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Aldo M. Leiva

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Environmental Technology Transfer and Foreign Investment: Factors Impacting Environmental Protection in a Transition-Era Cuba
Aldo M. Leiva
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Environmental Technology Transfer and Foreign Investment: Factors Impacting Environmental Protection in a Transition-Era Cuba

Aldo M. Leiva, JD
Miami, FL
I. Cuba's Environmental Challenge

The transition\(^1\) of Cuba from a totalitarian communist state to a free and democratic republic will entail a complex series of political, social, cultural, moral, and economic issues. Among these issues will be the legacy of nearly a half-century of environmental neglect and mismanagement by the Castro regime. Not only will the new republic have to clean up and contain existing pollution and contaminants, but an environmental infrastructure will need to be developed immediately. During a time of intensely competing priorities and interests, a transition-era government may find itself struggling to balance the new republic's economic development with the environmental and human health concerns of its citizens.

Cuba's new leadership may avoid the pitfall of the "economy versus environment" debate if it realizes that both priorities are not antagonists; rather, in the special case of Cuba, the issues are inextricably linked. Due to the moral, aesthetic, and economic value of Cuba's geography and natural resources, a clean and protected environment will undoubtedly translate into a stable and healthy economy. A free and open Cuba will draw visitors from around the world, seeking to experience its tropical beauty, while providing a boon to the Cuban economy. Such beauty, however, must be protected with adequate environmental safeguards. More importantly, an adequate environmental infrastructure will not only serve as a positive investment in the Cuban economy, but it will provide an essential investment in the Cuban people, who are entitled to the benefits of clean air and water, protected forest reserves and arable soil, free of contaminants.

Note: for the purposes of this discussion, the term "transition" refers to the process whereby a democratic republic with a free market economy will be established in Cuba, following the death or removal from power of Fidel Castro and the present ruling elite of Cuba.
Addressing Cuba's environmental needs will require both financial investment as well as actual imports of environmental technology, such as treatment materials, filters, scrubbers, containers, and liners. Since Cuba's nascent government and free market system will lack both the funds and the actual required technology, such funds and equipment will probably have to be provided in the form of direct foreign investment and technology transfer.

This paper will analyze: (1) the current environmental conditions on the island and identifies the causes of Cuba's environmental crisis; and (2) the role of environmental technology transfer and foreign investment in addressing this issue, including analysis of factors impacting the environmental technology transfer to Cuba.

II. Cuba's Environment in Crisis

Cuban studies scholars have extensively addressed the possible political, economic, and social “environments” in which Cubans will live during the transition era, yet few have raised the issue of the actual physical environment in which Cubans will develop their new society. Any new political freedoms enjoyed by Cubans will be undercut by substantial environmental health risks if Cuban lands, waters and air are not adequately protected. Coupled with the reality that much of Cuba’s tourist industry will be based on Cuba’s natural beauty, unmarred by pollution, a transition government will have to ensure that the environment will be a key priority on the national agenda.

A new emphasis on the value of the environment will be a radical departure from the current regime's official policy, which has been the wholesale destruction of the Cuban environment in exchange for foreign currency2. For almost forty years, such policy has ranged from neglect and disregard, to rapacious consumption of natural resources in the name of socialist progress. Recently, in the hopes of attracting funds from international non-governmental organizations, the Castro

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regime has actually added a new-found “concern” for environmental protection to its international propaganda arsenal. As seen below, environmental conditions on the island demonstrate the degree to which the regime has failed to safeguard the well-being of the people and the fauna and flora of Cuba.

Soil

Official government policy has negatively impacted Cuban soils in several ways. For example, a great deal of erosion has been caused by official agricultural practices that entail the clearing of low-quality soils that are already prone to erosion. The severity of the problem is demonstrated by the estimate that 50% of the arable soil in Cuba is eroded. Among those areas most critically affected are Guantanamo Province, where 80% of arable soils are eroded, and Camagüey Province, where the erosion rate is 75%. High rates of deforestation also contribute to soil erosion, as loss of trees and brush results in greater erosion rates.

