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# **Environmental Implications of Cuba's Economic Crisis**

By David S. Collis

Cuba's economic crisis and the gradual introduction of market-oriented reforms are having a contradictory impact. These events are damaging the island's physical environment, yet simultaneously creating innovation opportunities for Cuba's environmentalists.

The economic crisis - known to Cubans as the "Special Period in Time of Peace" - has increased pressure to sacrifice environmental protection for economic profit at a time when resources to remedy existing problems are scarce. In addition, the crisis has triggered a decentralized and semi-capitalist development that is incompatible with the existing environmental regulation structure designed for a centralized, socialist economy. However, the crisis has also been the impetus for pursuing "sustainable development" in several sectors. While that rhetorical phrase serves the Cuban government's international political purpose, the term also reflects the opening of real maneuvering room for researchers and environmental activists on the island. These individuals are trying to use this space to influence a centralized system which depends on economic growth for survival. Whether the environmentalists' ideas will be incorporated into official policy remains unclear.

The following overview of Cuba's current environmental situation is drawn both from U.S. sources and from field research conducted in Cuba. It addresses environmental regulation, the energy crisis, agriculture, industrial and urban development, community activism, tourism and ecotourism. Space and time limitations have prevented discussion of other important issues. Further research is needed to expand the limited base of information this paper presents.

## **Environmental Regulation**

Cuba has two main environmental regulation problems. Economic needs frequently over-ride environmental concerns, and the centralized structure means bureaucratic units are often responsible for ensuring their own compliance with environmental laws.

Until recently the Comisión Nacional de Protección del Medio Ambiente y del Uso Racional de los Recursos Naturales (COMARNA - National Commission for Protection of the Environment and the Rational Use of Natural Resources) was the central mechanism through which all matters having an environmental impact passed. This special commission of the Council of Ministers was created in 1977. By 1980, COMARNA offices spread to every province and municipality in Cuba. In April 1994, COMARNA was officially replaced by a new Ministry of Science, Technology and Environment. Though COMARNA has been superseded, its history illustrates the challenges the new bureaucracy will face, and therefore warrants exploration.

In 1981 Law 33, titled Ley de Protección del Medio Ambiente y del Uso Racional de los Recursos Naturales (Law for the Protection of the Environment and Rational Use of Natural

Resources), provided the basic principles for environmental protection in Cuba. Law 118, passed in 1990, defined the structure, organization, and function of the Sistema Nacional de Protección del Medio Ambiente y del Uso Racional de los Recursos Naturales (National System for the Protection of the Environment and Rational Use of Natural Resources) and made COMARNA the governing organ. This law also made the Havana-based National Commission of COMARNA responsible for suggesting new environmental laws, and verifying that existing laws were obeyed. COMARNA was transformed into a coordinator responsible for incorporating over twenty ministries and institutions in the environmental decision making process.

Analysis of COMARNA as a past overseer of new construction and development illustrates the bureaucratic legacy the new Ministry has inherited. Foreign investors wishing to build hotels in Cuba had to present their ideas to the Institute of Physical Planning which suggested a site and, in most cases, had an environmental impact study performed. The proposed location of the site, the environmental impact study and construction plans were then presented to COMARNA, which reviewed the documents in consultation with environmental experts. Finally, COMARNA called together a meeting of all relevant ministries and institutions to discuss the project. If all groups agreed on the final proposal, it was approved by Physical Planning and work began. If there were any insurmountable disagreements between the parties the decision was deferred to the Council of Ministers. In light of Cuba's economic situation, the Council of Ministers at times may have been more concerned with development than with environmental protection.

This occurred in the discussion of a proposed road linking the mainland with a tourism complex in Cayo Coco. Cuban scientists insisted the road be composed mainly of bridges to permit water circulation vital to the survival of numerous species of fish, sponges and coral. The internal waters, between the archipelago and the mainland, house some of the richest aquatic biodiversity in Cuba. The proposed roads/bridges were to take an indirect route spanning gaps between naturally existing land masses.

