteenth-century Europe is based on the idea that reason and its progress represent the only ways to achieve human happiness. Science as the exponent of all reason is transformed into the instrument enabling human beings to become masters of their own destiny. Faith in the possibilities of scientific knowledge is what is responsible for the change that occurred between human beings and nature. From an organic vision we proceed to an anthropocentric

conception where "man" occupies the center of the universe with everything else subordinated to him.

From these conditions another trait of modern development emerges, one that postulates that absolute faith in science is the only valid path to knowledge and its corresponding ideology, namely "scientism." This also implies the exclusion of other forms of knowledge and thought alien to this unilaterally defined scientific concept. These various forms of knowledge that permeate the "underdeveloped" societies are *a priori* rejected and viewed furthermore as an obstacle to both modernization and development.

❖ *Representative Democracies*

The modernization ideal is founded on the notion of a society governed by people well grounded in politics. Individuals elected by society to represent it will manage development. In this fashion unions, political organizations, and the state become the depositories of the citizens' wills and wishes with regard to the course human societies will adopt. Decisions therefore are made by professional politicians in consultation with expert scientists who, after deciding on the appropriate course of action, shape it into a juridical and normative structure. Citizens who do not have the option to challenge the decisions until the next electoral period must respect this structure. This particular notion of representative democracy has constituted the primary base for legitimization of modern development under the rhetoric of democracy linked to scientific knowledge, which guarantees that the political decisions made are the best suited for society as a whole. The idea of democracy that emerges from this modernization scheme emphasizes the representation of citizens and not their participation, thus promoting centralized and vertical structures while rejecting models of decentralization and self-government that put decision making into the hands of the citizenry.

Sustainable Development

The genesis of sustainable development can be viewed from two perspectives. The first refers to the great variety of social and citizen-based movements that include among others ecologists, peasants, indigenous groups, women, consumers, and intellectuals, i.e., people who have lived through and suffered from the effects of development. Based upon the customary activities in their lives, these groups started to question its sustainability for nature and human life.

A second aspect was channeled through the institutional route where environmental damages and citizens' actions put pressure on international organizations and, to a lesser extent, on local states to acknowledge the necessity for addressing ecological issues when formulating developmental strategies.

For Enrique Leff (1998), the first aspect corresponds to a developmental process that is generating various manifestations of resistance opposed to globalization policies. A recent example of this phenomenon is the 1999 Seattle demonstrations. These resistances help construct an alternative paradigm of sustainability. Natural resources appear as potentials capable of rebuilding the economic process within a new context of productive rationality. This new, more social rationality shows how cultural diversity, democracy, and nature can be productively linked to create sustainable development.

The institutional perspective can be traced to the 1972 Conference on Development and Environment sponsored by the UN. It is still significant due to the involvement of the United Nations and other international agencies. It ultimately led to the publication of the 1988 Bruntland Report and the 1992 Rio de Janeiro Earth Summit. By the signing of the accords and promises of Agenda 21 (which at best were only partially fulfilled), sustainable development was accepted as an institutional strategy for UN-member countries. In the final analysis, the institutionalization of an alternative paradigm of sustainability led to the elaboration of the so-called ecotechnocratic discourse on sustainability.

This discourse aims at spreading the message that the planet is in danger not because *rich nations* have developed wasteful forms of energy production and consumption that upset the natural balance, but rather, because *poor nations* that witness rapid population growth are degrading nature through their poverty, ignorance, and backward agricultural practices.

The concept of sustainable development is today at the core of an intense debate. It is a concept that is both in construction and surrounded by controversy. At the core of the debate is the definition of what exactly should be sustained. For some the answer could refer to sustaining present consumption levels or natural resources. Others point to the fact that what is not sustainable is the present development process;

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they are searching for possible alternatives that could be sustained.

From the standpoint of modernization the idea of sustainable development refers to sustaining the present development model and economic growth while taking into account the restrictions that the environment imposes on such a model. Sustainable development is an objective that can be attained through the present model tempered by environmental issues. *Science* (that researches more efficient processes and technologies) and *markets* (that value scarce natural resources) can be seen as two tools for sustainable development.

From another perspective sustainability emerges within the context of globalization as the marker for a boundary and the symbol that reconnects mankind's civilizing process. Sustainable development is viewed as an alternative to the dominant modernization development; thus its strategies are oriented toward the transformation of institutions, the consumption of natural resources, and the prevailing development policies. The elements of these strategies include, therefore, effective democratization, enhanced citizen participation and control, redistribution of wealth, reorientation of scientific development, and the creation of an alternate economic order.

The intent of creating a conceptual basis for sustainable development must take into account the interlinking of various dimensions. For the purpose of this article, four are of interest to us: the political, the epistemological, the economic, and the ecological. Each will be briefly described.

❖ *The political dimension*

The failure of the modernization model (that is, its strategies and institutions), has pushed to the foreground the political dimension as a central issue in sustainable development. Various social actors play a fundamental role in the processes for the design and management of developmental schemes. Local and social organizations acquire greater relevance, and civil society challenges the vertical and corporate exercise of power by the State. This leads one to contemplate the creation of strategies and methods that promote and develop the capacity of self-management for organizations while furthering greater participation of those involved in the processes of development. It is from the Political Ecology that the most relevant contributions are garnered. It is a novel train of thought that uncovers a distinct form of understanding, i.e., the political, the economic, the social, and the cultural, all viewed from an ecological perspective. For Leff (1998) the political dimension appears as a social response to ecological destruction and globalization while bringing new perspectives to the political culture. It is also opposed to all forms of authoritarianism and concentration of power. This proposition is founded on autonomy, self-management and self-determination, and aims at building a society that is embedded in participatory democracy and the decentralization of power.

❖ *The epistemological dimension*

The epistemological dimension usually does not enter into debates on sustainable development since it is assumed that the system of knowledge acquisition, based on scientific principles, represents a universal epistemology. In reality the modernity crisis signifies also the crisis of western science. As noted above, it is one of the central components of the discourse and practice of the modernity scheme. This dimension becomes of central relevance to a discussion on sciences and learning. From the perspective of sustainable development alternative viewpoints of thinking are proposed, ways that are more pluralistic, in order to move closer to reality and generate knowledge. This methodological pluralism requires one to adopt nonscientific methods and to consider multiple discernments. In this sense, it is possible to suggest that the distinct forms of knowledge on which western civilization feeds are also relevant for a dialogue about knowledge that involves the problems of modern societies. In this manner, when considering the necessity to contemplate the various epistemologies and forms of knowledge, the perspective of sustainability prompts one to scrutinize as well the participation of the various social actors involved in the decisions about the direction of societal development and to question the monopoly held by politicians and scientists in these decision-making processes.

❖ *The economic dimension*

The economic dimension of sustainable development has generated a heated debate. Although there are many points of contention, for the sake of the example, we shall mention three cases: the monetary valuation of natural resources, a different productive rationality, and the economic and ecological relationships between countries. Of particular relevance are the contributions from the Ecological Economy, which views the environment as a system

composed of interdependent subsystems shaping a dynamic reality made of complex natural, cultural, social, economic, and ecological relationships. The Ecological Economy claims the necessary unity between natural and social sciences and establishes the interconnection between ecological, economic, social, and cultural processes.

According to the Ecological Economy it is impossible to value environmental resources from a monetary perspective when recognizing the values of existence and opportunity that lie beyond the values of usage and exchange. It emphasizes as well the absence of future generations when assigning monetary values to present-day goods. The Ecological Economy proposes, in addition, the rethinking of the basis of the conventional economy given its incapacity to consider the natural issues. It also seeks the switch from past economic concepts to economic instruments oriented toward a novel productive and ecological rationality. Finally, this manner of thinking views as the main ecological problem facing our contemporary world the growing gap between rich and poor nations. The global character of the ecological crisis and the globalization of asymmetrical economic relationships make it necessary to redefine the relationships between developed and underdeveloped nations if one truly is concerned about sustainable development.

❖ *The ecological dimension*

A last dimension of sustainable development is the ecological. It is of particular relevance since it is the environmental situation and its global character that provide the most generalized evidence of the Western civilizing scheme. For Leff (1998), ecological sustainability appears as a normative criterion for the reconstruction of the economic order, as a prerequisite for human survival, and as a pillar for achieving a durable development process, thus challenging the very basis of production. The concept of sustainability emerges from the recognition of the function that nature plays as a support mechanism, the condition and potential of the production processes.

The modernizing ideal establishes its relationships with nature from an anthropocentric perspective where human beings are the masters and as such are entrusted with dominating it. Sustainable development aims at having human societies establish relationships with nature from the awareness of species and an inter - and intra-generational ethic. This implies a radical departure from a much more ecocentric vision to one that, for example, is present in rural and indigenous cultures. The ecological dimension presupposes the reconsideration of ways in which nature is utilized and the analysis of the impact of human activities from an ethical perspective. Sustainability implies a reconsideration of the notions of growth and development, production and consumption, as well as the access to natural resources and the social responsibilities for their use.

Conclusions

Given different assumptions about epistemology, nature, and economics that underlie our curriculum in schools and colleges, does sustainable development take on a new meaning and challenge? From what epistemological perspective should our educational processes take form? If curriculum needs a new form, what is the nature the educational processes for our students?

In part, local involvement of the academy in community building may be required to rethink our assumptions about nature and economics, as well as their interrelationships. Local engagement and reflection is one method to avoid "split up" knowledge creation. It is becoming clear that, in general, modern "scientism" does not promote local democratic processes and decision making. While sustainable development requires a strong local control and focus, it does not mean that we do not need to keep one eye on the health of the planet.

"Sustainable development aims at having human societies establish relationships with nature from the awareness of species and an inter- and intra-generational ethic."

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Article

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Casting a Glance at Life in Chiapas: *An Essay*

Ana Romero

From near and from afar you listen to the rain without really sensing it; a soft, steady drizzle that for years has fallen on this region and to which, in spite of its everlasting presence, everyone remains indifferent . . . it is the rain of life.

Altamirano is located approximately 30 minutes from Ocosingo, an area that gave birth to one of the most significant armed movements in the history of Mexico. This is where my function as a physician and as a person placed me in the role of observer of a culture which is so entrenched in my country and yet so unknown to many, a culture that pointed out to me the many differences of indigenous life.

As always the consultation starts with the visit of numerous Tzeltales and Tojolabales[1] who had traveled on foot many hours under the rain. This, however, is of no consequence; there is hardly a difference between today and yesterday, the *cux xotan*[2] (heart pains) prompted them to come once more. For years they suffered from these pains, only to be told by the doctors: "Eat well, don't drink only coffee." By applying themselves, they managed to drink pozol[3] twice a day and eat beans since coffee no longer agreed with them.

Unlike other days, today there are few Tzeltales and many "hermanos"[4] Tojolabales. The cattle truck they paid for is spacious enough to accommodate thirty children and women plus one or two men to look after them all; the other men must stay behind to work in the coffee fields.[5] It is harvest time and the mecapales[6] are ready to be loaded with the crops; pains and other discomforts can wait.

For the doctors, there are more than enough patients for the morning consultation—various calls of dyspepsia, parasitosis, respiratory infections, prenatal checkups, and, of course, the ever-present cases of diabetes and tuberculosis.

Among this medley of illnesses, by far the most striking, the most tenacious, is tuberculosis; a cough

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[1]The Tzeltales and Tojolabales are ethnic groups from the state of Chiapas.

[2]The particular dialect of the Altamirano region is the Chanabal. See http://mexico.udg.mx/geografia/lenguas/indice2.html

[3]A fermented beverage made from corn. See http://www.cup.org/books/kiple/mexico.htm

[4]The Tzeltales and Tojolabales consider themselves brothers originating from the same land and the same culture although they were born into different ethnic groups.

[5]Coffee cultivation is one of the main agricultural activities in the state of Chiapas and as such represents one of the principal sources of income for the native communities.

[6]The Mecapal is a pouch made of *ixtle* (mezcal fiber) with leather straps tied around the forehead and used to carry heavy loads on one's back.

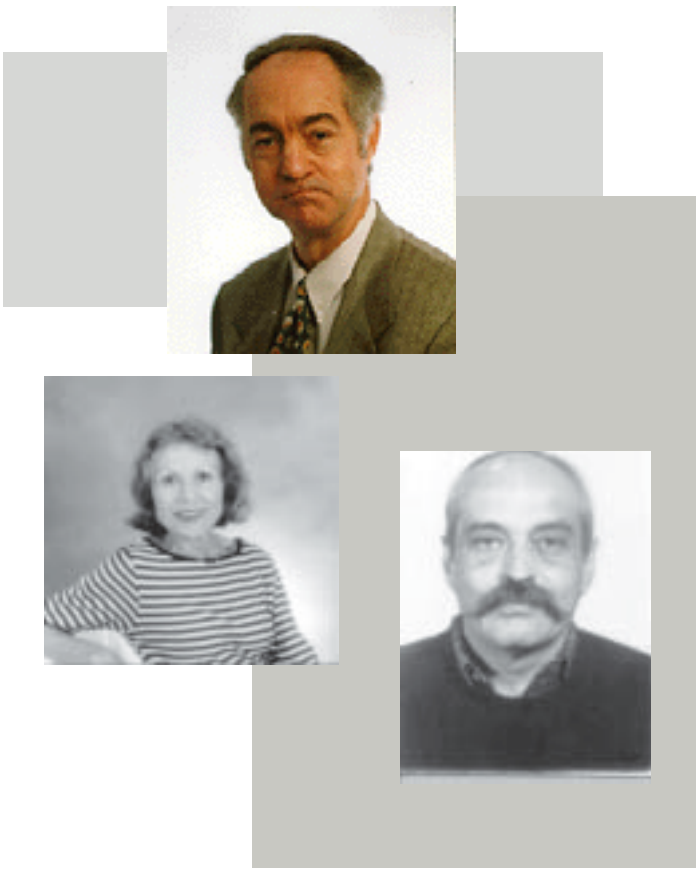
lasting for years, cough during the day, during the night, cough at bedtime, cough while drinking pozol, cough while working in the coffee fields, cough while eating tortillas and beans, cough, cough, and more cough, almost to the point of the cough becoming one's best friend, one's most faithful and trusted friend, albeit more than its shadow, because not even in the darkness does the cough leave you. With the passage of time the exhaustion of the perpetual companion appears; the fatigue while walking increases, and you cough from tiredness, a cough mixed with blood. A bloody cough is a bad omen. Blood and cough are scary. This is why Juan is coming today after having been coughing for the past five years.

"For the doctors, there are more than enough patients for the morning consultation; various calls of dyspepsia, parasitosis, respiratory infections, prenatal checkups and, of course, the ever-present cases of diabetes and tuberculosis."