Along with erosion, salinization of soils is also a serious problem, ranging from Guantanamo Province to La Habana and Pinar del Rio Province. The primary causes of such phenomena are: (1) agricultural practices and management that cause degradation of soil; (2) policy decisions that disregard the changing of negative customs and procedures; (3) underestimation and/or ignorance of the negative effects of soil degradation, and (4) specialization of agricultural zones without considering the risks of soil degradation.

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4 Id. Agencia Ambiental Entorno Cubano (AAMEC), Situación Ambiental de Cuba, Informe Anual de la AAMEC, 1997.
Lastly, soils are also polluted by toxic metal wastes arising from strip mining\textsuperscript{10}, as well as by the many dumpsites dotting the Cuban landscape. For example, in Santa Clara, there exist 100 authorized dumpsites, 86 of which are in poor condition\textsuperscript{11}. An additional 273 illegal clandestine dumpsites are reported in the area\textsuperscript{12}.

**Deforestation**

Since the onset of Cuba’s “Special Period” following the collapse of the socialist Eastern bloc, a scarcity of fuels in Cuba has triggered an increased demand for firewood, resulting in increased rates of deforestation\textsuperscript{13}. In fact, according to Cuban government sources, forests covered 26.8\% of Cuban land area in 1993\textsuperscript{14}. By 1996, the percentage decreased to 21\%\textsuperscript{15}, meaning that in a three-year period, 29\% of Cuba’s remaining forests had been cut down.

The majority of deforestation occurs in old-growth forests, which are home to the great majority of Cuba’s native species\textsuperscript{16}. Such forests are favored by Cubans seeking fuel, as the state-owned wood plantations are insufficient to meet the national demand for wood, which is calculated at 1 million cubic meters annually\textsuperscript{17}.

Despite attempts by the government to reforest, reforestation has had limited results, due to the low percentage of survival of plants on plantations\textsuperscript{18}. For example, in Camagüey, the most deforested province in Cuba, only 209 nurseries

\textsuperscript{11} AAMEC. La recogida de basura en la Ciudad de Santa Clara. CUBAECO # 1, October, 1997. Id.
\textsuperscript{12} Id.
\textsuperscript{14} Agencia Ambiental Entorno Cubano (AAMEC), Situacion Ambiental de Cuba, Informe Anual de la AAMEC, 1997.
\textsuperscript{15} Id.
\textsuperscript{16} Id.
\textsuperscript{17} Id.
\textsuperscript{18} Id.
out of the planned 849 actually survived, resulting in the lowest reforestation rate of recent times\textsuperscript{19}.

Another problem is the lack of compliance with reforestation plans. Mining companies doing business in Holguín, for example, were supposed to plant 100 hectares of forests in Pinares de Mayari, but planted only 6 hectares, resulting in an enormous deficit\textsuperscript{20}.

Forest fires also constitute a factor in deforestation, with every fire resulting in an average loss of 13 hectares of forest\textsuperscript{21}. Through October of 1997, 245 fires had occurred in forest plantations, 34 more fires than those that occurred in 1996, and with an overall increase of 700 hectares lost\textsuperscript{22}. Most fires occur in Pinar del Rio, Camagüey, and Isla de la Juventud, which account for 51\% of forest fires\textsuperscript{23}. The majority of fires result from human activity, with approximately 43\% due to negligence and 10\% intentional\textsuperscript{24}.