The construction of these bridges was deemed too expensive by the Cuban government. Because an agreement could not be reached in COMARNA's meeting, the decision was deferred to the Council of Ministers. An important official then intervened by pointing out that the planned road/bridge structure did not follow a direct route. He then proceeded to take out his pen and draw a straight line from Cayo Coco to the nearest point on the mainland.

This design was adopted, and a straight, bermed road with intermittent underwater tunnels was constructed. Scientists argued that there were too few underwater tunnels to maintain natural water flows. Through negotiation, they were able to double the number of passages, a small victory considering their original opposition to the plan.

This example illustrates that while COMARNA was able to settle minor issues itself, it did not possess the authority to make a final decision involving controversial matters. When a project was deemed highly attractive, the environmental protection system could be manipulated to serve a more important agenda. In this case, development and the need to attract foreign investment prevailed.

In addition to COMARNA's lack of real authority, its capability to enforce and penalize violators of environmental protection laws was dubious. In several interviews, the author was told that most violations were corrected "voluntarily" because Cuba is "a solution oriented, not penalty oriented" country. No one interviewed could cite an example of violators being taken to court and fined. The majority of Cuban enterprises were (and still are) state operated, and a COMARNA suit against the state was inconceivable. In essence, COMARNA had no enforcement capability and its only recourse was to work through the existing structures and hope disputes could be resolved voluntarily. This obvious flaw in the system became the center of an ongoing debate, which continued after COMARNA was superseded.

When questioned in early 1994 about the apparent lack of enforcement capabilities, the National Commission of COMARNA pointed out that its staff of approximately twenty people was too small to effectively monitor compliance with regulations. Enforcement was left up to the Ministries which had "more personnel and resources." For example, the Ministry of Agriculture, which both supplied food to the population and promoted agricultural exports, was also responsible for enforcing environmental regulations governing cultivators. In effect, the Ministries were judge and jury of their own affairs.

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All of these problems were discussed during interviews with Cuban specialists. They noted that, in the past, when the state was virtually the only investor, disputes were settled relatively quickly, if not necessarily equitably, within the system. However, they acknowledged that the process of "settling disputes among ourselves" began to breakdown as foreign investment grew and the economic crisis intensified competition between development and environment. Many Cuban specialists suggested that the system would probably be reorganized to address these flaws. In April 1994, the Cuban government announced the creation of the Ministry of Science, Technology and Environment, which replaced COMARNA. The publicly proclaimed motivation for the change was a government restructuring aimed at consolidating the activities previously performed by many separate bureaucracies into one ministry. This change reduced a large disconnected bureaucracy into a single ministry of 120 employees led by one minister, two vice ministers, eight directors and four agency heads. It simultaneously sought to address the previous structure's conceptual problems, including COMARNA's obsolescence and the need for information sharing between the scientific institutes and policy makers.

The new Ministry's structure is geared toward policy formulation, and features four agencies which provide information needed to formulate policy, then implement those policies once they are defined. The agencies are:

1. Specialized Information: Integrates the knowledge of the scientific institutes into a central data base.
2. Science and Technology: Responsible for the management of the scientific institutes previously affiliated with the Academy of Sciences.

3. Environment: Incorporates the expertise of the scientific institutes to recommend policies.
4. Nuclear: Pursues the Ministry's agenda for nuclear research and power.

Enforcement of environmental regulations will be carried out by special Provincial Delegations which allegedly will serve as independent overseers separate from the government. Exactly how their independence will be protected is unclear. What power they will have in future conflicts with other parts of government also remains to be clarified.

While the creation of the Ministry was announced in April 1994, it was not until January 1995 that the structure was determined. Raising the environmental issue to the ministerial level and employing "independent overseers" for enforcement purposes appears to be an important step. However, it is too early to determine the relative effectiveness of the environmental protection component of the Ministry. Further research will be needed to determine whether the Provincial Delegations are permitted to carry out their enforcement roles.