Yet my favorite cases are people suffering from parasites. Nothing embodies better the origin of these beings of bronze and magic than their parasites. They have been friends ever since childhood; they are common and yet funny, especially if after looking for the appropriate site to defecate one notices them swarming around in the stool. Parasites are not a priority provided they are not too numerous. In reality there is no priority, except drinking pozol. Anatalia's husband knows it well. That is why it does not bother him to carry her in his arms for hours and when he eventually reaches the road he does not mind paying for the car ride with what he earned from the coffee. He does not know how he will return home. All he knows is that he must get to the clinic, because for six days now Anatalia has been unable to drink pozol. The fight for survival was going on at home; the herbalist had massaged her stomach to alleviate pains caused by indigestion, yet despite the repeated efforts of a rudimentarily trained medical assistant who put her on an IV and injected her with vitamins, nothing helped. Anatalia no longer could fight because she no longer could tolerate pozol. "She is going to die, brother, she does not drink pozol anymore," her husband had remarked when the doctor asked him why he was bringing her in. And it does not matter that for the past eight days she has been drinking only atole (a non-fermented beverage) and that for the past three months she ate beans only once a day. It does not matter that for four months now her feet have been failing her, refusing to support her while walking, and her back no longer supporting her when sitting down, and her mouth was no longer capable of drinking. What still keeps her alive are the sighs emanating from her chest, the hampered breathing, just as her heart is kept alive. Even if she faintly smiles from under the handwoven quilt her husband had wrapped around her, she does not grasp the meaning of the blood transfusion or the hemoglobin reading of 2.3; she does not understand the doctor's concerns for her transfusion; she only smiles as long as she is able to breastfeed her 3-year-old child. There is nothing pressing for her; the pozol no longer matters, she told her husband without complaining about her discomfort. And catching her breath while her husband takes her in his arms, she added: "I cannot go and see the doctor without my little son." That is why she had been unable to come. As long as she is with her child and is able to feed him if he is brought to her, there is no urgency.

But this is not possible, theoretically not possible; it is madness. It is not compatible with life. Yet life under the rain in the forest has been magical[7] and compatible with life itself. Thus it has been during centuries of oblivion and anonymity; thus it rains every day in Chiapas.

[7]In Aztec culture the warriors were considered the product of the mixture of magic and bronze.



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Sustainable Guadalajara:
Water—Quality & Quantity on the Decline?

Stanley R. Ingman, Guillermo Martin,
and Veronique Ingman

Guadalajara, the second largest city in Mexico, has some 3.8 million inhabitants. It consists of seven "municipios" or municipalities or townships and is located in the State of Jalisco in the western part of Mexico. Founded in 1542, Guadalajara was the administrative and ecclesiastical center for the region of Nueva Galicia. It remains the political, cultural, and economic center of western, northwestern, and central Mexico today. While isolated to a degree from the revolutionary spirit of central, southern, and northern Mexico, the area rebelled against Spanish rule in the early nineteenth century. It was the seat of the liberal and anti-interventionist movement of the mid-nineteenth century, and also of the pro-Catholic and anticentrist Cristero Rebellion of the 1930s (Logan, 1984). With steady urbanization Guadalajara has grown from 1 million in 1970 to the present 3.8 million. Currently, Guadalajara covers less than 2% of the land surface of the State of Jalisco, but contains 55% of its population and 70% of the economic activity of the State (Woo, 2000). The Guadalajara Metropolitan Area referred to in this article (ZMG) includes Guadalajara, Tlaquepaque, Zapopan, Tonala, El Salto, Juancatlan, and Tlajomulco.

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When we use the term *sustainable* in relationship to a city or a society we focus on the ability of that population to preserve the natural resources so that future generations can exist in the same general geographic area. It is a society or region that can persist over generations, one that is farseeing enough, is wise enough, not to undermine either its physical or its social system of support (Meadows, Meadows, Randers, 1972). Of course regions and nations can exploit other areas to maintain a way of life beyond the resource base of their own area; this has been the driving force in part for various wars and globalization movements. For this discourse we intend to focus upon one resource issue facing the State of Jalisco, namely, fresh water. Cities throughout Mexico or Texas, such as Mexico City, Monterrey, El Paso, Houston, and Dallas, face similar challenges of access to fresh or potable water, which affects the nature of their further growth and well-being.

Blessed Ecosystem

As one of the best-developed agricultural areas in Mexico, the State of Jalisco with its cool nights and warm days attracts retirees from around the globe. The rainfall varies between 20 inches and 50 inches, thus theoretically water sufficiency should not be an issue. However, much of the rainfall occurs in the four-month rainy season. There are numerous lakes and rivers in the State that reflect a relatively high rainfall rate compared to some parts of Mexico. Located south of Guadalajara, Lake Chapala (about 50 miles long, 10 miles wide) is the largest lake in Mexico . It provides some fifty percent of the drinking water for the urbanites to the north. North of Guadalajara flows the now very polluted Rio Santiago, which originates in Lake Chapala and receives most of Guadalajara's waste water. It flows west some 700 miles and empties into the Pacific. The relatively unpolluted Rio Verde travels from the northeast to the west some 100 miles, meeting the Santiago just north of Guadalajara.

The Pacific Ocean to the south boasts of some 200 miles of lovely coastline and beautiful beaches for the State of Jalisco, from Puerto Vallarta in the west, to just north of Manzanillo in the south. To the west of Guadalajara, lush vegetation covers various parts of the Western Sierra Madre resulting in a diverse flora and fauna. An hour or two to the west and south are various active and nonactive volcanoes; they form the core of national parks that provide much local pride. The Monarch butterflies from North America migrate to the southeast side of Lake Chapala, along with many wonderful egrets, pelicans, and cranes that inhabit the lake basin.

The area below the city of Guadalajara is blessed with sizeable underground aquifers. However, the once pristine groundwater reserves under Guadalajara and its surrounding region are now somewhat polluted by sewage, industrial leakage, and agricultural waste. Furthermore they have also been tapped excessively for human and industrial consumption. Expansion of paved urban areas has also decreased the capacity to recharge these aquifers.

Overall, the ecosystem of the sixteenth century that greeted the Spanish invaders has been transformed forever by agriculture, industrialization, population expansion, and urbanization. As the flora and fauna regressed, the quality of fresh, and even saltwater near coastal cities, along with land and air, deteriorated. Water in its absolute quantity has actually declined within the State of Jalisco, in terms of lost lakes and smaller lakes, shrunken or dried up rivers, and lower aquifers. Unlike the early indigenous populations of Nahutl, Huichol , and Zapotlan, who left little noticeable imprint on the land they lived on for some thousand years, the newcomers from across the ocean did leave their indelible "ecological footprint" (Wachennagel, 1996).

Status of Lake Chapala

The largest lake in Mexico, as it existed in the sixteenth century, has shrunk in actual size to one half of its original surface and is only at 25.9% (2,104 million cubic meters) of its total capacity as of April, 2000. However, its current low level is comparable to the level measured around 1955 when the lake was still recuperating from a drought that had started in 1945. In 1926 the lake was at its historical high (9.721 million cubic meters). Thus, while quality of lake water is a clear concern, one must be cautious in assessing the current low levels of the lake. The current low levels are due in part to a ten-year drought (Afilano and Rodríquez, 2000).

Experts and officials who have reviewed the situation agree on four factors to explain the current low level of the lake as well as the quality of the watershed Lerma-Chapala-Santiago. First, to the east the Rio Lerma flows through five states—Mexico, Michoacan, Queretaro,

Guanajuato, and Jalisco—before emptying into the lake. The Rio Lerma is drained of thousands of cubic feet of water while picking up agricultural, industrial, and human waste products because of expanded population, agricultural exploitation, industrialization, and urbanization. The watershed of the Rio Lerma now supports over 10 million inhabitants before emptying into Lake Chapala, as it travels some 500 miles west from near its origin, just west of Mexico City, in the State of Mexico. There is also a 600-foot pipe that pulls water from the basin to help supply water to Mexico City to the east. The governor of the State of Mexico in 1990, Ignacio Pichardo, stated that the "river" was a nostalgic term for what actually is an industrial waste channel (Russell, 1994). It is estimated that 95% of the residual water from cities and factories in the valley is untreated.

Second, over 100,000 individuals live around the lake. North of Lake Chapala and south of Guadalajara, on the highway corridor that links the metropolitan area to the Miguel Hidalgo International Airport, there are over 150,000 people inhabiting the Valle de Toluquilla. Few sewage treatment facilities have been built around the lake, and thus local villages are adding to the pollution of Lake Chapala. In the last sewage treatment plan for Jalisco, the governor has announced the construction of 10 additional facilities around Lake Chapala (Juárez, 2000). The Valle de Toluquilla has no facilities and its aquifers have long been over-tapped for residential and industrial uses.

Third, within the lake a set of pipes, six feet in diameter, extracts water to provide some 50% of the water used by businesses and residents in Guadalajara. It is estimated that annually some 250 million cubic meters of water are extracted from the lake with these pipes, according to Sistema para los Servicios de Agua Potable y Alcantarillado en el Estado de Jalisco (Cinco, 2000). The Rio Calderon with a dam to the east of Guadalajara and the local aquifers with some 1500 wells in the city provide the rest of the tap water for the city.

The fourth factor and the one considered by some to be a major reason for the reduction in the lake is the 1400 million cubic meters of water lost to evaporation from the lake, or some 84% of the yearly loss. Various options have been discussed to address this concern. The idea of reducing the size of Lake Chapala and thereby the surface area, was debated and deemed not workable. Politically this would involve the administration of two states—Michoacan and Jalisco—thus, it is considered too complex at this stage. One concern would be about the advisability of the proposal in terms of general ecology, that is, the impact on the flora and fauna of the region. Experts contend that the 16% used per year by Guadalajara citizens from Lake Chapala is not significant to the level of Lake Chapala.

The lake represents an important source of tourist dollars for the State of Jalisco. Around the lake's northern shore are communities that attract retirees from Europe, Canada, and the United States. There is therefore a strong economic incentive to save the lake or even increase its size. Steady development is the goal of many current homeowners and developers alike wishing to maintain property values and boost all businesses in the area. Allegedly, the USA community represents one of the largest expatriate communities in the world. One must now walk 1200 feet or more to reach the shoreline of the lake, which has dropped some 26 feet. It is important to note that Lake Chapala was not used for providing water for Guadalajara until 1956, and the highest point for the lake was 1965.

The federal government, an interstate management commission, the World Bank, and other international bodies have presented various proposals to "Save the Lake." The Federal Government has in recent years moved to take the issue out of the hands of the State of Jalisco and make it a federal responsibility. In the late 1980s the lake was adopted as a global treasure to be preserved. Chapala has also been a recent focal point for pilgrimages, such as ritual prayers for rainfall in 1999. A workshop met in June 2001 to plan how to save Lake Chapala, and a colleague from Texas recalled that some forty years ago there was a front-page article in a Guadalajara newspaper discussing how to save the lake. The point is that the political will does not seem to exist to address the challenge.

By some estimates, nearly 40% of the Guadalajaran water system is unaccounted for. Leakage and stolen water are two major reasons. Solving the leakage problem may necessitate a massive public works program. Apprehending people who steal water is very difficult. Both challenges will also require massive citizen involvement and education about the issues. As water shortages occur and illnesses due to poor water increase, citizen

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awareness and involvement will expand (*El Informador*, 2/12/2000, 6B).

Smaller Lakes and Major Rivers

As recently as some twenty years ago, there existed a twenty-mile-long lake called Laguna de Sayula between Guadalajara and Ciudad Guzman to the south. It has shrunk to the size of a small lake at the south end of a long salt flat. It evolved into a salt flat for several reasons. With the encouragement of government officials, some farmers built small dams on the hills above the lake for irrigation or to water cattle; consequently, less water reached the valley. The federal government decided to build a major highway to Ciudad Guzman, right down the middle of the Laguna, leading to further degradation of the Laguna and the ecosystem in the valley that had been a major destination for migrating birds. Deforestation of the hillsides above Laguna de Sayula has also contributed to its decline. The nearby Laguna de Marcos and Laguna Atotonilco are beset by the same grim fate, and are nearly dry. Nearby Laguna de Cajititlan, and other smaller water bodies in this region are also targeted for future water use by Guadalajara and may be thus under threat of extinction (*El Informador*, 2/26/2000, 6B).

The small Laguna de Zapotlan near Ciudad Guzman, where the city sewage and agricultural runoff are deposited, is heavily contaminated, i.e., cholera bacteria were recently reported in the water. Various projects had been designed over some ten years, with no actual waste plants built as yet. A waste plant is actually scheduled to be built in the coming year. The contaminated fish from the Laguna, it is rumored, are shipped to Guadalajara for consumption (Atilano, 2000).

East of Guadalajara, one encounters one of the most fertile agricultural area in the State of Jalisco, and in Mexico, called Los Altos or "Highlands." A massive hog and chicken industry produces waste that threatens the rivers in this region. Locals farmers are building small ponds to irrigate small areas for agriculture and cattle. Cities such as Tepatitlan, and particularly the expanding tequila agro-industry, are a major source of surface and underground water pollution. Since the Rio Verde and its watershed was decreed through the National Water Commission (CNA) a reserve source for Guadalajara, 88% of the surface water cannot be used by a local farming-based population of over 327,000. It is forbidden to build new ponds for retaining rainwater, as had been the tradition since its settlement in the sixteenth century. New ponds are destroyed (Martin and Ortega, 1998).

The Rio Verde that flows into the Rio Santiago just north of the city of Guadalajara seems to be one major target for solving the water shortages in the city. The Rio Santiago now receives direct sewage or "black water" from the city and is heavily polluted as it passes by the city to the north. The Rio Calderon, the Rio Verde, the Rio Juchipila, and other rivers all empty into the Rio Santiago as it flows north and finally west. Since clean water is mixed with sewage from Guadalajara, gradually the river becomes less polluted. In the dry season, the Rio Santiago (as well as the Rio Lerma) is characterized by large dry sections, before the sewage from Guadalajara mixes with the water from the Rio Calderon and the Rio Verde. However, it is clear that the Rio Santiago remains polluted as it flows north and west, with the waste from a city of 3.8m inhabitants traveling along its banks.

Guadalajara Aquifers

Aquifers are a complex entity. There are three levels of aquifers: level one is 600 feet or less, level two is around 900 feet, and level three is some 1800–2000 feet deep. Level one is fully exploited and is often dry. Level two is dropping 3 to 4 feet per year. Level three is not tapped in Guadalajara and represents a potential reserve. Other cities in Mexico, for example Monterrey, are tapping this third level. Guadalajara sits in a large basin and collects water from the surrounding hills. In the western part of Guadalajara, the aquifer is a major resource for the wealthier residents of the city.