Loss of Habitat and Biodiversity

Loss of natural habitats has resulted in the extinction or near-extinction of native Cuban fauna and flora, often due to unchecked competition by non-native species, that lack natural predators\textsuperscript{25}. For example, twenty endemic bird species are considered extinct, due to accelerated deforestation, poaching, and collection for sale, and many others are considered threatened\textsuperscript{26}. Coral reef habitats are also being destroyed by agricultural runoff and toxic waste, deposited in bays by polluted rivers\textsuperscript{27}. Extraction of living coral, for use as calcium carbonate in mining

\begin{flushright}
\textsuperscript{19} Id.  \\
\textsuperscript{20} Id.  \\
\textsuperscript{21} Id.  \\
\textsuperscript{22} Id.  \\
\textsuperscript{23} Id.  \\
\textsuperscript{24} Id.  \\
\textsuperscript{26} AAMEC, Desaparecen Especies de la Avifauna Cubana, CUBAECCO # 1, October, 1997.  \\
\end{flushright}
operations, also contributes to the destruction of Cuba’s unique aquatic ecosystem.

Waters

Environmental problems affecting Cuban waters are (1) increased extraction rates from aquifers, (2) salt water intrusion into aquifers due to accelerated extraction, (3) pollution of rivers, streams, estuaries, coastal zones, and bays by industrial waste, chemical runoff, and sugar industry wastes. Excessive water extraction is associated with mismanagement by government authorities in expanding urban water supply and increasing irrigation, both of which jeopardize the sustainability of Cuba’s aquifers and triggers salinization.

Pollution of Cuban rivers is also widespread. The Almendares River, which crosses Havana, is heavily polluted with urban waste, raw sewage, solid waste and industrial waste. Another urban river, the San Pedro River in Camagüey, is contaminated with waste oils, acid water, cellulose fibers, cement, and greases and detergents.

In addition to contaminated urban rivers, rural rivers, such as in the mountains in Pinar del Rio, are contaminated with coffee bean husks and industrial wastes. Along with grain husks, coffee husks acidify the water and contribute to environmental degradation. Sugar mills also pollute rivers with hydrocarbons, acids and grease.

28 Id.
30 Id.
31 Agencia Ambiental Entorno Cubano (AAMEC), Situación Ambiental de Cuba, Informe Anual de la AAMEC, 1997.
32 Id.
33 Id.
34 Id.
35 Id.
Polluted rivers flow into coastal zones, which are in turn contaminated as well, particularly the bay of Havana\textsuperscript{36}. The Bay of Nuevitas, north of Camagüey, is polluted with hydrochloric acid, lead, and hydrocarbons, which are released from a series of factories, including an electric wire factory, fertilizer, cement factory, and a maritime fuel terminal\textsuperscript{37}. The Bay of Los Perros, north of Ciego de Avila, has been polluted to the point of altering its salinity, density, temperature, and dissolved oxygen content, resulting in the disappearance of 84\% of reported commercial fish species from the bay\textsuperscript{38}.

Causeways, known as pedraplenes, which are built by Cuban authorities to link the mainland with small keys in order to promote tourism, are built with stones, sand and mud, but wreak havoc on stream systems and harbor environments\textsuperscript{39}, as they close such systems off from ocean currents, resulting in high concentrations of toxic pollutants in those waters.

Oil spills also occur, such as the worst spill in Cuban history, where 2,300 tons of petroleum were spilled into Cienfuegos bay in a matter of minutes, causing extensive damage to marine life and seabirds\textsuperscript{40}. Cuban oil refineries, operating in Havana, Santiago de Cuba, Cabaiguán and Cienfuegos, pollute waters with heavy metals, oil, and toxic wastes\textsuperscript{41}. Removal of sand and coral mud for industrial purposes also deteriorates the marine ecosystem and degrades beaches\textsuperscript{42}.

As a key component of the Cuban economy, the sugar industry is a major source of pollution on the island. Waste pulp is used as a fuel, resulting in the release of toxic industrial wastes and molasses into the surface and groundwater systems\textsuperscript{43}. Sugar cane derivatives also include paper, which is one of the major

\textsuperscript{36} Id.
\textsuperscript{37} Id.
\textsuperscript{38} Id.
\textsuperscript{40} Id., at 57.
\textsuperscript{41} Id., at 58.
\textsuperscript{42} Id., at 52-53.
\textsuperscript{43} Id. at 55.
causes of surface water contamination in Cuba. Alcohol and other paper wastes are discharged, untreated, into streams and rivers.