## **Energy**

The role of bureaucratic units in the decision making process is only part of the larger picture. The struggle to survive the economic crisis has put tremendous pressure on Cuba's internal resources as the government and people search to replace previously imported products with domestic commodities. A clear example of this is in the area of energy consumption.

The fall in oil supplies was one of the most detrimental results of the collapse of the socialist world. Shipments from the Soviet Union fell by slightly more than half from 1989 to 1992. The dramatic cut severely impaired the Cuban economy and prompted Cuba's state owned oil company Cuba Petróleo (CUPET - Cuba Petroleum) to pursue foreign investors capable of exploring for domestic oil.

The increased extraction and refining of oil in Cuba could have detrimental effects on the environment. Offshore drilling is likely to increase with the discovery of oil deposits in the Bay of Cárdenas and other areas. This increases the possibility of oil spills that would destroy the surrounding ecosystem. The amount of pollutants released into the air from refining the crude oil and the amount of oil residuals would also increase with production.

The tourist industry, one of Cuba's most important mainstays, could also be negatively impacted by increased oil production. Cuba's beaches and the growing ecotourism sector draw increasing numbers of visitors. In 1994, 630,000 tourists visited Cuba and brought \$850 million in gross revenue to the island. Even a single major oil spill close to the premier Varadero beach resort would devastate the industry.

Along with the search for oil, Cuba is also seeking to obtain nuclear energy. Cuba's interest in nuclear energy dates back to the Batista government, which was offered U.S. assistance under the "Atoms for Peace" program. Plans to construct a nuclear power plant were cancelled in 1960 with the break in U.S.-Cuban diplomatic relations and lay dormant until 1976. In that year Cuba signed an agreement with the Soviet Union to build two 440-megawatt nuclear power reactors at Juragu , in Cienfuegos Province. Construction started in 1983, but slowed after the abrupt

decline of Soviet assistance in 1990. In September 1992, Fidel Castro announced the temporary suspension of construction due to a Russian demand that Cuba pay \$200 million to continue building the facility.

Cuba has actively sought foreign investors to complete construction, while it has used a \$30 million Russian loan to mothball the existing facility. European contractors are currently conducting a study to explore the feasibility of raising investor funds to finish the project. At the time of writing, the study was scheduled for completion by the end of June 1995. A U.S. source close to the issue reports that even if the mothballing was executed correctly, an optimistic assumption, it would cost about \$1 billion to finish the 30% of Juragu -1 and the 80% of Juragu - 2 that remain incomplete. Part of this cost is due to faulty Soviet-era instrumentation, which must be replaced with Western equipment at a cost of about \$300 million. Since foreign investors would be paid out of revenue generated by the plants' electricity sales, and Cuban consumers pay for electricity in non-convertible pesos, it seems quite unlikely that Cuba will locate an investor for the project in the near future. In any case, Cuba does not yet possess the nuclear fuel with which to start up the reactors.

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Still, the United States is concerned that Cuba has cut corners, initially sacrificing safety considerations in its attempt to get the plant operational, and subsequently mothballing the facility improperly. Critics have expressed fear of a Chernobyl-type accident at the Juragu facility that would have disastrous consequences for Cuba, the U.S., and the Caribbean. In their 1994 article "Cuba's Nuclear Power Program and Post-Cold War Pressures" (The Nonproliferation Review, Winter 1994), Jonathan Benjamin-Alvarado, a Ph.D. candidate at the University of Georgia's Political Science Department, and Alexander Belkin, a researcher at the Moscow State Institute of International Relations, reported:

[The fallout from a serious accident] would create a 'dead zone' with an 18-mile radius where nothing could survive; a 200-mile radius where there would be serious health risks and agriculture would be impossible; pockets of high contamination that could drift as far as 300-miles away, and a radioactive cloud creating serious ecological damages as far north as Tampa, Florida, with secondary fallout extending to a 900-mile radius (depending on prevailing weather conditions).