José de Jesus del Rio Preciado, from the citizen's movement for environmental improvement, proposed in February of 2000 that more absorption wells be created within Guadalajara and its expanding suburbs in order to replenish the aquifers. These wells allow rainwater to be absorbed into the aquifers (for example as in Guadalajara's Colonia Chapalita), and thus aquifers could remain an important source of drinking water for the city inhabitants. Slowly with urbanization, concrete has replaced fields, and rain water cannot be absorbed easily into the aquifers (Estrada and Maguey, 2000; La Zona Metropolitana, 1997). Various experts caution that this solution presents certain problems that must be considered carefully; it may cause buildings to shift (Arias and Bitar, 2000).

Guadalajara does not separate rainfall from industrial and domestic drainage. Some argue that the 1993 petroleum leakage and industrial waste of all sorts have polluted the Guadalajara aquifer (Valle de Atemajac basin) as well as aquifers from Los Colomos through Santa Ana Tepetitlan. Major concerns were also expressed about the issue of irreversible environmental destruction of the nearby, and once beautiful, Rio Santiago and its unique Barranca de Oblatos, a spectacular gorge that can be seen to the north of the vast, tastefully landscaped zoological park on the northern side of the city. The Rio Santiago flows some 700 miles north and west, with few villages on its shores, and passes through two dams before emptying into the Pacific. According to experts, tests on water show that the walls of the river bank and natural aeration do clean up much of the pollution originating from Guadalajara (Arias and Bitar, 2000). The damage to the flora and fauna of the Rio Santiago, however, cannot be denied.

Solutions Under Discussion

Rio Verde Answer?

Some officials are looking at the relatively untapped Rio Verde as a water resource for Guadalajara. The plan to divert the Rio Verde into Lake Chapala was viewed as one way to save the lake and solve the water needs of Guadalajara. Currently the river empties into the Santiago River that comes north out of Lake Chapala, some fifty miles from the lake. The impact on the Rio Santiago (as well as the Rio Verde) of tapping or diverting the Rio Verde needs careful review. It would truly create a vast wasteland along the banks of the Rio Verde that would dry up as well as possibly reduce the flow of the Rio Santiago north of Guadalajara. Any changes in the Rio Verde watershed could also generate economic and environmental losses in the region east of Guadalajara. This region now suffers from emigration and rural economic stagnation. In April 2001, there was even a proposal to transfer water from the Rio Verde to the Rio Lerma to supply both Lake Chapala and Guadalajara with more water.

During the dry season, the Rio Lerma has no water flowing into Lake Chapala. In December 1999, it was reported to be so dry that visiting officials actually walked the riverbed during inspection (Juárez, 2000). A few decades ago, the monumental Salto de Juanacatlan spillway, east of Lake Chapala, registered flows of over 130 cubic meters per second. Now, frequently no water flows out of Lake Chapala; thus sections of the Rio Santiago are often dry also. Until the raw sewage from Guadalajara enters upstream, the initial first 12 miles of the Rio Santiago river bed remain dry for many months. The construction of a new dam near Guadalajara on the Rio Verde is alluded to occasionally. However, experts estimate that pumping water would be too costly, and it is not being seriously considered.

More Sewage Treatment Plants?

Sewage plants and devices to recycle used water and rainwater from Guadalajara must be part of the solution. Some 60 sewage treatment plants have been proposed in the last five years. To date few have been built, and some that were built are questionable from a technical point of view. Because of unrealistic budgeting to secure funds to complete these 60 waste plants in the near or distant future, the plan has been frequently downsized. In Denton, Texas, the water authority takes water from a nearby lake, uses it, then collects the used water and treats it before discharging it back into the lake. Then, they essentially extract the "same" water from the lake for their drinking water. Lake Chapala or the Calderon Dam may or may not be close enough for such recycling of water. However, all water extracted for use should be treated before it is discharged into any streams or nearby lakes, so that reuse becomes a possibility.

Efficient Water Use by Agriculture?

In the watershed of the Rio Lerma, the federal government has proposed to cut back utilization by 21% in 2000 (*El Informador*, 2/10/2000). Farmers will need to restrict water usage in order to become more efficient consumers. One wonders whether urban citizens and industries are willing to share the burden of water conservation with all the farmers in the Jalisco and the Rio Lerma basin. The newspaper noted that this policy would not affect water access in Guadalajara. Currently, some 88% of the surface water in the Rio Verde watershed east of Guadalajara cannot be used by farmers and villagers. It is reserved for Guadalajaran citizens.

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Repair the Guadalajara Water Distribution System?

On February 28, 2000, Alejandra Atilano (Mural) reported on the recent water testing in the Guadalajara metropolitan area. The University Center for Exact and Engineering Sciences tested the tap water of 100 households located in various areas of the city to determine the number and type of bacteria. Some 35% of the household water tested indicated contamination that could negatively affect human health, especially people with an impaired immune system, e.g., children and senior citizens. A bacteria, "aeromonas" resistant to ordinary clinical treatment, was found in the tap water. Since allegedly the water leaves the treatment plant in an acceptable condition, it is the distribution system that appears to be the source of contamination. Each home is equipped with a cistern in the basement where water is stored. The cisterns are reported to be a major source of contamination.

Currently it is estimated that some 40% of the water distributed is unaccounted for, i.e., 12% due to leakage and 28% to theft. It seems that previous administrations had mismanaged this system. In the 1990s the Japanese were asked to assess the situation and propose a plan. They would provide credits or loans if the city would focus on a project for repairing the water distribution system and build waste treatment plants. One condition stipulated that half of the anticipated sewage treatment facilities to be built and management operations would go to Japanese businesses. Politically, the issue became highly controversial. Both the Revolution Independent Party (PRI) and Revolution Democratic Party (PRD) attacked the National Alliance Party (PAN) for considering the deal, and in October of 1999 PAN announced it would not move forward with the plan. PAN claimed they would look to the Federal Government for assistance. The renovation of the water distribution system must be considered in Guadalajara for improving the quality of the water as well as to conserve water.

Absorption Wells?

As in some other parts of the city, the neighborhood of Chapalita on the southwest side of the city has developed a system of absorption wells to collect rain water. Rainfall collected thus is then directed into the aquifer. The relatively high rainfall represents an asset for the region that should be carefully managed. As mentioned above, rainfall and sewage water is typically mixed together throughout the city and flows directly into the Rio Santiago. The recent Lake Chapala workshop, as noted earlier, discussed the absorption well as a component to a comprehensive solution. With an annual rainfall range between l9 and 50 inches, rainfall collection for aquifer restoration seems possible (Estadistica del Medio Ambiente, 1997).

The unintended consequences of this solution need to be carefully investigated. The soil in certain areas of the city tends to be porous, and absorption wells could result in unstable infrastructures causing buildings to shift. The control of water quality directly injected through the absorption wells will be crucial if contamination of the aquifers is to be prevented. Various regulations now exist in some areas of the ZMG to require all new buildings to install absorption wells. Regardless of the problems with absorption wells, the aquifers are currently over exploited and need to be restored for future generations by some appropriate means. Certain institutions (e.g., country clubs, universities) have unrestricted access water out of the aquifer. A sound technological and an equitable approach to protect the aquifers is imperative.

The "Hidrogel" Solution?

The University of Guadalajara Committee for the Study of Water proposed recently the use of "hidrogel" to increase the efficiency of water use in agriculture. This system focuses on the inefficient use of water on the farms. Of the some 4,000 million cubic meters captured annually, 85% are for irrigation in the Lerma basin. Hidrogel could be mixed with soil, thereby allowing crops to absorb only the required amount of water to grow. In this manner, the water use would be reduced by 50%. One would salvage some 1,000 million cubic meters and the lake in theory would fill up. One kilogram of hidrogel absorbs and retains 370 liters of water. This method could be applied to the 400,000 hectares that are used for agriculture in the basin. The National Water Commission is testing the proposal on one hectare to determine any possible side effects (*El Informador*, 2/26/2000).

Green Party of Mexico Plan

At the February 2000 workshop on Lake Chapala, Victorio Carrillo Camacho, from the "Partido Verde Ecologista de Mexico," proposed a comprehensive plan that would involve the five states concerned. From their perspective two major problems need to be addressed: overexploitation of Lake Chapala and other fresh water sources, and the pollution of these waters. They designed a master plan that would, on the one hand, focus on youth education in schools about the environmental issues with emphasis on the preservation of nature. The five states with the support of the federal and local government would focus upon consumption behavior and the reduction of water pollution. With the recent gains at the ballot box, some of this plan may emerge as a viable option.

Manifestations and More Manifestations

Raquel Gutierrez Najera, representative from the Instituto de Derecho Ambiental (IDEA), with its focus on environmental laws, proposed to keep the pressure on the governmental officials by voicing a stream of criticisms at them. Only in this way, she argues, could progress be maintained. Some feel that local and national radio, television, and newspapers could not be trusted to cover or monitor objectively the realities of the water issue because of economic and political interests that control the media. Oppenheimer (1996) noted that two barriers affect media participation: the practice of paying reporters to write stories, and monopoly ownership of the media in Mexico that limits coverage of environmental issues.

Creation of a Common Front

The representative from Biología, Ecología y Conservación (BIOECO), Alejandro Juárez Aguilar, proposed at the Lake Chapala workshop that a consortium of concerned organizations be formed in order to work on common interests such as environmental education, reforestation, and the reliable monitoring of the water that flows into the lake and the water that leaves the lake. He recalls that many erroneous solutions had been proposed. Apparently water lilies were thought to be destroying the lake. The solution was to introduce manatees to eat them. Uninformed fishermen, unacquainted with manatees, shot some of them. This anecdote highlights the importance of sound citizen education and the sustained commitment of the citizenry over a period of years (Estrada and Maguey, 2000). Some 18 nonprofit groups, seven government officials, 28 academics from various universities, and 35 concerned citizens met to create a common front on Lake Chapala at the workshop in February of 2000.

El Salto-EGC Aqueduct Construction

The El Salto dam on the Rio Salto that empties into the Rio Verde was completed in 1994. Part of the same plan was to build the El Salto - EGC Aqueduct to carry water from the El Salto Dam to the Calderon Dam. Funding dwindled and the aqueduct was not built. The construction of an aqueduct was part of the Japanese proposal. Local civil engineers from the state government believe that this would provide enough water in the interim to give them time to work on other solutions as the metropolitan area grows to some 4.4 million by the year 2010 (Arias and Bitar, 2000).

Conclusions

Controlling water pollution, promoting water conservation, and transforming consumption patterns seems to be understood by some in Jalisco as part of an overall plan for the region. Engagement of the population to assist with the solutions given the needs of future generations to exist in the region may be key to formulating public policy. Theoretically all water remains on the planet, yet its distribution and quality does not necessarily stay constant. Some 1% of all water on earth is usable fresh water; thus, how we use existing fresh water and how we recycle or reuse it become the key issues for our sustainability as a species or at least whether a particular region is able to sustain a population or not.

Guadalajara should be given credit for its use of absorption wells to refill the aquifers. In other parts of the world , various industries are reducing their water consumption dramatically for purely economic reasons as the price of water rises. The number of absorption wells in Guadalajara may need to be expanded. Differential pricing of water may be a next step to getting the attention of corporations to encourage the recycling of water.

More technical solutions such as the construction of the El Salto Aqueduct may be part of the overall plan. In the short run this may buy time as the local experts claim

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to address more long-term solutions. However, the impact on rural Jalisco and the Rio Verde watershed must be clear before the plan moves forward. Rural needs must be considered. The 40% of unaccounted water in the distribution system of Guadalajara needs to be addressed first, before the rural population is asked to sacrifice once more for the conveniences of urban living and commerce; daily consumption may need to be reduced to 150 or 200 liters.

Practices such as conserving water require an informed civil society as well as a certain amount of trust between officials and citizens. Just as in Dallas and Houston, citizen alienation is high and distrust about governmental policies and practices persists. Guadalajara citizens harbor many doubts about the skills of the managers of the water distribution system because of past corruption and mismanagement. Due to the speculators operating in the predominantly working-class area on the eastern side of the city, privatization is viewed with a degree of suspicion. Some rationing of water existed in the 1970s, and once again in the year 2000 there are discussions about the need to ration on the east side of town. Thus, some speak of totally reforming the water authority. One more so-called "reform" that merely costs money and does not address the fundamental issues will make genuine reform difficult in the future.

There are now many more environment-oriented citizens' groups active in the region as well as increased higher citizen awareness about the complexity of the problem. However with youth alienation, meager economic growth, high unemployment, low wages, and limited public budgets, the people of Jalisco face a major challenge as they attempt to reverse the decline of the water resources in the region. Out-of-state immigration (especially from rural areas) is one crude indicator that the city and region may not be sustainable as an economic, social, and ecological unit, much as the Mayan cities of old, the cliff dwellers of New Mexico, or the ghost towns of western United States.

With water relatively cheap for homeowners, roughly $120–200 (U.S.) per year, there is limited evidence that the citizens of Guadalajara think much about where their water comes from or whether they need to preserve the water from the tap. For drinking water the middle and the upper classes reply on large bottles of purified water. All restaurants of any standing provide purified ice cubes and purified drinking water, and many restaurant patrons still order bottled water with their meal. Large 19-liter containers are delivered to most middle- and upper-class homes; some homes have installed their own purification systems. Mexican TV shows advertise various home water systems that will produce "crystal clear" drinking water. Most regular hotels do not provide potable tap water in the rooms. There was a proposal some years ago to distribute chlorine pills for everyone to add to the water.

The story of two cities in India helps us focus upon the issue of conservation. In the city of Gopalpura, with but a few inches of rainfall, local people have learned to preserve their limited resource as a precious commodity and avoid shortages, whereas in Cherrapunji, where they have some 37 feet of rainfall, there are continuous shortages (*The Economist*, March 25, 2000, 69). Most governments, as reported in *The Economist*, mismanage their water supplies, and many even charge the poor more for water than the elites. As you might assume, *The Economist* argues that correct pricing, or higher pricing, will cause industries and consumers to conserve. In Mexico City private firms are helping governments to improve bill collections, reduce leakage, and upgrade the infrastructure. Public policies that will not hurt the less privileged will be crucial if further privatization schemes and a new pricing system are to be implemented.

The success story of immunization of the children in Mexico is perhaps instructive about the ability of the State of Jalisco to meet a challenge and implement a major program. In 1989–90 there was a major outbreak of measles in Mexico. A national system to immunize all children was implemented. This program has become world famous. The ecological issues related to water conservation in the Lerma-Lake Chapala-Santiago watersheds involve many vested interests across the five states concerned. The challenge of the water issue may be the true test of the national ideology to preserve the integrity of the Mexican family and protect its children and its citizens.

Article

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Sustainable Development, Water, and Tourism:
The Case of Mazamitla, Mexico

Bobette Brasfield

Mazamitla

The small town of Mazamitla* is located in the Trans-Mexican Volcanic Belt in the state of Jalisco, Mexico. Situated 2600 meters above sea level, Mazamitla's climate is warm, sub-humid with rains during the summer. This town of approximately 16,000 people is nestled in the mountains 100 miles south of Guadalajara, the second largest city in Mexico.