Air

Although industrial output has decreased during the Special Period, poor pollution controls continue to cause air pollution in industrial/urban areas. For example, in Mariel, a local plant covers the area with thick dust and a dust column that normally runs ten to fifteen miles windward. Already a major source of contaminants prior to the Special Period, the economic crash of the Special Period has prevented such plants from obtaining imported pollution abatement equipment.

Mining activities in particular generate a great deal of dust. The gold mine at the "Isle of Youth," for example, releases high concentrations of mercury and arsenic into the atmosphere. Likewise, nickel and cobalt processing plants release smoke, soot, and mainly nitric and sulfuric acid wastes into the air.

In addition, cheap low-quality oil, both imported and domestic, is heavily utilized in Cuba and produces high amounts of contaminants upon combustion, as evidenced by dense clouds of smog over La Habana and near power plants.

The Cuban government itself has admitted the existence of all these environmental problems, including inoperative sewage treatment plants, lack of

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44 Id. at 55.
45 Id. at 55-56.
46 Id., at 48.
47 Id., at 49.
50 Id. at 52.
51 Id. at 53.
52 Id.
trash pickup, lax or no enforcement of environmental laws, water contamination, soil erosion, and elimination of environmental monitoring programs\textsuperscript{54}.

III. Causes of the Cuban Environmental Crisis

The primary cause of the Cuban environmental crisis is the Cuban government’s failure to create and/or maintain an adequate environmental infrastructure, a reality common to communist countries. The reasons for said failure can be categorized as (1) ideological/political, (2) legal, and (3) economic factors.

Ideology/Politics

As a government that has centered its ideology, political nature and authority around the Marxist-Leninist model, the Cuban government’s environmental policies and practices contain many of the faults seen in the former Soviet Union and the former Eastern Bloc countries. In all of these nations, central planning, the keystone of Communist economics, has resulted in environmental degradation for several reasons\textsuperscript{55}.

First, all industry is owned by the Cuban state, either directly or as a controlling joint partner with a foreign entity. Thus, the almost-exclusive generator of industrial and agricultural pollution on the island is the Castro regime itself\textsuperscript{56}. However, the sole environmental enforcement authority in Cuba is also the regime, thereby creating a situation where, if the Cuban government is to adequately protect the environment, it must police itself. Such policing is unlikely, however,

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\textsuperscript{54} Ariel Remos, Cuba admitted the country’s ecological disaster at the Earth Summit, June 27, 1998, Diario las Americas.


\textsuperscript{56} See, e.g. AAMEC, Fuentes Contaminantes del Ambiente en Cuba, CUBAECO # 2, October, 1997.
in a system where industrialization is the overriding directive, focusing on increasing industrial output at the expense of all other considerations.\footnote{Sergio Briquets & Jorge F. Pérez-Lopez, The Environment and the Cuban Transition, Proceedings of the Association for the Study of the Cuban Economy, 1997.}

Lastly, as a totalitarian system with centralized authority, all decisions impacting environmental policy are made by appointed bureaucrats and without any meaningful public participation whatsoever.\footnote{Id.}

**Legal Factors**

The legal structure and institutions of the Castro regime have inherent flaws that have contributed to environmental destruction. First and foremost, as a totalitarian dictatorship centered on the whims of a caudillo, the concept of a rule of law in Cuba is non-existent. As the sole controlling political entity, the Cuban Communist Party has exclusive control over all branches of power. Despite an extensive code of laws and regulations, officials and entities place party objectives above the law, and therefore such laws are applied arbitrarily.

In fact, in order to provide government authorities the maximum flexibility in pursuing the overriding directives of the Party, the law is written broadly and vaguely. As such, laws in present-day Cuba are often broad statements of policy, bereft of any detail, transparency, or consistency. Cuba’s existing environmental law unfortunately falls into this pattern.