U.S. safety concerns have been somewhat eased by Cuba's September 1994 signing of the Tlatelolco Treaty on nuclear safety and proliferation. Via this treaty and other accords, Cuba has agreed to provide reports on the safety levels of its nuclear facilities, to allow thorough international inspections of all its nuclear sites, and to justify the use of nuclear energy in comparison with alternative energy sources. While these agreements do not guarantee an accident will not occur, they do provide internationally recognized mechanisms to monitor Cuba's nuclear program.

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In its search for alternative energy sources, the Cuban government is also studying the economic and ecological practicality of using peat reserves, mainly located in the Ciénaga de Zapata of Matanzas Province. Cuba's peat reserves, eleventh largest in the world, are estimated to be equivalent to 200 million tons of oil. In his 1992 book *The Poisoning of Paradise* (Miami: The Endowment for Cuban American Studies), Cuban American scholar Dr. José Oro said prospecting for peat and asphalt increased dramatically after the announcement of the Special Period, and the government planned to construct a major power plant using peat as fuel. To date, the Cuban government has not moved forward with plans to build a peat fueled power plant. Indeed, a Cuban soil expert recently reported that no such project is currently under consideration. It is difficult to determine whether this decision is related to the high costs of importing technology or the endeavor's well known ecological consequences. The use of peat as fuel would be environmentally damaging for several reasons. First, Ciénaga de Zapata's peat reserves serve as a filter that protects vast tracts of agricultural land from salinization caused by the incursion of seawater. Second, mining peat would destroy an ecosystem which is home to a great variety of flora and fauna. When burned, peat gives off sulfur which would contaminate the atmosphere and water. While recent Cuban publications continue to refer to peat as a possible domestic energy source, the Cuban environmental community adamantly opposes the idea.

To overcome energy shortages, Cuba is also experimenting with renewable sources. Small hydroelectric plants play a prominent role, and 200 have been built, of which 180 are functioning. Most installations are in isolated mountainous areas where Dr. Ramon Pichs of Havana's Centro de Estudios de la Economía Mundial (CIEM - Center for Research on the World Economy) estimates 26,000 people live. Plans to construct a large 360 megawatt hydroelectric plant in the Toa and Duaba rivers were recently cancelled, in part due to concerns about environmental impact voiced by Cuban scientists. (The environmental impact of Cuba's existing dams is discussed in the agricultural section below.)

In addition to hydroelectric power, Cuba has begun small scale use of windmills and solar energy. According to Dr. Pichs, Cuba has approximately 5,700 windmills and 354 solar heating systems. The latter are being used at social centers and for drying seeds. While these sources of energy are renewable and environmentally friendly, they do not significantly contribute to Cuba's yearly energy needs. The Cuban authorities apparently are not interested in pursuing wide use of wind and solar power because of high start up costs and low energy returns. However, a research center in Santiago de Cuba continues to study the feasibility of solar power on a large scale.

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The sugar cane residual bagazo and biogas (methane from manure and waste material) play a more significant role in Cuba's search for alternative energy sources. In his 1994 publication *Desarrollo Sostenible: Un Reto Global* (Sustainable Development: A Global Challenge [Editorial de Ciencias Sociales, Havana]), Dr. Pichs calculates that biogas could represent the equivalent of 370,000 tons of oil per year, while the utilization of bagazo could save Cuba 700,000 tons of oil

per year. The Cuban government is trying to develop specialized technology to reduce the air pollution produced by burning bagazo.

In sum, Cuba's energy needs are vast and its alternatives limited. Unless Cuba finds large amounts of oil, a long term solution to the energy crisis is doubtful. This dim picture increases the chances that when faced with a decision between higher domestic energy outputs and protection of the environment, the Cuban government will choose the former.