The community leaders of Mazamitla are currently involved in dialogues with academic and professional volunteers from both Mexico and the United States in which sustainable development options appropriate to the local area are being studied. One proposal under consideration is that the town actively seek to increase the amount of local tourism. This paper will address the appropriateness of tourism as a sustainable development strategy in Mazamitla based on an analysis of water resources and water infrastructure.

*The author is indebted to the following persons for interviews that provided much of the information specific to Mazamitla: Professor Stanley Ingman, Mr. Sylvester Flores, Ms. Andee Chamberlain, and Sr. Alberto Guzman of the University of North Texas; Sr. Carlos Ceja, Director of Social Welfare in Mazamitla; and Mr. Richard Franco, Director of Denton County Public Housing.

Current Economic Conditions

The largest source of income in Mazamitla is the United States labor market. A large percentage of the town's men have migrated to the United States to work and return a portion of their earnings to family members in the town. One result is that in many families only the wife and children are full-time residents of Mazamitla.

Although the forests in the local area were extensively logged in the past, there is still a cabinet and wood working industry that is the second largest income producer for the town. Logging in the area is now more tightly controlled, and some reforestation efforts are underway. Third on the list of income producers is the rose growing industry, with Japan as the largest customer. Recently a micro-loan of $4,000 from Dallas City Homes, Inc., was made to a group of local women who are in the start-up phase of a lily nursery.

The tourism industry is the fourth largest source of income in Mazamitla. Visitors are primarily Mexican nationals. Mazamitla benefits from its proximity to Guadalajara and is considered a day-trip or weekend trip for residents of that city. In addition, a nearby colony of foreign retirees in the Lake Chapala area supplies an influx of tourism dollars as they visit Mazamitla. At this time there are a few large hotels and small guesthouses,

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Figure 1. Map of Mexico showing location of Mazamitla

Brasfield *(continued)*

both new and old, but everyone seems to be in the process of adding a room or building a cabaña to take advantage of the tourist industry.

The living conditions of the citizens in Mazamitla are quite varied, depending on income level. Many homes have dirt floors and no electricity or running water, and recently faculty and students from the University of North Texas have joined forces with community leaders to assist in the replacement of cardboard roofs with more durable materials. Economic development at the local level is considered by the community to be a prerequisite for improving the standard of living of these citizens. At the other end of the spectrum are a number of small mansions that serve as second homes for upper-middle-class residents of Guadalajara or Morelia.

Politics in Mazamitla

In Mexico town mayors are elected to a three-year term. In Mazamitla that position has recently been won by a PRI (Institutional Revolutionary Party) candidate who will replace the previous PRD (Democratic Revolution Party) mayor. The new mayor's council contains 5 PRI representatives and 2 PRD representatives, and many positions within the local government are political appointees of the mayor. There is some concern that the new mayor and his appointees will not continue to work with the network of friends and advisors who have been interfacing with Mazamitla community leaders on sustainable development efforts. However, a local group of business owners and professionals is forming a Rotary Club, which may help bridge the gap as the reins of power change hands. Also, The Council for Ecological Preservation was established in October 2000.

Zoning and development decisions are made at the local level, giving local politicians the ability to make sustainable development a part of the economic development plan of Mazamitla if they so desire.

Sustainable Development

Sustainable development has been defined as development that meets the needs of the present generation without sacrificing the ability of future generations to provide for their own needs. Three principles underlying this definition of sustainable development are

(1) Renewable resources used in such a way that the harvest rate is not greater than the natural regeneration rate (Downs et al., 2000),

(2) Waste flows to the environment kept at or below the "assimilative capacity" of the environment (Downs et al. 2000), and

(3) Biological diversity maintained at predevelopment levels (Zoreda-Lozano & Castañeda, 1998).

Sustainable water development/use is a subset of the sustainable development parameters and in many cases the limiting factor for sustainable development. The ability to meet future water demand without degrading ecosystems is therefore an important indicator of the success of sustainable development projects (Downs et al., 2000).

As a portion of its mission the National Water Commission (CNA) was given the task of achieving sustainable development of Mexico's water resources. This is a Herculean task given the current state of both the quality and quantity of water resources, the requirements for repair and expansion of infrastructure, and the beleaguered Mexican economy. Certainly, this cannot be accomplished solely in a top down approach. Since the brunt of the negative consequences of poorly planned development are felt at the local level, communities must be proactive in managing sustainable development at the local level.

To analyze competing development options on the basis of sustainability and to evaluate the compliance of implemented options to sustainability goals, a measurement model unique to the area should be designed. For sustainable water resource management, the following criteria measured from a baseline over time are a minimum set of components that should be included:

Species counts
Habitat quality
Water quality as measured in pollutant concentrations
Water quantity

Tourism

The importance of tourism to the Mexican economy is undeniable. In 1994 Mexico ranked 10th in the world in the number of international arrivals and 12th in earnings. Tourism is the country's second largest employer after agriculture (Clancy, 1999), and in 1998 generated more foreign currency than oil within the Mexican economy (Guenette, 2000).

A special report on tourism in *Business Mexico* in March 2000 cites Mexico as still among the top 10 tourist destinations worldwide in 1999. The undersecretary for Tourist Promotion in Mexico, Elias Rivas Torres, is quoted as calling this a "miracle" based on the fact that Mexico had a tourism promotion budget of only $20 million (U.S.) in 1999. Funded by a $15 (U.S.) per person visitor tax on international tourists, the year 2000 budget for Mexico's new Tourist Promotion Board is $50 million (U.S.). The report also notes that the Tourist board hopes to increase Mexico's revenue from certain niche markets, including nature tourism, by working with state tourism offices, municipalities and private companies to design promotion strategies (Guenette, 2000).

"Because land use changes and increased human populations, as well as chemical pollutants, are often habitat-killers, nature tourism, more than any other form of tourism, contains the seeds of its own destruction."

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Historically tourism has not proven to be environmentally benign. In light of some glaring environmental costs from tourism in the Yucatan Peninsula and the Acapulco areas of Mexico, including slums and eutrophication of water bodies from excessive levels of sewage (Simon, 1997), government oversight of environmental conditions is imperative. Therefore, it is a hopeful sign when Torres states, "the countries that best preserve their environment and historical identity will be the nations that get a better share of tourism in the future" (Guenette, 2000). Similarly, Guenette speaks of "banking" on natural beauty and diversity, and leveraging "higher-revenue" ecological and cultural tourism. Although economic valuation of nature in terms of natural capital is a slippery slope fraught with misunderstandings and sometimes questionable valuation methods, economics is currently the language of business and governments and allows for the pursuit of a common environmental goal by wildly diverse groups.

Negative environmental consequences of tourism

The demand for tourism can create the components of pollution, which may include improperly treated water, fertilizer run off, pesticide toxins, garbage, and fuel consumption by-products. These pollutants may become manifest as a loss of aesthetics and habitat degradation. Ultimately, the loss of natural flora and fauna and human health issues may result, depending on the assimilative properties of the environment's biological, physical, and chemical components.

For many nature-based tourists, biodiversity and pristine habitats are the attractions. Because land use changes and increased human populations, as well as chemical pollutants, are often habitat-killers, nature tourism, more than any other form of tourism, contains the seeds of its own destruction (Glasson et al., 1995).

The proximate causes of the negative environmental impacts of tourism are the management practices of the product providers and the environmental regulations of the host country. The ultimate cause, however, is the sum of individual consumer demand and the consumers' lack of environmental caution.

In addition to specific environmental damage, a locational shift and increase in natural resource consumption takes place at tourism destinations. Two examples are fresh water usage and fuel consumption. A local community adapted to the locally available resources can quickly oversell natural resources when there is a permanent transient population increase caused by tourism. This population increase may result in the need to import resources at a higher cost or reallocate available resources among users. Reallocation based on purchasing power could favor the tourist community and negatively impact the host community (McLaren, 1998).

Consequently, knowledge of the destination location's infrastructure and natural resource stock is critical when determining the level of tourism that can be incorporated in a community's sustainable development plan.

Water implications

An obvious impact on water resources from humans is the level of demand. For example, a study of water use in Mexico City shows that the mean number of liters per person per day (l/pp/d) varied by socioeconomic status, ranging from 40 liters in the poorest economic group to a high of 450 l/pp/d in the highest income group, as shown in Table 1.

Table 1. Water demand in liters per person per day in Mexico City by Income Level

Socioeconomic Group	Mean	Standard Deviation
I Very low income	40	8
II Low income	100	20
III Middle income	210	42
IV High income	330	66
V Very High income	450	68

Source: adapted from Downs, 2000

In a review of water use by international tourists in the Mediterranean, Lanquar (1996) estimated per person per day use at 250 l/pp/d. Thus, the Mediterranean international tourists would fall between the Middle income and High income categories in Table 1. Depending on the proportion of citizens in each socioeconomic group, tourism could have an extreme impact on the quantity of water required in a locale. The scale of water intensiveness of recreation components such as swimming pools and golf courses along with

personal use will determine the impact on water demand by tourism. An increase in water demand and especially the consequences of peak demand during tourist seasons must be factored into infrastructure planning by local communities.

Another major impact to water from tourism is an increase in wastewater. Properly treated wastewater released into local water sources maybe within the assimilative capabilities of the water shed. However, if untreated or inadequately treated wastewater is allowed to infiltrate the remaining water sources, the quantity of useable water is reduced due to a decline in water quality. There are examples worldwide where the failure to adequately plan for and treat wastewater generated by tourism have caused environmental degradation. Simon (1997) draws attention to two examples in Mexico, Cancun and Acapulco. Evidence of a shortfall in treatment infrastructure is already evident in several other watersheds in Mexico. This infrastructure problem must be corrected before additional wastewater loads are delivered to those ecosystems due to tourism.

A third component of tourism and water resource interaction is the indirect reduction in the quantity of water resources through quality reductions other than those caused by wastewater. Development activities for the building of tourism-related structures could increase run off of sediments into nearby water bodies. Additionally, runoff contaminated with fertilizers, pesticides, or petroleum byproducts, which negatively impact water quality, reduces the water available for both human and ecosystem uses.

Sustainable tourism

There is much discussion about the definition of "sustainable tourism." That discussion can be avoided here by considering tourism as simply an option for achieving sustainable development and relying on the principles for sustainable development set forth above. To reiterate those principles: renewable resources are not used at a rate greater than their regeneration rate, waste flows are limited to the level that can be assimilated by the environment, and biological diversity is maintained.

Garrod and Fyall (1998) argue that if tourism adheres to these concepts for sustainability, the common intergenerational costs that are often manifest as depletion and degradation of natural resources can be avoided.

Tourism options

Modern tourism was spawned by the Industrial Revolution, which ultimately made travel both socially acceptable and affordable for a growing middle class (World Tourism Organization, 1999). From the time of its birth to its current status as the one of the world's largest industries, tourism has had a profound effect on the physical and cultural resources at the destination community. As the industry has grown, new types of tourism have proliferated. Some of these niche markets as defined by the WTO are presented in Table 2.

Table 2 Types of Tourism

Type of tourism	Descriptor
Ecotourism	physical environment is the focus of the tourist activity
Cultural	places special emphasis on cultural attractions
Rural	experience of a way of life in sharp contrast to the modern city
Adventure	natural features provide a thrill, challenge or unique experience
Health	destinations provide health-care services or health benefits
New age	search for life's deeper meanings and escape modern materialism
Educational	learning within a structured program
Service	traveler provides a service for the community or environment

Source: adapted from World Tourism Organization, 1999

Several of these forms of tourism can be managed in a sustainable fashion. In particular, ecotourism, cultural, rural, educational, and service tourism are all viable options. The advantages of these types of tourism are that they can be supported with small-scale development under the control of the local population, which would make them applicable to Mazamitla.

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Water Resources in Mazamitla

Mazamitla is located in Mexico's hydrological region 12. Water in this area is considered abundant, but contamination of surface and ground water with fecal coliforms and of surface water with phosphorous has been reported by the National Monitoring Network and the Quality Standards Uses (Jiménez et al., 1998). Because these data include the entire Lake Chapala basin, which is known to be heavily polluted by lakeside communities (Anda et al., 1998), it may not properly reflect the water quality of the town of Mazamitla, which is located in the mountains south of Lake Chapala.

The town of Mazamitla receives approximately 50 inches of rain a year with the rainy season presenting in June through September. The most recent hydrological survey indicates that there is a water shortage. However, Carlos Ceja, Director of Social Welfare for the city, contends the shortage is simply a distribution problem and not a quantity problem. Water is considered of sufficient quantity and quality to meet the needs of the local people. Pretreatment of surface water consists only of the addition of chlorine. The water from public and private wells is considered drinkable without pretreatment.

Like electricity, water and associated infrastructure costs are subsidized by the government. The infrastructure is owned and supported by the municipal government and the federal government. The water delivery system in Mazamitla is 30 to 40 years old and composed primarily of brass pipes. The system is entirely gravity fed and the pipe layout design requires that water be shut off to some residents so that pressure will build in the line forcing the water to other users uphill. The local and federal governments are in the process of replacing the old brass pipes with polyvinyl chloride (PVC) pipes. Unfortunately, they are placing the new pipes in the old ditches and not rerouting the delivery system. Therefore, the same distribution problems will exist after the upgrade.

Wastewater, or blackwater, is not treated before being released to the mountain streams. Local water officials are confident that the biofiltering that takes place purifies the water. Furthermore, not all users are connected to the city sanitary water lines, so septic tanks and outhouses are in use, especially in areas outside of the city center. There is no plan in place at this time to build a municipal sewage treatment plant due to cost issues. An estimate supplied by Ceja shows the cost of a new sewage treatment plant as $100 thousand (U.S.). To address the cost issue a recommendation is under consideration to construct a smaller scale system that would be less expensive and serve as a pilot project. Also, it is possible that one of the infrastructure efforts ongoing at the national level will supply the funds necessary for construction of pre- and post-treatment plants and an improved delivery system. A European based hotel chain planning to build a hotel complex in Mazamitla will provide its own wastewater treatment facility.

Sustainable development

Economic development, sustainable or otherwise, is not the ultimate goal of Mazamitla. The anticipated end state for which an increase in the local economy is merely the tactic is an improvement in the quality of life of the town's citizens. An expansion of the local economy could serve to reunite families by supplying local jobs, improve public health by providing funds for water and power infrastructure improvements, and allow for a higher quality of housing for the poorest people in the community.

Many types of industry can support sustainable development objectives if they are managed appropriately. Although the citizens of Mazamitla are inclined to support tourism as a way to boost the local economy, tourism can and does result in negative, ecological consequences in many circumstances. Thus, whether tourism in Mazamitla will ultimately contribute to sustainable development will be a function of the form of tourism marketed and the way it is managed.