The key Cuban environmental law is Law No. 33, also called the “Law on Environmental Protection and the Rational Use of Natural Resources.” The law itself is a brief document consisting of only 25 pages. Unfortunately, rather than creating an effective procedural and substantive legal framework, the Law provides only a broad policy statement, with undefined and vague terms.\footnote{Carlos Wotzkow, Naturaleza Cubana, Ediciones Universal, Miami, Florida, 1998. B. Ralph Barba and Amparo E. Avella, Cuba’s Environmental Law, Proceedings of the Association for the Study of the Cuban Economy, 1995.} For example, the Law requires “proper treatment” of wastes before release into the environment, but
does not define and clarify the term “proper treatment” nor does it define “wastes.” The law also fails to set standards and contamination limits, making it virtually unenforceable.

In defense of its system, the Cuban government has argued that the absence of clear definitions and concentrations is necessary, since such regulations should be promulgated by the legislature. However, to date, none have been created. Similarly, enforcement provisions remain inoperative and are not applied.

Most importantly, the law’s stated purpose is to “establish the basic principles to conserve, protect, improve and transform the environment and the rational use of natural resources, in accordance with the integral development policies” of the Cuban government. Thus, the very language of the statute establishes that Cuba’s environmental regulatory framework is secondary to “integral development policies” thereby favoring economic development over environmental protection.

Another flaw of Cuban environmental law is its focus on current compliance rather than on clean-up of past contamination. Thus, Cuba lacks any legislation similar to the U.S. Superfund Law or the Resource Conservation and Recovery Act’s “corrective action program.” Because no law addresses pre-existing contamination, there is no impetus for state-owned industry or foreign investors to address these problems, thus acting as a disincentive to the development of an infrastructure to address past contamination.

In addition to problems with the law itself, government authorities charged with enforcing the law do not adequately apply the law. The government agency authorized to enforce and apply Law 33 is called the Commission for the

61 Id.
63 Id.
64 Id.
Environment and Natural Resources (COMARNA)\textsuperscript{67}. However, regulations proposed by COMARNA are never or poorly enforced\textsuperscript{68}. Further, because COMARNA's goals are deemed inconsistent with competing goals of industrialization and development, other Cuban ministries have actually worked to slow the implementation of new environmental policies. Thus, inter-agency conflicts frustrate goal-setting and environmental infrastructure planning.

For example, on the local level, the Ministry of Agriculture (MINAGRI), charged with promotion of development of resources, has complete authority over Commissions for the Environment\textsuperscript{69}. Other ministries, with competing agendas, such as the National Institute for Tourism (INTUR), often act in spite of, or independently, of environmental authorities\textsuperscript{70}. Even supposedly environmental authorities, such as the National Enterprise for the Protection for Flora and Fauna, have the overriding mission to exploit natural resources by exporting indigenous species\textsuperscript{71}. Likewise, the Ministry of the Fishing Industry (MIP) and the Institute for Ecology and Systems (IES), both serve to promote intensification of sugar agriculture, building of pedraplenes, damming of rivers, and hotel plans\textsuperscript{72}.

As a consequence, there has been no institutional or political continuity in environmental protection, making environmental policy itself both transitory and inconsistent. In the absence of consistent policy, the setting of priorities with respect to infrastructure development in particular, is precluded.

Lastly, another reason for the lack of environmental enforcement is the absence within the existing totalitarian regime for any form of public pressure in promoting enforcement. Although several small civic environmental organizations have organized on the island, no major non-governmental organizations exist to

\textsuperscript{67} Id. at 8.
\textsuperscript{68} Id. at 9-10.
\textsuperscript{69} Carlos Wotzkow, Natumaleza Cubana, Ediciones Universal, Miami, Florida, 1998; p. 42.
\textsuperscript{70} Id.
\textsuperscript{71} Id.
\textsuperscript{72} Id. at 43.
protest against government projects with a negative environmental impact. In any case, if such groups voice their opposition to official policy decisions, they are often deemed political dissidents and detained or imprisoned.