## **Agriculture**

Cuban agriculture has long neglected environmental concerns. This has led to soil erosion, water pollution, contamination and degradation of coastal habitats, and development of chemical-resistant pests. Perhaps the most serious problem, however, is soil salinization. According to *The Greening of the Revolution* (Peter Rosset and Medea Benjamin eds, [Melbourne, Australia: Ocean Press, 1994]), almost two million acres of farmland, mainly located on eastern and southern Cuba, suffer from severe salinization. The Cuban government claims to have stopped further salinization, though it admits little progress has been made in rehabilitating soils. In a 1993 paper titled *Water, Development, and Environment in Cuba: A First Look* (Third Annual Meeting of the Association for the Study of the Cuban Economy, Florida International University), Cuban American scholars Sergio Diaz-Briquets and Jorge Perez-Lopez wrote that one of the main problems of Cuban agriculture has been its expansion of irrigation. In the 1970s and 1980s, the government constructed hundreds of dams and reservoirs. The damming of most of Cuba's free flowing water, combined with unsound water management and irrigation practices, contributed to the soil and water problems mentioned above. Over-watering, over-tilling, and poor flood control exacerbated salinization and erosion, and contributed to the decline in overall soil fertility.

In the view of the twenty scientists of various nationalities whose findings were reported in *The Greening of the Revolution*, Cuba has recently implemented organic farming techniques to counter the low soil fertility resulting from excessive cultivation and chemical use during the 1970s and 1980s. Cattle, pig, and chicken manure, peat, bio-fertilizers, worm humus and recycled waste are employed in this program.

Soil erosion is being addressed by reducing the number of tillings per year and introducing plowing techniques which cut the roots of weeds without turning the soil. In addition, Cuba's positive net reforestation is likely to somewhat ease erosion. However, Cuba's urgent food needs cause many observers to question how diligently these techniques will be pursued if they lead, even temporarily, to lower productivity.

Cuba is also experimenting with the use of bio-fertilizers and bio-pesticides to cut the costs of importing expensive chemical products. Throughout the world, the overuse of chemical fertilizers and pesticides has contaminated the environment, damaged workers' health, and produced resistant strains of pests and plant diseases. While Cuba began to respond to such problems in the 1970s, the real nationwide push toward more rational use of chemicals did not begin until the mid-1980s. This transition, while environmentally sound, was primarily motivated by economic necessity. The costs of importing chemical pesticides and then having to

deal with resultant pest resistance were so high that Cuba sought alternatives. In a 1994 article, U.S. researchers Peter Rossett and Shea Cunningham argued that "Cuba is presently in the third year of the largest conversion of any nation in history from conventional modern agriculture to large scale organic farming" ("The Greening of Cuba," Food First Action Alert, Spring 1994). In other countries, biotechnological development can be more expensive than using chemicals. Cuba's abundant human capital (it accounts for a tenth of Latin America's scientists) and its foreign exchange shortages, however, caused the authorities to conclude that the strategy would actually be economical. They felt it made sense to invest in an industry where a large portion of costs are related to labor and scientific research rather than imported raw materials.

Institutionally, organic farming gained support from the universities and the Plant Protection Division of the Ministry of Agriculture in the 1980s. Research on pest resistant crops was undertaken for tobacco, sugar cane, and potatoes. The biological control component of the program has witnessed the most significant advances. Research began with successful efforts to control the sugar cane borer through use of a predator fly. Chemical import costs were drastically cut, and the environmental impact was positive. The fly's use is now widely supported by both the Ministries of Agriculture and Sugar. Research has been expanded to look for biological alternatives to chemical pest control for citrus fruits.

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The proven success of biological applications fueled the Cuban government's support of new research through creation of the Programa Nacional de Lucha Biológica (National Program of Biological Struggle) in 1988. A direct outgrowth of this program has been the creation of 218 centers for research, production and distribution of bio-pesticides and bio-fertilizers.

The recent creation of Uniones Básicas de Producción Cooperativa (UBPCs - Basic Units of Cooperative Production) and their supposed independence from the state has also created a new opportunity. Scientists are trying to convince UBPCs to switch from chemicals to the cheaper and safer bio-products. Given the prohibitive costs of chemical imports, the biotechnology industry hopes to find a captive market. Even with these advances, organic farming is still faced with a number of challenges. The technique leads to an initial drop in crop yields. This is a consequence of the time required to restore lost soil fertility and re-establish natural controls of insects and diseases. Cuban sources say the drop is not very large and recovery time is an estimated one to three years.