Water resources and development

As noted above, Ceja believes, based on the latest hydrological report, that there is adequate water to allow for additional growth and that the delivery infrastructure is the limiting factor at this time. But even at the current population level, water service is intermittent for some sections of the town, and this should be remedied prior to placing additional demands on the system.

The primary problem appears to be the absence of any type of post-treatment facility for wastewater. Without hard data on the amount of pollutants in the mountain streams used to biofilter the community's wastewater, caution must be used in accepting assurances regarding the adequacy of the water for human

consumption or aquatic system health. The assimilative capabilities of the aquatic system need to be analyzed and used to develop allowable Total Maximum Daily Loads (TMDLs) for common wastewater pollutants in order to determine sustainable development levels and treatment requirements.

Management Criteria

Although water planning is essential, it must be incorporated into a broader management plan for tourism in Mazamitla. Based on the requirements for sustainable development, a set of recommendations to manage tourism has been created and is offered below. These guidelines have been adapted from multiple sources and modified to address issues specific to this discussion. The primary sources used are identified in the reference list with an asterisk. The elements of this tourism management plan may also be applicable to other communities in Mexico with development decisions similar to those in Mazamitla.

Decisions governing development and management of tourism will be most effective if made by the local government and citizens of Mazamitla. However, it is unlikely that the expertise required to assess the current state of infrastructure capacity, create detailed land attribute maps, and prepare environmental impact assessments exists at the local level. Because of this, Mazamitla will need to draw on the resources of higher levels of government, non-government organizations, paid consultants, and volunteers in order to create a successful sustainable tourism management plan for their town.

Discussion of management criteria

First, Mazamitla's citizens must agree on a development strategy. The impacts of tourism on a

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Guidelines for Sustainable Tourism Management

- Discuss development options with local citizens, clearly presenting the positives and negatives in order to ascertain community commitment to alternative development options.
- Determine current infrastructure capacity, including water, power, law enforcement, traffic, and health care.
- Map current land use and vegetation types to determine acceptable development sites and areas to be protected based on habitat quality, watershed protection requirements and the presence of unique natural or cultural attributes. Incorporate this information into effective zoning and development policies.
- Perform initial Environmental Impact Assessment (EIA) prior to development.
- Develop waste reduction and resource efficiency programs.
- Prepare visitor guidelines that define acceptable behaviors during natural and cultural interactions and acceptable levels of resource consumption.
- Establish a specific framework for measuring progress toward sustainable tourism.
- Form strategic alliances with conservation and service groups.

community are not limited to the environmental consequences but also affect the structure of the community. The type and size of the tourism mode that the citizens select will determine how their community looks and functions in the future.

In concert with this activity, the infrastructure capacity for multiple products, services and resources should be considered. Although the national economy has stabilized somewhat since its crash in 1995, there is still a lack of funds to correct existing environmental problems or protect the Mexican people from new ones. Water infrastructure and quality are of concern throughout the country. Even if there were unlimited national funds, it would take years to install adequate water treatment facilities in all areas of the country. Small rural communities such as Mazamitla are therefore unlikely to receive substantial national funding while the aquifers and surface waters that supply Mexico City and Guadalajara become more depleted and polluted with each day. Because of this, it is critical that current capabilities of the water supply and infrastructure be fairly assessed and development be constrained within those capacities until funding can be secured for upgrades.

Citizens can take control of their destiny by driving the planning, zoning, and development of their town with effective land use decisions. An accurate inventory and careful zoning can help protect the natural resources in the area and create a safer and more comfortable environment for the people of Mazamitla. An Environmental Impact Assessment should be required prior to approval of major development decisions so that the consequences of alternative decisions can be fairly weighed.

The carrying capacity of local resources can be increased through efficiency and waste minimization programs. Visitors as well as local citizens should adhere to these programs. They can be communicated to visitors as part of an overall natural and cultural guide, which is highly recommended for an area where visitors and hosts are in close proximity and where natural areas are a valuable community resource.

"Even if there were unlimited national funds, it would take years to install adequate water treatment facilities in all areas of the country. Small rural communities such as Mazamitla are therefore unlikely to receive substantial national funding while the aquifers and surface waters that supply Mexico City and Guadalajara become more depleted and polluted with each day."

Measurement criteria for evaluating progress toward sustainable tourism can vary widely depending on the attributes of the given area. In the case of Mazamitla, examples might include water quality over time, average per capita earnings of local citizens, percentage of trees of a given diameter, number of species or habitat quality over time. Both human and natural conditions measured from an initial baseline should be included.

Finally, resources from outside the community can be of assistance. As an example, during the last few weeks I have met many people who are donating time and expertise to the city of Mazamitla for their sustainable development endeavor. The city has already formed an alliance with students and faculty from the University of North Texas and with community leaders in Denton, the university's "hometown." Conservation- and service-oriented groups can be a valuable resource to small communities needing additional expertise and should be actively solicited for assistance. Mazamitla's leaders should also seek out international funding sources willing to invest in sustainable development projects or community infrastructure improvement.

Conclusion

If Mazamitla is to develop a sustainable tourism industry, it will take perseverance and patience. Quick fixes in the form of rapid development can bring long-term, negative environmental consequences. Community consensus, scientific assessment of resources, and proper zoning decisions are time consuming but the patience to see these processes through is key to becoming a sustainable community.

Green Warriors
UNT Scientists Battle to Save the Environment

Kelley Reese

In the 1960s, President John F. Kennedy recognized that people had the capacity either to take care of the earth or to destroy it. And he warned that with that capacity comes power—the power of each generation to become the best in the history of the world, or the last.

Today, faculty members in the UNT Institute of Applied Sciences work to harness that power to ensure that the complex pieces of the environmental puzzle stay together for all future generations to enjoy.

It's a mission that started more than 50 years ago. Through the water research of J. K. G. Silvey and other biology faculty members, UNT began to build a legacy in environmental science.

Today, the university is a recognized leader in the field, especially in water and aquatic life studies, which are at the center of the environmental research UNT conducts. But the institute takes a holistic view of its environmental discipline. "The water we drink, the air we breathe and the land we live on are all interdependent," says Ken Dickson, the institute's director.

Stream Cleaning

So when professors Sam Atkinson and Tom Waller detected high concentrations of atrazine (a restricted-use pesticide that may promote some forms of cancer) in the streams that feed Lake Lewisville near Denton, they went to work. The researchers began to study the surrounding area, or watershed, as well as to monitor the life forms that live in the water.

"The levels of atrazine we found in the feeder streams were alarmingly high," Atkinson says. "However, we've never found a higher-than-accept able level in Lake Lewisville. So we still have time to help keep the area's drinking water resource from being dangerously polluted by this chemical."

To do that, the researchers had to determine where the chemical was coming from. Through remote sensing—satellite picturing of the earth—Atkinson and UNT students developed a model of Lake Lewisville's watershed. Then they studied the slope of farmland where atrazine might be used, and they analyzed the soil type to determine where the chemical would most likely be present in the highest concentrations.

With the areas of pollution identified, the next step is to eradicate the hazardous runoff.

"We conduct applied research to learn what we need to know to fix a problem or stop one from happening," says Waller. "Either way, the research always leads to the need for public education."

In the case of atrazine, the research will allow Waller and Atkinson to educate the community about the problem and what's causing it. Then they will have to influence the way the pesticide is being used.

One way to do that is to convince the manufacturers and the Environmental Protection Agency to add use—specific restrictions, based on proximity to creeks, rivers and lakes, to the pesticide's label.

Preventing a Problem

Influencing the EPA's label standards and working with chemical manufacturers through preventative ecotoxicology studies is central to UNT's environmental research program. The ecotoxicology research is conducted in a laboratory setting using environmental chemistry and biology to determine the effect of chemicals when they are introduced into an ecosystem. "The studies are done to ensure the chemicals are as safe as possible," says biologist Jim Kennedy.

UNT conducts this work on its 40-acre Water Research Field Station, located about five miles from campus. Using more than 80 different "ponds" and "lakes," faculty members and their students simulate entire aquatic ecosystems to study what happens when a chemical gets into water.

The research examines both what happens to the chemical—how it breaks down and how it spreads—and what happens to the life in the ecosystem. One chemical at a time is studied for about six months to determine its behavior.

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What Others Are Saying *(continued)*

Currently, UNT researchers are studying pyrethroids, a new generation of agricultural pesticides known to be fatal to low-life water creatures. "The pyrethroids are very toxic, but they have a very short life span, so they should have virtually no effect on humans," says biologist Tom LaPoint. "However, if they are killing off the low-life water bugs and plankton, that disrupts the food chain. The research will tell us how people can use the chemical and not disrupt the ecosystem."

Similar work is conducted at UNT's new experimental stream system at the city of Denton's sewage treatment plant. The streams will be used to study the effect of multiple chemicals on aquatic life. The information will help determine which chemicals, alone and together, are of concern. In addition, the streams will allow the researchers to gauge the effectiveness of the water treatment system.

Protecting the Future

These water and land studies will help determine what can be done to protect life today and in the near future. The effects should be seen in our lifetime. However, some of UNT's environmental research looks far to the future.

Miguel Acevedo, a computer scientist and biophysicist, has developed a computer model that could save the South American rain forests and other endangered ecosystems. With grants from the National Science Foundation, he has produced preservation models for forests in Oregon, is working on sites in Venezuela and plans to begin work soon in Puerto Rico.

The computer models, which incorporate projected climate and population changes, show the impact of those changes on the forest ecosystems 500 years from now. The results can help determine ways to use the forests and still protect their long-term life. Computer modeling can also be applied to other environments, such as lakes and farmland. In fact, researchers are using models in the atrazine study to determine the effects of different rates of pollution.

National Impact

The work the researchers conduct is often multidisciplinary, calling on expertise from several research areas. For example, Ecoplex—Denton, Dallas and Fort Worth's part in a national initiative called EMPACT (Environmental Monitoring for Public Access and Tracking)—combines all of the institute's research disciplines and tools. Funded by the EPA, the project is designed to monitor, record and anticipate daily environmental conditions for specific communities.

The information is gathered and posted in real-time on the Internet so that people can access data about the environmental conditions to which they are exposed. The web site, at www.ecoplex.unt.edu, provides details about the day's ozone levels, heat index and conditions on the area lakes. The site also archives past levels and predicts future levels.

The point is to get the public involved in the environment on a daily basis, says Dickson. "Generally people say they know about the environment when they do their part to recycle, he says, but in order to be involved with and aware of the environment, people have to know the physical world that surrounds them every day."

Through EMPACT, the researchers hope to educate the public so that this generation, and each of those to come, can strive to be the best on earth instead of the last.

Having a Heat Wave—
A Public Health Issue

The 1990s was the hottest decade in recorded history, and it brought with it intense heat waves. One direct health effect of climate change is heat-related illness such as heat exhaustion and heat stroke. The people at greatest risk are the very young (who have not yet developed effective temperature control mechanisms), the infirm, and the elderly, particularly those who live alone. The number of heat-related deaths may be under-reported by medical examiners, according to Laurence S. Kalkstein of the University of Delaware's Center for Climatic Research. He believes this has contributed to a lack of awareness of how dangerous extreme heat can be.

In July of 1995, the people of Chicago faced the dangerous combination of elevated temperatures and humidity. The temperature hovered at 104 degrees F and the dew point rose to an unprecedented high. The city was stunned as heat-related mortality rose to 733 people over a five-day period. St. Louis, Missouri, experienced a similar scenario in 1980, with over 300 deaths. Both cities, in an effort to ensure that such tragedies would not be repeated, developed plans that included flyers on prevention of heat-related illness, air conditioners on loan, and heat shelters provided by the Red Cross and Salvation Army.

Cities create their own climate with concrete, blacktop, dark roofs, etc., absorbing heat. The

temperature in a city may be 10 degrees F higher than the outlying countryside. With climate change, many cities will have an increase in 100+ degree days (while some areas will not—climate change affects each area differently). Interestingly, although the South has more hot, humid days, people there know how to cope and so have a lower rate of heat-related illness.

For the urban elderly, fear of crime causes some to keep their windows locked, ignore offers of help at the door, and stay inside. Other factors increasing the risks are inadequate housing, and medical conditions that restrict movement or require medications that alter the body's response to heat.

M-Rising contacted Diance Rackers of the Missouri Department of Health, Office of Epidemiology, in Jefferson City. Rackers said that even with their education and outreach programs, 92 heat-related deaths were recorded last year. The majority were senior citizens living alone who either had no air conditioning, or, if they had it, wouldn't turn it on. "I've lived this long without air conditioning," one victim had told relatives, "why should I use it now?" The high cost of electricity for air conditioning may also have been a consideration.

WHAT YOU CAN DO

- Reduce fossil fuel consumption. Most scientists consider this the best first step.
- Check with your local public health office and find out what plans they have for heat emergencies if your area is prone. Make plans for heat waves early. Develop networks.
- Support research into clean and renewable energies.
- Be informed on global warming issues and share your knowledge with friends and elected representatives. Ask political candidates to state their positions on clean air and global warming.

*** The two excerpts above are from *The Mercury's Rising*, a project of the Environmental Alliance for Senior Involvement, May, 2000.

Galveston Goes Green

James M. Stevenson

There are signs of an environmental storm in the famously stormy town of Galveston. It began almost imperceptibly and has grown in resolve and results. Now, in the twenty-first century, it seems habitats and their wild inhabitants are getting some attention and respect.

To get a glimpse of the strides being taken for nature, one need only drive down the Gulf Freeway and gaze at the recently-rebuilt salt marsh that locals are calling the I-45 Corridor. Led by the hard work of Scenic Galveston, a nonprofit organization led by Evangeline Wharton, salt marsh restoration has turned aquatic trash piles into recovered homes for birds, fish, and many other creatures.

That may be the most obvious project to the casual observer, but much more lies in wait for nature enthusiasts. On the east end of the island, changes are afoot. Apfell Park, a lovely area for bird watching and fishing, lies just before East Beach, and offers the smart hiker a quiet walk along seashore and dunes where automobiles cannot go. Even a Common Raven, arguably the world's most intelligent bird, chose this scenic spot for an unlikely visit from the Rockies.

On the other end of the island, the San Luis Pass area still boils with controversy as owner Al Dugan tries his best to protect the once-pristine dunes and grassland from ATVs, four-wheelers, and trash.

Unable to effectively gain protection from law enforcement, Dugan hires deputies to patrol the area, cutting down on incidents of environmental abuse. This is appreciated by the Black Skimmers and various tern species who nest among the dunes, and birders who can watch these sleek beauties nest with at least moderate protection.