**Economic factors**

Cuba's economic conditions have negatively impacted environmental protection as well. First, the communist economic model imposed by the Castro regime is inefficient and has impaired the ability of the regime to fund its activities. Second, following the economic and political collapse of the Soviet Union and the Eastern Bloc, the Cuban government has lost key subsidies that helped support its ailing economy. Since then, the Cuban government has entered what it has labeled the “Special Period,” which has further inhibited compliance and enforcement of Cuban environmental law.

In fact, the Cuban government's response to its economic crisis has been to attempt to increase industrial development, especially encouraging foreign investment. Considering Cuba's competing economic priorities, such as increasing industrial development and output, and lobbying efforts designed to attract foreign investment, it is not surprising that environmental enforcement is sacrificed. In addition, current Cuban statutes do not mandate the aggressive development of a comprehensive environmental infrastructure. In sum, for the reasons outlined above, Cuban environmental laws are not enforced and the Cuban environmental regulatory entities are neither adequately funded nor staffed, resulting in the present environmental crisis.

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74 Id. at 45.
76 Id.
IV. The Role of Environmental Technology Transfer and Foreign Investment in addressing Cuba’s Environmental Crisis

At the dawn of a new Cuban republic, a transition-era government will not only have to identify and prioritize the many problems it will face in the aftermath of the Castro regime’s disastrous misrule of the island and its people, but it will have to identify sources of funding for resolving such problems. In a post-Castro free market Cuba, strategies based on domestic sources of funding would be similar to that in other newly-developing countries, such as direct government expenditure of funds, general-obligation bonds, subsidization, and concessions to enterprises. However, relying on public financing will have significant limitations, especially in a nation transforming its economy to a free market system and facing an immense foreign debt. Related limiting factors would involve the creation of a bond system, limited revenue, economic troubles, and decades of poor financial management.

In sum, public funds will be too limited to adequately address environmental needs.

Private domestic funding sources during the transition process will also be limited. Newly-established Cuban banks will lack the necessary experience in financing environmental infrastructure development. Also, as it is likely banks will charge high interest rates during a time of economic insecurity, all but the largest businesses will be precluded from financing environmental projects. Considering these conditions, it is unlikely, at least initially, that Cuban banks will be able to provide the massive amounts of capital necessary for the development of an environmental infrastructure.

Similarly, relying on international monetary institutions, such as the International Monetary Fund and the World Bank, will be a difficult choice for the new leadership, especially in light of Cuba’s existing debt load and the stringent terms and conditions often imposed by such lenders. For these reasons, Cuba, like many developing countries, will probably opt for foreign capital as a source for funding environmental development\(^\text{80}\).

**Foreign Investment**

Foreign investment in Cuba, and Latin America for that matter, has historically been a divisive issue, often pitting countries’ investment needs with valid concerns over excessive political and economic power wielded by foreign investors. In Cuba, where all foreign businesses were expropriated only 40 years ago, and where issues arising out of these events will continue into a Transition-Era Cuba, the issue of foreign investment and its interplay with national sovereignty and security will remain a key consideration. However, as discussed below, foreign investment in environmental infrastructure may be a form of investment which will best serve Cuba’s economic and environmental interests.

First, not only will such investment provided the much-needed funds, but in the area of environmental protection, foreign entities and businesses will serve as the source of the required environmental technology and know-how for addressing environmental problems. Such investment and technology transfer, if managed properly, will also spur the creation of a domestic Cuban environmental industry which will benefit both the economy and the environment.

Worldwide, developing countries have been approaching foreign investment as a form of private funding, with increasing frequency\(^\text{81}\). However, foreign investment decisions involve an evaluation by two parties: the investor and the nation seeking investment. Essentially, the nation seeking investment will have to

\(^{80}\) Id.  
\(^{81}\) Id.
determine the degree to which such investment will serve national and public interests, while the foreign investor will seek suitable conditions to control risk and ensure a return on the investment.