The application of bio-fertilizers and bio-pesticides also requires specialized training. Cultivators are unfamiliar with new techniques and want to stay with the old reliable chemical methods. The Ministries of Agriculture and Sugar still prefer to use chemicals even when biotechnologies are available. Application of biotechnology agents also is labor intensive and must be executed at certain times of the day, making these products less convenient than chemicals.

Cuba's biotechnology industry includes other elements as well. Cuban scientists are working on genetic engineering, microbiology, micropropagation, and production of artificial seeds. As in other sectors, shortage of funds, Cuba's isolation, and limited access to new technologies constrain development. Nonetheless, Cuba is one of the main employers of biotechnological research in the hemisphere.

## **Industrial and Urban Development**

While the economic crisis has created opportunities for expansion of environmentally-sound agricultural techniques, it has also exacerbated pre-existing urban and industrial pollution. In his previously cited book, Dr. Jos, Oro lists over sixty specific industries that are causing ecological damage due to the employment of antiquated technologies, poor management, and lack of environmental controls and safety devices.

The main industrial polluters are in the areas of cement, sugar, mining, paper, electrochemistry and electrometallurgy. These industries are responsible for air and water pollution in the form of dust clouds, smoke, soot, steam, release of airborne toxic chemicals, and dumping of chemical waste into ravines, lakes, and rivers. The contamination of Havana Bay and the Almendares River are well documented and attest to the severity of the problem.

Cuba's economic crisis and the government's inability to purchase new, environmentally sound equipment have contributed to the problem. While foreign investment is sought, it is unlikely that over the short term Cuba will attract enough foreign capital to modernize the polluters' facilities.

In addition to industrial problems, urban deterioration is taking its toll on Cuba's cities. Water shortages, lack of sanitation, as well as sewage and waste disposal problems have resulted from poor government management and lack of funds.

According to a Havana water official, leaking pipes waste 50% of the city's water supply. This, combined with sub-normal rainfall, has caused a critical water situation. The Miami Herald reports that underground water is not only being depleted faster than necessary, but at least one-third of the supply is contaminated by fertilizer and insecticide residues.

To repair and clean-up the water system would require a major commitment of resources. Neither the Cuban government nor foreign investors have made that commitment. On November 1 last year the Cuban government began to charge consumers for potable water, but it is unlikely that these peso revenues will be sufficient to fund the system's rehabilitation.

Solid waste disposal and sewage treatment have suffered a similar fate. A lack of fuel has slowed garbage pick-up and disposal, while the antiquated sewage system is awaiting long overdue repairs. These problems produce unsanitary conditions and promote the spread of disease.

## **Community Efforts**

Many of Cuba's urban problems result from failures of the central state authorities. Recently, community self-help organizations have sought to take up some of the slack through environmentally sustainable development solutions.

Founded in 1987, the Grupo para el Desarrollo Integral de la Capital (Group for the Integrated Development of the Capital) is a grassroots organization working at the neighborhood level in Havana. The Group addresses concerns such as housing, urban transportation, water pollution, waste disposal, and insufficient green spaces, implementing decentralized projects. Funding for the Group's programs comes from the state, non-profit foreign organizations, religious groups, and academic and solidarity associations.

In Pogolotti, a neighborhood of the Municipality of Marianao, the Group initiated an experimental recycling program in collaboration with the Ministry of Public Health. It collects glass, paper, cardboard, metal, and textile waste. The population sells the raw materials to designated resident buyers and/or directly to local purchasing houses. The Group is incorporating local schools and work centers into the campaign. The project reduces the country's need to import primary material, creates income for people buying and selling the raw materials, finances a social fund to be utilized according to the community's priorities and improves the population's health and hygiene while reducing the amount of solid waste in the neighborhood. Due to the success of this endeavor, work is now underway to expand the project to other neighborhoods in Havana.