The best woods on the island has been spared the chain saw and has been set aside as the Laffite's Cove Nature Preserve. Located just before the golf course on Stewart Road past Pirate's Beach, this woodland is home to dozens of vertebrate species, flying, crawling, and burrowing into the dense forest. Spring and fall bring fabulous numbers of migrating birds and butterflies, with more ecotourists reveling in Galveston's nature and boosting its economy.

Island residents are banning together to protect as much of the fragile ecosystem as possible. The Galveston Bird Club, a subsidiary of the Galveston Ornithological Society, comes together in force at the Galveston Island State Park to re-enact the Texas Chain Saw Massacre. This time, though, they are visiting the invasive Chinese Tallow Trees with power tools in a concerted effort to return the park's vegetation to its natural state of bluestem and other grasses.

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Frequently the bird club takes outings to discover Galveston's birdlife and has found quite a list of rarities in their five-year history. The general public is welcome on these trips, and interested parties may contact the president, Maureen Myers, at (409) 737-5924. Other conservation groups, such as the Sierra Club and a local Audubon chapter, have sprung up as well.

Galveston even has its own nature newspaper, *The Galveston Bay Gull*. Published by the Galveston Ornithological Society, it contains articles on local birds and other animals, with a conservation slant toward preservation and education. Copies may be obtained by calling the GOS at (409) 737-4081, or through E-mail at <natrix@airmail.net>. They even teach courses at the local college in bird lore and zoology as part of their commitment to environmental education. And how many barrier islands have its own book, *Wildlife of Galveston*, dedicated to an understanding of its creatures and ecosystems!

Many ordinary citizens have taken an interest in the welfare of the birds and other creatures of Galveston. Bird feeders and water sources are springing up all over the island, often in preparation for the mind-numbing songbird migrations of spring and fall. The city even sports two stores for bird seed and accessories, all the trimmings for keeping the wild birds happy!

Galveston has a long way to go in meeting the needs of its wild creatures, ignored for too long. But despite being located in a state not known for making huge environmental strides, this town, long known for standing up to hurricanes, is standing up to the pressures of development enough to make the preservation of its earliest inhabitants a priority.

One can only hope that this kind of forward thinking takes the rest of Texas by storm.

The Sustainability Workout: A Workshop
Redefining Progress
To Help People Push for Sustainability

Mathis Wackernagel

Why is sustainability so simple and yet so elusive?

This is the question many of us who have embarked on the arduous but fascinating voyage toward sustainability face. To find out the answer, we take stock of our situation in the first part of the workshop, and get specific about where we want to go. After all, how can we plot a course toward our goal without locating it on the map?

Using a tool called the Ecological Footprint, we will determine current global, national, and even our own individual ecological sustainability. Through this process, we will be able to set specific targets, face challenging obstacles with more clarity, and chart a more direct course toward sustainability.

Cutting through the "sustainability fog"

We know that sustainability means achieving satisfying lives for all using the limited resources provided by our planet. Yet there is frequently a disconnect between the simplicity of this concept and the inability of most sustainability initiatives to address this goal. Discussions often become bogged down in details and goals become fuzzy. Perhaps society is comfortable with foggy sustainability discussions because we like to avoid accountability. And perhaps deep down, we don't even believe that sustainability is possible. Without a realistic vision for a sustainable world, a grounded belief that getting there is possible, and the courage to take a stand for such a world, our self-destructive path will prevail. The Sustainability Workout not only clarifies goals, it also begins the important process of envisioning our goal and transforming it into a self-fulfilling prophecy.

A map of the Workout

This workshop may be the most you will ever sweat while standing still. You may be tempted to squirm, strategize, and discuss myriad solutions—all to alleviate the tension. Ironically, the Workout challenges us to stay with the tension—long enough to realize the contradictions of our situation and to think about the specifics of our goal. While you may sweat as you stare into the face of current contradictions, hopefully you will also discover sparks of inspiration for what you can do to accelerate the transformation—and maybe selling ready-made solutions will not be part of that list. After the Workout, you will be able to significantly sharpen sustainability discussions and face its emotional challenges more successfully.

The Sustainability Workout includes presentations, but also allows for ample opportunities to participate. The three-hour session has five parts:

- ***Warm-up quiz—*** Taking stock of our current resource use situation;

- ***Tough decisions—*** Making some difficult choices to define our ultimate sustainability goal;
- ***Visualization—*** Envisioning the sustainability goal that we have just defined in color and 3D;
- ***Engaging our friends—*** Bringing these ideas successfully into our professional and private circles;
- ***Reflection and evaluation—*** Reviewing what we have learned and determining what to do next.

The Workout requires a quiet room where all participants can sit in a circle (upper limit of 50 people). We need an overhead projector and a flip chart. If available, we like to use a slide- and computer-projector as well. Participants should assess the acreage of their own Ecological Footprints prior to the Workout using the calculator at http://www.rprogress.org/resources/nip/ef/ef_household_calculator.html

What people are saying about the Sustainability Workout:

- "Worthwhile, encouraging and practical . . . lots of applicable examples to follow."
- "The Workout was very beneficial and I enjoyed it immensely"
- "Teaching conversational skills for dialogue was wonderful"
- "I feel more confident in speaking about sustainability"

If you are interested in hosting a Workout, or want more information, contact Mathis Wackernagel at Redefining Progress, either by calling (510) 444-3041 x 317 or via wackernagel@rprogress.org

Landcare Australia

Jos Webber

So how did it all start?

Once upon a time, way back in 1989, an unexpected thing happened. Two groups that were usually on opposite sides of the fence, the National Farmers' Federation (NFF) and the Australian Conservation Foundation (ACF), got together around a plantation timber table in Canberra. The partnership they formed took the idea of early community landcare groups in Victoria and Western Australia and made landcare a national community movement to tackle land and water degradation.

The result was a community environmental movement, with support from both sides of politics. The Hawke Government fully backed the concept of landcare, committed substantial funds, and declared the 1990s the "Decade of Landcare." A plan was formed with support from the community, state, and federal governments and landcare officially began.

Groups began to pop up like saplings; their projects received the funding they needed and people talked to each other about things never before discussed across the farm fence. Then came demonstrations. And they were not traditional demonstrations, but demonstration sites, practice projects, testing new ideas, and lots of research.

Landcare is lots of things, but in the beginning it was mostly about balancing the necessary productivity of farming with nature conservation. It was about bringing together a whole range of groups that were working on their own to share experiences, gather information, and take action in local communities. Landcare has been about a social change, a change in the ideas and practices of people who work on, care about, and enjoy the land.

FARMERS have taken landcare on to ensure the future of their businesses.

SCHOOLS have introduced landcare as a way of educating young people about the environment in a hands-on way.

CITY landcare groups are focused on caring for the bits of native vegetation that are left.

RURAL landcare groups are working with their neighbors to adopt better farming and nature conservation techniques.

COASTAL groups are protecting dunes and estuaries.

BUSINESSES are supporting landcare through funding on-ground projects and awareness-raising activities.

INDIVIDUALS are making changes in their homes and gardens to cut down waste and improve the environment.

For more information please go to
http://www.landcareaustralia.com.au/

Volunteerism by the Elderly

Life satisfaction, well-being, happiness, longevity, and absence of disability have been commonly used as measures of successful aging. Studies have consistently shown that leisure activity is related to well-being. Well-being comes from enhanced self-esteem, improvement in an individual's sense of mental and physical competence, and from opportunities for personal growth and accomplishment. More participation is paid and volunteer work has also been found to correlate with "successful" aging.

Of the unlimited types of leisure activities, volunteering is unique in its integration of a broad range of benefits for its participants. It offers productive roles in a variety of settings that provide seniors with feelings of usefulness, mental challenge, and social integration. The volunteer role also can serve as a substitute for an individual's paid work role that ended with retirement, thus providing role continuity and a maintained sense of self-esteem.

When an older person's physical function declines, volunteer positions offer a substitute for physical activity and enhance an individual's self-concept. Volunteering is an extremely accessible leisure activity due to a well-organized national and local infrastructure that included the Nation Senior Service Corps and the Retired and Senior Volunteer Program.

Volunteer participation appears to be a specific form of leisure activity that has the potential to facilitate positive adaption in elders who are suffering from loss of physical function. Physical therapists' knowledge of volunteer opportunities and promotion of elderly participation in the diverse opportunities which exist represent an effort in treating the "whole person."

News from EASI

EASI
Environmental Alliance
for Senior Involvement

Potential for Worldwide Senior Environment Corps

EASI President Tom Benjamin recently traveled throughout Europe and then attended a meeting of the European Union in the Netherlands to spread the Senior Environment Corps concept. These meetings re-emphasized EASI's potential to begin a worldwide Senior Environment Corps.

In London, Tom met with Anita Prosser of the British Trust for Conservation Volunteers/Conservation Volunteers Alliance, who confirmed their interest in cooperating with EASI to provide volunteer opportunities for EASI seniors around the world.

The next meeting was with Marc Goldman of England's HelpAge International, with whom Tom discussed the possibility of using senior volunteers in developing countries to introduce sustainable projects. Mr. Goldman is seeking funding for a pilot project tentatively scheduled in the fall.

In Scotland, Tom was the guest of Fred Edwards, chair of the Scottish Environmental Protection Agency. Fred was instrumental in establishing the Scottish Senior Alliance for Volunteering in the Environment (SSAVE). The Carnegie Foundation of Scotland has given them an initial grant of 10,000 pounds sterling to start three pilot projects—a garden project, a project to preserve and maintain waterways, and possibly a groundwater protection program. Tom and Fred also agreed to work on establishing a Scottish Volunteer Exchange Program, which may start with Fred visiting one or more of EASI's projects in the US.

The Netherlands visit included a series of meetings with aging, environmental, and government agencies. There is now a basic commitment to form a coalition of support of EASI/Netherlands. Another meeting to work out a strategy on how EASI can assist the Netherlands in starting an EASI Senior Environment Corps program was scheduled to take place during the AARP Conference in Orlando in late June. At that time, Tom was to coordinate a strategy on how EASI's contacts in Ireland, Scotland, England, and the Netherlands can move forward on an EASI European Union.

The Netherlands visit culminated with the European Union conference, a one-day meeting attended by about 100 individuals representing over 50 organizations and government agencies. Tom's presentation about the success of senior environmental volunteer programs in this country spurred great interest among attendees.

A Rabbi from the International Council of Churches said he is willing to work on advancing the EASI concept to religious leaders worldwide. Green Cross International is interested in introducing all Green Cross countries tao thae EASI concept. It also was suggested that EASI, with an international coalition, hold a conference in June or September of 2001 in Washington, DC, on "Senior Volunteers in the Environment" in honor of the United Nation's Year of Volunteers.

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EASI Senior Environment Corps Tackles Source Water Protection

The Environmental Alliance for Senior Involvement (EASI) has been awarded a significant grant by the U.S. Environmental Protection Agency's Region 6 office to expand senior environmental volunteer activities that directly help protect source water throughout the EPA Region 6 states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.

EASI Senior Environment Corps (EASI SECs) in Amarillo, El Paso, and Denton, Texas, have had a visible impact on source water protection through their involvement in the statewide initiative, Texas GOLD. Based on the success of these projects, this year EASI will expand these existing EASI SEC programs and establish 10 new local organization in Region 6 states. The Source Water Protection Program is based on a model tested over the past 4 years in 11 states.

Local senior organizations, partnered with local governments, rural water associations, civic and youth organizations, recruit and train an average of 20 senior citizens to educate their own communities about source water protection, nonpoint source pollution, watershed management and restoration, and water quality monitoring. These volunteers use special educational tools such as the innovative Groundwater Simulator to demonstrate the potential for contamination of a community's drinking water supplies.

Since "prevention is worth a pound of cure," the U.S. EPA assists states and localities to develop source water protection plans, to avoid contamination where possible and before it becomes essential to clean up pollution. EASI SEC members, with lifelong commitments and experience in community environmental and public health issues, have proven remarkably proficient at getting the messages across and helping their own communities develop consensus about protecting drinking water sources.

EASI is seeking applications from local senior organization to host SEC Source Water Protection programs throughout Region 6 states. If your organization is interested in participating in this exciting project, please contact Peggy Knight, EASI Project Director, at (703) 241-0019 – phone; (703) 538-5504 – fax; Mknighteco@aol.com – email; 5615 North 26th Street, Arlington, VA 22207 – address.

Center for Environmental Economic Studies and Research

The Center for Environmental Economic Studies and Research was founded in the fall of 1990 and is based in the Economics Department of the University of North Texas. Its primary objective is to promote, coordinate, and conduct environmental economics research and complementary activities on the UNT campus. To accomplish this mision, the center focuses on two main areas: research and education.

The center investigates economic solutions to environmental problems and then disseminates the resarch results. Developing efficient solutions to environmental problems includes a careful analysis of the costs and benefits of all proposed actions. The center has conducted studies on water use and pricing, landfill and recycling costs, and biodiversity.

It has worked for the General Land Office of Texas, the U.S. Army Corps of Engineers, and the U.S. President's Council on Environmental Quality. In addition, environmental economists have been invited to lecture to faculty and students.

For more information regarding the Center for Environmental Economic Studies and Research please contact Michael Nieswiadomy, the Director of the Center, through email at mike@econ.unt.edu. More information can also be obtained through the Center's website at www.econ.unt.edu/research.

Book Reviews

Reviewed in this Issue:

Voluntary Initiatives: The New Politics of Corporate Greening

Eco-efficiency: The Business Link to Sustainable Development

Acts of Balance: Profits, People and Place

The Virtuous Spiral

Restoring the Earth: Visionary Solutions from the Bioneers

Regenerative Design for Sustainable Development

Making Better Environmental Decisions: An Alternative Risk Assessment

City-Region 2020: Integrated Planning for a Sustainable Environment

Environmental Politics and Policy

Across the Great Divide: Explorations in Collaborative Conservation and the American West

Land in the American West: Private Claims and the Common Ground

Sociopolitical Ecology: Human Systems and Ecological Fields

Introduction

Hiram Friedsam, Book Review Editor

To a significant degree, pairs of books in this issue draw attention to a common theme even though their treatment of it may reflect differing perspectives. Two books, for example, address the role of "corporate greening," but one is based primarily on Canadian experience, while the other emphasizes and "advises" multinational corporations based in the United States. Another pair deals with the role of Non-Governmental Organizations (NGOs), e.g., foundations and other non-profit groups that support development programs in many parts of the world. One, however, is based largely on an individual's experiences in working with NGOs; the other leads to a description of the problems that NGOs encounter in their efforts and offers suggestions for overcoming them. In the third pair the theme is sustainability as "regeneration" or "restoration." One book is restricted to projects in communities in the United States while the other tells the stories of unusual efforts in many areas. Two books reviewed that differ sharply in content have underlying unity in their focus on planning. The first focuses on how assessments of environmental risk are made—and can be made better; the second describes the process by which a plan has been developed for a major metropolitan area in the United Kingdom. Environmental policy in the U.S. is the link for anther set of reviews. One book reviewed traces policy changes at the federal level and describes the factors—and actors—that influence the making of national policy, while two books are reviewed that examine the making and impact of policy at a regional level, specifically the American West. The remaining review cannot be paired. It describes a book that offers a sociological paradigm that has implications for research directed to community sustainability. Although this book cannot be "paired," at an abstract level it is related to all the books reviewed.