#### **Ecotourism Case Studies**

**The Sierra del Rosario area was recognized by UNESCO as a biosphere reserve in 1985. The biosphere is subject to international regulations which require the protection, study and preservation of the forest. Approximately half of the biosphere's 1,500 permanent residents live in the settlement of Terrazas. Permission to live in the biosphere is restricted. Residents who work inside the biosphere are self-sufficient and responsible for the protection, study and preservation of the area. Residents are not allowed to own animals other than one pig per person. The biosphere includes four primary schools which emphasize the role of children in protecting nature. The small size of the local hotel, which features only twenty-five rooms, limits the number of tourists.**

**In preparation for ecotourism, resident guides have been trained, and nature trails are being designed to provide visitor access to specific areas, while minimizing the impact on the rest of the park. Funding from the United Nations Developmental Program has enhanced park management.**

**Another ecotourism site is being developed in the National Park of Ciénaga de Zapata. This immense park, mostly covered in marsh and mangrove vegetation, is divided into 182 protected areas of varying management specifications. Its permanent population of 7,000 and it has little industry other than tourism associated with the site of the Bay of Pigs invasion. Unlike Sierra del Rosario Ciénaga de Zapata has poor roads and is severely understaffed, forcing scientists to function as park rangers. Lack of fuel and vehicles for transportation, combined with the absence of hand radios, make it virtually impossible to properly manage such a large park. Travel from the main station to the far reaches of the park takes hours by car.**

**Fires are another problem facing park management, They have been allowed to burn out naturally, but the park's director is not convinced this is the correct strategy. He wishes to**

**learn how foreign park officials, particularly those responsible for Florida's Everglades, deal with this problem. He is also concerned that nonnative vegetation is killing indigenous species, and wonders if a system other than weeding has succeeded elsewhere.**

In addition, the Group sponsors the experimental creation of "Neighborhood Transformation Workshops" in several troubled areas of Havana. The Workshops are five to twelve person teams of planners, architects, engineers, sociologists, and social workers who usually live in the targeted neighborhood. Their aim is to improve the physical, social, cultural and environmental conditions of the community. The experiment began in 1988 with three troubled neighborhoods, Atares and Cayo Hueso in the inner city and La Guinera on the southern periphery. At the request of other neighborhoods, the project has expanded to eight additional sites.

Another grass roots group is ProNaturaleza, a self-proclaimed non-governmental organization (NGO) founded in April of 1993 to promote environmental consciousness. ProNaturaleza is a non-profit organization, and membership is "unrestricted and voluntary." The organization has approximately 8,000 members, a national steering committee, affiliates in all provinces, and base committees at the municipal level. Members pay a five peso initiation fee and one peso per month continuing membership fee. Members give time to the organization in addition to their normal employment. ProNaturaleza's current projects include combatting deforestation caused by fuel shortages, confronting local industrial pollution, working with rural women, as well as educating children about the preservation of nature.

Several other self-described NGOs have also recently been formed, including SOS Almendares, which wishes to clean up Havana's main river, and Fundación de la Naturaleza y el Hombre, (Nature and Man Foundation). It remains to be seen just how effective these various groups will be.

### **Tourism and Ecotourism**

Part of Cuba's response to the elimination of Soviet subsidies has been to develop tourism as a foreign exchange generator. The main tourist centers are Havana, Santiago de Cuba, Cayo Largo, Cayo Coco, and Varadero. This growing industry has profoundly impacted Cuba's environment. According to the Cuban Institute of Physical Planning, Varadero was not developed in the most environmentally sound manner. While coastal protection regulations existed, no specific laws were in place. Too many hotels were built and many were badly constructed. Hotels were established close to the beach, and inadequate space was left between buildings. In addition, the introduction of non-native trees and plants to the area had an adverse environmental impact. Only in the last several years has an infrastructure been created to deal with environmental issues associated with tourism. The principle motivation for change has been the realization that if Cuba does not preserve its environment, it will lose its attraction to tourists.

The Institute of Physical Planning has created a sub-group to focus on coastal development. In addition, in 1988 the National Commission of COMARNA formed a working group of coastal scientists to minimize the negative impacts of tourism development and preserve the natural surroundings. Scientific experts from the Institute of Ecology, Oceanology, Geology have also

developed programs to address beach erosion, beach regeneration and clean-up. Two years ago the Academy of Sciences created the Dirección de Recursos Naturales y Turismo (Directorate of Natural Resources and Tourism), headed by Dr. Gisela Alonso, to address the new development issues related to tourism. At about the same time Cuba also formed a National Commission on Ecotourism designed to draw on the experiences of other countries. Dr. Alonso is in contact with Costa Rican ecotourism experts and hopes to take a group of two to three Cuban scientist to Costa Rica to see their work first hand.

Already the authorities have decided that a percentage of ecotourism revenue must be spent on park infrastructure, management, and protection. Decisions on the limitation of tourist access to ecotourism sites, preparation of the sites, and development of visitor conduct manuals are also underway. Presently six sites are under consideration for ecotourism development: Ciénaga de Zapata, Sierra del Rosario, Tope de Collantes, Sierra Maestra, Guanachacabibes, and Pinares de Mayarí. To date, however, ecotourism development has been slow. Preparation of sites requires extensive scientific study, determination of pathways, hotel construction, training of guides, and education of the local population. Funding to start up all these processes simultaneously is lacking.

Whether the need to attract foreign capital will cause Cuba to sacrifice its goal of rational development in this area has yet to be determined. Presently, Cuba has neither the financing nor the construction capability to turn itself into an environmental disaster overnight. The number of proposed ecotourism sites remains small and tourist visits are limited. The current prospects for severe environmental degradation appear low. However, this could change if development plans are redesigned to maximize hard currency earnings.

## **Conclusion**

Cuba is at a crossroads. The economic crisis has increased pressures to sacrifice environmental preservation for economic profit. However, that crisis has also presented opportunities for inexpensive, environmentally sound development. It is not yet clear which path Cuba will choose, but some preliminary conclusions are possible.

First, regime survival is linked to economic recovery. Therefore, the government's emphasis on economic development currently overshadows environmental protection. The government is likely to pursue environmental preservation when it is low cost and/or profitable in the short to medium term. By the same token, the government is unlikely to support preservation when it requires costly imported technology or greatly reduces the profitability of a venture.

Second, economic realities have forced the government to decentralize, thus permitting local entities more freedom in problem solving. This process has resulted in several examples of community groups pushing for sustainable development. The inherent conflict between community driven groups and centralized state control is somewhat reduced by the fact the government no longer has the resources to provide solutions. State reaction to such groups has been relatively positive. There are examples of government tolerance, when groups like ProNaturaleza have asked the state for environmental reforms on behalf of concerned citizens. However, one must keep in mind that Cuba's centralized system puts limits on such organizations, especially if their activities politically threaten the state. This restricts groups to

pursing "non-political" development agendas. In Cuba, as elsewhere, environmental decisions are essentially resource allocation determinations, which are inherently political. Therefore, one should expect some environmental NGOs to eventually encounter formidable political obstacles. Third, Cuba's transition to a semi-capitalist economy has rendered obsolete the past environmental regulation structure, designed for a centralized socialist economy. The creation of the Ministry of Science, Technology and Environment has addressed some of the conceptual problems inherent in the former structure. However, it has yet to be seen if regulations will be enforced. Without enforcement, it does not matter how many environmental protection laws are enacted.

In sum, Cuba is neither an ecological disaster area nor a paradise. Environmentally destructive decisions have been taken in some instances, while preservation concerns have won in others. Cuban experts working in the field are aware that the most critical profit versus environmental protection decisions have yet to be made. Growing environmental awareness at the grass roots, the population's relatively high level of scientific education, the lower cost of some environmentally sound methods, and the acknowledged importance of environmental protection to long term tourism revenues all provide limited grounds for hope. However, the economic and political forces militating against environmental protection remain formidable and should not be under-estimated.

*David S. Collis was Deputy Director of the Georgetown University Cuba Project from April 1992 until February 1995. He is currently a Rotary International Ambassadorial Scholar in Santiago, Chile.*