Corporate Greening

Voluntary Initiatives: The New Politics of Corporate Greening, edited by Robert B. Gibson. Broadview Press, Peterborough, Ontario, Canada, 1999, 268 pp.

Canadian experience with voluntary programs by businesses or industries is cogently presented in this well-edited and useful book, which originated in the abundance of worthy submissions for a special issue on voluntary initiatives in the Canadian *Alternative Journal: Environmental Thought, Policy, and Action.* The editor of that journal is also the editor of this book as well as an associate professor in the Department of Environment and Resource Studies at the University of Waterloo in Peterborough, Ontario. Between his introductory and concluding chapters, the reader will find seventeen interesting studies highlighted by nine very helpful sidebars. The book concludes with a useful "Pocket Guide To Corporate Initiatives for Environmental Improvement" in Canada.

Gibson's introductory chapter, "Questions about a Gift Horse," surveys relevant definitions and issues, and presents the main theme for the

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book, which is that although the voluntary corporate initiatives reviewed are attractive and significant, they pose "worrisome" problems when they are touted as substitutes for environmental regulations and policies adopted and enforced by governments. That theme is amplified in the case studies and concisely reviewed in the concluding chapter: "It is demonstrably true that voluntary initiatives can, as their advocates claim, sometimes do a better job than conventional regulations in getting industry to make environmental improvements, . . . " but ". . . there is good evidence in support of critics' claims that voluntary initiatives . . . have been used not just to pre-empt tougher regulatory requirements but also to avoid the public involvement provisions of more open processes and to excuse government cost-cutting that undermines regulatory capacity" (p. 239). Gibson argues that voluntary initiatives should not be viewed as positive or negative alternatives to regulation, but as interdependent aspects of a "governance for sustainability" package "designed to mobilize and strengthen the full set of players and motivations." An ideal policy framework integrates governments, industries, and corporations in a "five tier approach," combining the voluntary corporate initiatives, "zero-impact companies," non-regulatory incentives, and "smart regulatory instruments" that are promulgated and enforced by governments and international regulatory authorities. Fifteen points are presented as "An initial checklist for an integrated package of 'governance for sustainability' measures to promote [a new politics of] corporate greening" (p. 252–4). The difficulties of attaining all of those points are discussed, and the significance of economic and market forces is recognized as well as political constraints and the problems of governmental officials and agencies in making necessary changes.

"Non-regulatory Environmental Measures" and legal issues are surveyed in the first section of papers. The second section contains seven case studies of voluntary initiatives undertaken in Canada, including the Responsible Care program, the ARET (Accelerated Reduction/ Elimination of Toxics) Challenge, the WMI (Whitehorse Mining Initiative), and the CIPSI (Canadian Industry Packaging Stewardship Initiative). The latter's demise is chronicled in a chapter titled "Who Killed CIPSI?" The section on international initiatives focuses on emission reductions in pulp and paper mills' gases and liquid effluents and on Nortel Networks' environmental management for competitive advantage and the ISO 14000 voluntary environmental management standards. The final section of the book includes the New Directions Group's "Criteria and Principles for the Use of Voluntary or Non-regulatory Initiatives," enunciated in 1997 after seven years of dynamic interaction between governmental, business, and environmental leaders in Canada.

This excellent book will be of particular interest to readers interested in corporate voluntary initiatives and Canadian experience, but there is much in the book that will be useful to many other readers of this review. I also recommend *Alternatives Journal* as an important source of ideas and information about various facets of Canadian environmentalism and policy development.

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Eco-efficiency: The Business Link to Sustainable Development, by Livio D. DeSimone and Frank Popoff with the World Business Council for Sustainable Development. The MIT Press, Cambridge, MA, 2000, 280 pp.

In 1982 business received a wake-up call. The Rio Earth Summit highlighted the potential risks to ecology and long-term economic and social development created by current patterns of industrialization, population growth, and social inequality. The message to companies doing nothing was the need for urgent action. The message to companies already taking the environment seriously was to do more—and to pay greater attentions to the issue of sustainable development.

This exhortation opens DeSimone and Popoff's how-to book for companies contemplating the move to more environmentally aware production processes. Their 1997 offering, released this year in paperback for the first time, is the third in a series of Rio Summit inspired books that seek to propose a sustainable business model and illustrate how companies can embrace sustainable development principles while being competitive in their markets.

Reminiscent of Tom Peters and Bob Waterman's 1982 classic *In Search of Excellence: Lessons from America's Best Run Companies*, DeSimone and Popoff call for strategic change in production management to reduce the

use of nonrenewable resources, reduce waste (especially toxic dispersions), enhance material recyclability, and extend product durability. Achieving these strategic goals leads to eco-efficiency—promoting the optimal, efficient use of ecological and economic resources. Specific tactics are illustrated through case studies in firms such as 3M, Dow, Waste Management, and NEC. Importantly, the book offers measures that can be used to create interim goals toward eco-efficiency.

Eco-efficiency has features that distinguish its precepts from other sustainable development approaches. There is an emphasis on business value creation, stretching long-term targets for improvement, linking environmental excellence to business excellence, and considering sustainable consumption as well as sustainable production.

While the authors take great pains to discuss how eco-efficiency will enhance business value, they are forced to acknowledge that much of their value argument ties creating business value to "value to society." Their argument that consumers will want to do business only with environmentally friendly businesses is overly optimistic. The authors also fail to address, in a convincing manner, market value issues. How should executives convince a stock market, with its penchant for quickly and severely punishing firms with lower earnings, that the short-term costs of eco-efficiency would lead to future value enhancement?

The authors make numerous comparisons between the move to eco-efficiency and total quality management (TQM) paradigms. While supporting the philosophical goal of "no-defects," they recognize that elimination of all waste and using only renewable resources as inputs to production is practically unobtainable. In keeping with most management books espousing "excellence" or the benefits of TWM, they provide several anecdotes illustrating efficiency gains and costs savings through better material and waste management.

DeSimone and Popoff suggest that changing a corporate culture to one that is environmentally aware could influence the consumption behavior of individuals. I find this argument compelling, even if it is not directly supported. If employees are trained to be waste and material conscious at work, they may choose to adopt environmentally sustainable practices at home.

One of the most compelling chapters illustrates the shortcomings of current environmental regulatory schemes in the United States. Arguing that rigid and inefficient regulatory structures are some of the biggest obstacles to businesses adopting sustainable development practices, the authors make several suggestions for improving environmental regulations and the coordination and delegation of responsibilities between federal and state agencies.

Overall, DeSimone and Popoff offer a well-written guide for companies looking to make a strategic shift to sustainable business practices. I doubt that a skeptic will be convinced, and, unfortunately, the authors resort to tired rhetoric in the absence of analysis to support some of their arguments. However, these failing are minor and are largely overshadowed by the book's usefulness to those that recognize the necessity of moving toward sustainable business practices.

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Working with NGOs

Acts of Balance: Profits, People and Place, by Grant Copeland. New Society Publishers, Gabriola Island, BC, Canada, 1999, 163 pp.

Grant Copeland documents his life work as a planner, developer, and environmental and cultural activist in this book. Accordingly, the volume provides a good insight into his thinking and the rationale of his actions. He begins with his early work as a developer of a unique houseboat community in Seattle in the early 1970s. He then moves north to British Columbia where he has since been involved in a wide range of issues, including recreational development, opposing current practices in the forestry and fishery industries, aiding in the preservation of lands and culture of native peoples, and promoting sustainable energy and wastewater treatment. He especially highlights the role played by advocacy nonprofit groups and disparages the incompetence of governments and the political process both in the state of Washington and the province of British Columbia in their attempts to deal with problems of development. His work seems to have had a decided effect in smaller towns and rural areas of British Columbia.

Copeland concludes with a series of recommendations based on his work that will balance economic viability with social appropriateness and the ecological bottom line. These recommendations include the need to foster planning, retain emphasis on long-term aspects, recognize and

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accept the need for innovation and change, mandate ecosystem-based planning, eliminate perverse subsidies, and support appropriate high-tech industry.

The major failing of the book is its disjointed nature. Each topic is dealt with in a summary fashion without adequate development before moving on to an entirely different topic. For the general reader there is no clear attempt to integrate these issues and to provide an overall paradigm for analysis. The recommendations given at the end of the text are general and represent Mr. Copeland's values without rigorous discussion. There is an underlying sense that all readers fully understand the unique situations in British Columbia and are sympathetic with Mr. Copeland's position. As a result the reader is left with no clear sense of how to cope with similar circumstances other than to call on Mr. Copeland.

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The Virtuous Spiral, by Alan Fowler. Earthscan Publications, Ltd., London and Sterling, VA, 2000, 225 pp.

In *The Virtuous Spiral*, Alan Fowler proposes ways in which Non-Governmental Development Organizations (NGDOs) can create sustainable communities in their work with Community-Based Organizations (CBOs). NGDOs attempt to end poverty and injustice, especially in the poorest countries, by supporting and even creating community-based organizations. The author uses data from several dozen NGDOs, large and small, indigenous and foreign, as well as from large official and governmental aid organizations. He attempts to deal with the tendencies of NGDOs to create programs that cannot survive without permanent infusions of outside assets. NGDOs probably produce no higher program survival rates that government aid does—about 15%.

Those who have worked with NGDOs, especially in the field, may at first glance find *The Virtuous Spiral* to be impractical, academic, or too idealistic because of the many paradoxes in aid work that it reflects. Among them are the following:

- The imbalance of power between the NGDO that supplies support and the CBO that receives it. The NGDO wants the CBO to be accountable while also wanting it to become independent.
- Measurements, evaluations, and predictors are identified as keys to remaining relevant. Although such work is easily possible for large organizations, it may place a great burden upon smaller ones.
- NGDOs are told to remain flexible in order to remain vital, but if they become too flexible they may lose their "niches" and therefore their identification with the donors that provide their assets.
- Agility and change are more easily achieved by NGDOs that support "programs" than by those that support "institutions" or facilities.

A closer reading shows the book to be realistic and practical and of value to NGDOs and CBOs. Fowler points out that while many NGDOs were comfortably situated with large supplies of assets in recent years, they themselves now are searching for firm financial bases as donations from large public sources have declined. The small organizations and those without the obvious and attractive service "niches" are especially vulnerable.

Having identified those obstacles that have grown in recent years, the author identifies ways in which an organization's agility or adaptability can help it to survive. Among those ways is seeking support from new sources, including businesses and foundations. Another is by becoming profit-making. Fees for services, often rejected in the past, may be the difference between survival and failure. He also suggests the possibility of changing to non-cash support for CBOs, such as using volunteers and providing expert services and advice. After making the suggestions, all of which may present dangers, Fowler says that, at best, capital probably will remain limited. He adds that even that limitation may not be the worst thing that can happen because the removal of "hunger" from an organization may rob it of vigor and creativity. Fowler insists that many problems can be avoided if both the NGDO and the CBO understand from the first that support will be ended at an appropriate time, and both work toward that end. In that process, the local people must be empowered and placed in control as they move from dependence to independence.

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Better Mousetraps

Restoring the Earth: Visionary Solutions from the Bioneers, by Kenny Ausubel. H. J. Kramer, Inc., Tiburon, CA, 1997, 247 pp.

"Life is change" is author Kenny Ausubel's chant. This book has the distant ring of pre-Socratic philosopher Heraclitus, who believed that fire was the key to reality, understood in the metaphorical sense. The nature of fire explains both the appearance of stability and the fact of change. Thus, reality is a process of continual creation and destruction. Ausubel speaks directly to such change as the only constant in nature. This key factor, along with the ideas of kinship, diversity, interdependence, food web, community, and spiritual connection, constitute the canon of his visionary Bioneers.

The author has written a book that will introduce the most unacquainted layperson to potential environmental solutions and the people behind them. Environmental concerns ranging from effects of industry toxins on water to the Chipko movement in South India, where hundreds of local "tree hugging" women are bravely embracing trees threatened by corporate interest and conquest, are organized into eight chapters. Ausubel clearly outlines each problem and offers a solution supported by interviews with prominent and engaged individuals who are trying to develop solutions. Furthermore, he suggests simple individual actions that can be taken for each problem. However, at times the book reads like a novel, rather disconnected from the primary issues but winding its way back to each. With exception of chapters one and two, *Restoring the Earth* blurs the line between environmental and social problems. Certainly the two are intimately related, but Ausubel's emphasis is on abstract social change rather than immediate real-world solutions to critical environmental problems. Therefore, the target audience could be those who are interested in buying an attitude or feeling: the rosy picture of business and government coming together in a celebration of tackling environmental concerns with hands clasped tightly and eyes wide open. Readers not sympathetic to New Age ideology may find this book overly optimistic. Unfortunately, it lacks the intended emphasis on restoring the earth in practice. Much is left in theory and personal narrative, which certainly has its place, but is not enough without action. In short, Ausubel offers us inspiration and dedication of the Bioneers to challenge us to rethink our connection to and relationship with the earth as our home and provider, but does not take the necessary steps to describe the practical means by which this can occur.

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Regenerative Design for Sustainable Development, by John Tillman Lyle. John Wiley and Sons, Inc., New York, 1994, 338 pp.

Regenerative Design for Sustainable Development deals with a very important subject in a sincere and striving manner. Indeed, the book has several examples of successful projects and are worthy of emulation. In some areas it dredges up the wisdom of the ancients to apply to modern life.

Much of the book cites experiments in California. In particular, several pages are devoted to the development of a dormitory facility, called a Center for Regenerative Studies, at California Polytechnics, Pomona. The facility is located in one of the most benign climates on earth where neither large amounts of heat are needed to warm the facility in winter nor air conditioning is needed in summer. The author develops an energy usage profile for persons living in this idealized setting, but energy for heating and cooling and transportation are left out because they are apparently not needed. Indeed, the largest energy use by the inhabitants is to dry clothes, but oddly no clotheslines are prescribed. This example is of limited value to persons who live outside of such mild climates.

The author also tackles regenerative agriculture. His suggestions that all persons become involved in food production near where they live is eerily reminiscent of Chairman Mao's disastrous cultural revolution; a prominent feature of that event occurred when urban intellectuals were sent to the countryside for reeducation by food producing peasants.

Another agricultural example described by the author is from The New Alchemy Institute at Cape Cod, Massachusetts; but the contributions from farming that barren spit of sand cannot be taken seriously as a contribution to our body of knowledge about agriculture. In fact, all of the author's examples are either tremendously labor intensive or limited to specific climates. And yet something must be done. It remains to be seen if "the invisible hand" of

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economics can steer us in a regenerative direction in agriculture.

In contrast, the chapter on water use and management is a marvel of reason and practicality within the scales to which the techniques described have been applied. The best watersheds and esthetically pleasing arroyos are still those that have not been covered with concrete. Arcata, California (population 15,000), and Crowley, Louisiana (population 18,000), are cited as having wastewater treatment systems based on regenerative principles. Both are beautiful and cost effective. The only question remaining after reading about these systems is the extent to which they could be scaled up. It is one thing for Arcata to commit a few acres of coastal land to handling its wastewater, but when Los Angeles wants to flush?

Throughout the book there is a bias against large scale projects that might ignore successful approaches to regeneration. For example, Chinese farmers spreading night soil on their paddies is OK, but pumping LA's sludge back to the fields of the central valley isn't even discussed. All things considered, however, this is an interesting book that might have applications to any reader's personal life.

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Making Environmental Decisions

Making Better Environmental Decisions: An Alternative Risk Assessment, by Mary O'Brien. The MIT Press, Cambridge, MA, 2000, 286 pp.

Mary O'Brien has written an excellent book outlining the process of risk assessment used by corporations and governments to justify "acceptable levels" of toxic contamination or environmental damage, that may be caused by a hazardous activity on the health of humans, other species, or on our planet's ecosystem. In her presentation, she convincingly reveals the many flaws in this risk assessment process. These include the inexact "scientific process" used, the biases involved, and the fact that the public is being duped into believing that their health and well-being is the main concern when in fact the main intent is often to justify the use of some harmful commercial product. But the greatest flaw in this risk assessment process is that alternatives to a harmful activity are most often not even considered. In addition, the real effects of one hazardous activity cannot really be assessed let alone the cumulative effects of multiple hazardous activities. Her presentation is not written in scientific jargon; instead, the purpose is to inform the lay public about the numerous flaws in the process that is so often used to convince the public that a particular hazardous activity is "safe."

As stated by the author, "the goal of this book is to help replace risk assessment of a narrow range of options with public assessment of a broad range of options." To illustrate the point, the author draws an analogy to a situation in which a women is standing on the bank of an icy river with the intention of crossing the river. She is surrounded by a team of risk assessors. The toxicologist advises her that it is safe to wade across because the river is cold but not toxic. The cardiologist says that her risk of cardiac arrest is low because she is young and is not presently chilled. The hydrologist advises her that in his judgment her risk of drowning is low because this type of a river is typically only about 4 feet deep and usually does not have deep holes or whirlpools. In addition, the Environmental Protection Agency policy expert informs her that compared to the depletion of the ozone layer or global warming her risks in crossing the river are trivial. Even with this so-called expert advice, the woman refuses to cross. The experts are baffled. They present her with their calculations and condescendingly inform her that her risk of dying from this activity is one in 40 million. But still, the woman will not wade across the river. The risk assessors ask her, "Why?" since it is obvious to them that the woman does not understand the nature of risks. Pointing upstream, the woman says, "Because there is a bridge." The author points out that here, the risk assessors are evaluating only one option; the woman is evaluating her alternatives. Crossing the icy river doesn't make sense to the woman when there is a much more sensible alternative. "This is the fundamental difference between risk assessment and alternative assessment."

O'Brien explains the principles behind the concept of the "alternative assessment" approach, which "requires decision making based on diverse public participation and consideration of numerous social and technical options." These principles arise from the reasoning that it is not acceptable to harm people or nonhumans when there are alternatives. In addition, she emphasizes that "risk assessment is an extremely flexible and powerful tool [used by some] for dispelling calls for change" that might better protect human health and the health of our environment and other species. We cannot entrust our own health and

well-being or that of nature to those who have other priorities, most often that of making a profit at the expense of others and our natural world.

The author describes how the risk assessment process actually works, pointing out that "in theory, risk assessment is an objective, science-based process. In reality, risk assessment involves choices among numerous 'guesses' and estimates. Politics, money and power affect those choices." She examines risk assessment from a safety and environmental perspective and concludes that "risk assessment is primarily used to defend unnecessary activities that harm the environment or human health." O'Brien includes numerous real life examples of corporate and government decisions that justify the author's critical assessment of the misuse of risk assessment and risk management related to health and environmental matters; she then presents an extensive treatment of the "alternative assessment approach," how it can be initiated and used. This is a very informative book that is well worth reading.

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City-Region 2020: Integrated Planning for a Sustainable Environment, by Joe Ravetz, with the Sustainable City-Region Working Group. Earthscan Publications, London, 2000, 307 pp.

City-Region 2020 is a frustrating book to read. It is at once a detailed technical report with figures and tables on almost every page, a methodological primer about ways to address sustainable development over twenty-five years, a series of models that can lead to "business as usual" (BAU) or sustainable development (SD), and, finally, many "what if" scenarios depending on actions taken. Thus, in view of the book's complexity, the reader finds himself flipping back and forth through the pages to double-check some point made earlier that is the premise for an argument in a later chapter. Of great help are two addenda, namely a list of abbreviations and acronyms, and a composite table showing all the core indicators from each chapter. These indicators provide comparisons across time of variables that could lead either to BAU or SD.

Good reasons exist for the book's complexity. The Sustainable City Working Group took as its laboratory the Greater Manchester, England, metropolitan area. The Group set out to examine the Manchester conurbation (the city and its hinterlands), with all its shortcomings and potentials, in an effort to recommend strategies for development through 2020 that would lead to an evolutionary restructuring of the urban system that integrated the economy, the society, and the environment. The task was formidable, since Manchester is "still dynamic and problematic. It has the world's best known football club, and the UK's liveliest youth scene . . . largest higher education campus . . . largest concentration of digital creative industries in Europe. It also has the worst pollution, mortality and depression rates . . . a million people live amidst poverty, unemployment and dereliction" (p. 25).

Ravetz and his fellow Group members determined the built environment, travel and transport, land and ecology, waste and pollution, energy and climate, and economy and work as key sectors for which targets could be identified in an effort to create a sustainable environment for Manchester. The book is built around two biological terms—ecology and metabolism—to ensure that the reader understands the dynamics of the situation. A change in the environment in one place leads to a speeding up or slowing down of development elsewhere. For example, one target under energy and climate is a 21 percent renewable energy supply. Developments in this sector will obviously affect other sectors such as housing, transport, and industry. The book lays out sixty-eight such targets. Various scenarios are then created, depending on the level of achievement of the targets.

Two concepts are critical to understanding the many recommendations and scenarios from the giant Manchester case study. One is balance; the other is integration. The Group was not seeking radical change and recognized that, while development must occur, successful strategic planning does not have to call for upheaval. At the same time, integration is stressed, particularly with the recognition that a solution in one sector—different housing patterns, for example—might affect another sector—transportation, for example—and that local and national organizations must work together. Planners must always keep those interactions in mind: ". . . the challenge of sustainable development—where the whole is greater than the sum of the parts—demands a high level of coordination and integration, for synergy and added value" (p. 250).

The culmination of the case study and of the book is a framework for sustainable development that relies on partnerships across levels and across sectors; the integration of vision and strategy; coverage of all the relevant sectors; consideration of all angles of the problem (environment, time, space, economics, politics, technology, society,

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culture); and allowance for operational concerns. The book concludes with an idyllic description of the Manchester conurbation in June 2024.

City-Region 2020's greatest value is for urban strategic planners. While the scenarios are specific to Manchester, the conceptualizations are valid anywhere.

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Environmental Policy Making

Environmental Politics and Policy, 4th ed., by Walter A. Rosenbaum. Congressional Quarterly Press, Washington, DC, 1998, 384 pp.

Anyone seeking to improve his understanding of environmental policy and politics in the United States would do well to include Walter Rosenbaum's *Environmental Politics and Policy* in his reading list. Rosenbaum does an excellent job outlining the shifts that have occurred at the national level in environmental policy as well as describing the inner workings of governmental entities at the federal level in wrestling with environmental policy concerns. He also incorporates a good summary discussion of selected environmental issues at the national level. His chapters on "The Battle for Public Land" and "The United States and Climate Diplomacy" are especially useful overviews of these issues.

The shortcomings of the book are both obvious and unavoidable. In dealing with the complex American federal system, Rosenbaum has focused widely on the functioning of the national government and does not attempt to examine variations across the fifty states or environmental policy at the local level. In dealing with a very dynamic policy system, Rosenbaum confronts the inevitable impossibility of remaining current. This book, being the fourth edition, is illustrative of the need for constant updating, and the temporal utility of the book as a guide to understanding current policy is thus limited.

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Across the Great Divide: Explorations in Collaborative Conservation and the American West, edited by Philip Brick, Donald Snow, and Sarah Van de Wetering. Island Press, Washington, DC, 2000, 286 pp.

Land in the American West: Private Claims and the Common Good, edited by William G. Robbins and James C. Foster. University of Washington Press, Seattle, WA, 2000, 222 pp.

In the Fall 1998 issue (Vol. 2, No.2) of *Sustainable Communities Review*, I reviewed several books that addressed the issue of the American West in terms of demographic trends, growth, sustainable activities, and land-use planning. At that time, I indicated that the West (and more specifically the Intermountain West) was the fastest growing region in the U.S. Now, data from the 2000 Census have corroborated this fact, and it also appears that the region will continue to experience dramatic growth rates throughout this decade. Along with demographic trends in the western U.S. there is the continued debate over conservation practices, economic policies, public land management, and the delicate balance between community viability, environmental quality, and social equity.

In this context, two additional books are required reading. *Across the Great Divide: Explorations in Collaborative Conservation and the American West* presents a thoughtful exploration of a "new" conservation movement, bringing together writing, reporting, and analysis from those directly involved in developing and implementing the approach. The movement, known as "collaborative conservation," emphasizes local participation, sustainability, and inclusion of the disempowered, and focuses on voluntary compliance and consent rather than legal and regulatory enforcement. Encompassing a wide range of local partnerships and initiatives, it is changing the face of resource management throughout the western United States. This is critical given the changing political and cultural face of the American West. The book also offers in-depth stories of eight noteworthy collaborative initiatives—including the Quincy Library Group from California's northern Sierra Nevada, Missoula, Montana's Clark Fork River Basin Committee, the Applegate Partnership from Applegate Valley in southwest Oregon, and the Malpai Borderlands Group in southeast Arizona and southwest New Mexico—that explore how different groups have organized and acted to implement their goals. Among the contributors are George Cameron Coggins, Tyler Professor of Law at the University of Kansas School of Law; David Getches,

Raphael J. Moses Professor of Natural Resources Law at the University of Colorado School of Law; Ed Marston, publisher of *High Country News*; William Riebsame, associate professor of geography at the University of Colorado, Boulder; and Maria Varela, a community organizer who has worked with rural communities since 1963. *Across the Great Divide* presents a valuable overview of collaborative conservation for anyone involved with conservation or within the larger environmental movement, as well as for all those who care about the future of resource management in the West.

Land in the American West is a collection of essays that were generated in a conference held in Oregon State University in 1997 focusing on the continuing dialogue about land and property-related issues. These essays deal with the complex, troublesome, and interrelated questions regarding land: Who owns it? Who has access to it? What happens when private rights infringe upon the public good, or when one ethnic group is pitted against another, or when there is a conflict between economic and environmental values? Many of these questions have deep historical roots. They all have special significance in the modern American West, where natural resources are still abundant and large areas of land are federally owned. Richard White, a contributor to this book, succinctly states the crux of the issue: "The environmental, social, and economic problems that Americans face on public lands are pressing and severe, but they will not be adequately confronted—nor will public lands be persevered in any meaningful form—unless Americans forthrightly face the issue of resurrecting 'public' as a meaningful category."

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A Sociological Perspective

Sociopolitical Ecology: Human Systems and Ecological Fields, by Frederick L. Bates. Plenum Press, New York, 1997, 272 pp.

"System" has been used to examine, describe, and label an endless number of relationships or interactions. In *Sociopolitical Ecology: Human Systems and Ecological Fields*, Bates argues that the concept of system has been overused and misused to the point that it lacks the clarity necessary to convey meaning. He criticizes approaches that view all relations and interactions as systems. Instead, Bates argues that a system is a bounded entity containing several separate yet interconnected parts that are interdependent and affect each other. Their relation to their environment is as a bounded and integrated whole. According to Bates, all too frequently what is called a system is actually an ecological field, the space in which systems and nonsystems are located. A system is differentiated from an ecological field based on the nature of the bonds between the respective parts. By definition, a system requires that the relationship between parts be bonded. This is contrasted to the contingent and competing nature of the relations between parts within an ecological field. Bates's purpose in clarifying and differentiating systems from ecological fields is to develop a clearer understanding of interactions and relations in the social world. His effort to clarify this concept challenges the reader to be clearer in his or her own definitions and assumptions.

Sociopolitical Ecology provides the reader with tools for understanding the relationships between social actors. Understanding the nature of relationships, specifically, how some relationships are bonded to form systems while others are contingent and form ecological fields, has potential applications for sustainable development. One problem often encountered in sustainable development projects is in the lack of understanding of how various actors are connected to the structures necessary to build a sustainable community. For example, understanding how a family is linked to the community through employment can help in understanding transportation needs and options. Rather than making assumptions about connections, sociopolitical ecology can be used to elucidate the nature of relationships so actors can be successfully integrated into projects.

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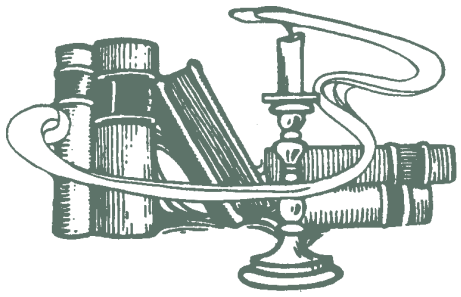

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SUSTAINABLE COMMUNITIES REVIEW

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Sustainable Communities Review is dedicated to the understanding and expansion of the concept and creation of sustainable communities in all parts of the world. The *Review* seeks to broaden the traditional focus of sustainable development to include other dimensions of community life that promote sustainability, such as empowerment, education, enterprise, and environment. Our definition of environment includes social and cultural influences as well as the more physical dimensions of our ecology. We welcome articles, commentaries, and news about ways to engage all citizens in sustaining quality community life and healthy environments to be submitted for consideration for publication. The *Review* is published semiannually.

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2. *Length of manuscripts*: Scholarly articles should not exceed 10 double-spaced pages. Shorter articles or essays describing innovative community projects and concepts, etc. should not exceed 4 double-spaced pages. The Review also welcomes brief notes on community activities (1 double-spaced page or less).

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