Transition Government Concerns

In Cuba’s case, a transition-era government will need to measure the benefits of such investment against domestic political considerations, including public opinion, and the need to create Cuban industries upon which a national economy may be rebuilt. With regard to public opinion, public perception of foreign investment may be tainted both by the ideological baggage of forty years of political and economic isolation, as well as by the experience under current foreign investment practices on the island, whereby Cuban citizens are exploited through unsafe working conditions and payment in the form of the almost-worthless peso. Most significantly, public perception places part of the blame of Cuba’s environmental crisis on foreign investors, who have come to the other island partially to take advantage of the Castro regime’s lax environmental enforcement practices.

In addition to considering public opinion, a transition-era government will need to determine the suitability of the proposed foreign investment within the context of a nation essentially re-building its infrastructure. Like other Latin American countries faced with similar decisions, Cuba’s new government will have to consider the form of foreign investment presented, which can exist in several forms.

Forms of Investment

Portfolio Investment is the primary source of foreign investments in Latin America, wherein investors hold highly liquid, debt and equity securities, without

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assuming managerial responsibilities. Portfolio investors supply enormous amounts of capital to developing economies, supplying 50% of all net external finance in Latin America between 1989 and 1992. In fact, portfolio investment accounted for 66% of gross capital inflows into Latin America in 1990-94, with $61 billion in net inflows in Mexico alone from 1990-93. Despite the benefits of such investment, portfolio investment can be a highly destabilizing force in Latin American capital markets, due to the rapid speed with which such investments can move in and out of markets. Sudden inflows can lead to an overvaluation of domestic currency that will favor imports over exports, and rapid outflows, such as in Mexico in 1995, can devastate local stock markets, cause huge swings in interest rates, and increase unemployment rates.

For these reasons, Portfolio Investment may not be the preferred form of investment for the purposes of creating an environmental infrastructure. As applied to environmental investment, any one of the forms described below will be useful options to consider in creating a Cuban environmental infrastructure, while avoiding the drawbacks of portfolio investment.

A possible alternative investment option may exist in the form of Relational Investment, which has been proposed for other developing countries as a means of providing investment without the pitfalls of portfolio investment. Relational investors buy and hold, but do not control, financial investments in domestic businesses and have a commitment to long-term economic performance. Therefore, these types of investors have an interest in maintaining stable economies.

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84 Id. at 543.
85 Id. at 556.
86 Id. at 559.
87 Id. at 543.
88 Id.
89 Id. at 544.
90 Id. at 544.
in developing countries, since they cannot suddenly shift investments out of the
country, as with portfolio investments. In addition to providing needed capital,
relational investments may act as a stabilizing force against changes in portfolio
investment flows. Of course, the degree to which such investments will serve as
stabilizers is variable. For example, in some instances, other causes of economic
instability, such as political instability, war, or a devaluation, may outweigh any
beneficial effects of direct investment. Nonetheless, such investments ensure that
some capital investments will exist to support a recovery.

Another alternative to portfolio investment is direct investment, such as in
the form of the joint venture. A joint venture is defined as: an integration of
operations between two or more separate firms where (1) the enterprise is under
the joint control of the parent firms; (2) each parent makes a substantial
contribution to the joint enterprise; (3) the enterprise exists as a business entity
separate from its parents; and (4) the joint venture creates significant new
enterprise capability in terms of new productive capacity, new technology, a new
product, or entry into a new market. Such partnerships can provide capital and
technological expertise from the foreign parent, and local knowledge and experience
from the local Cuban partner.

Another investment option is the use of concession agreements, whereby a
government grants a license to foreign corporation to engage in a particular venture,
with the foreign corporation providing management, technology, and capital, and

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91 Id.
92 Id.
93 Christopher J. Sozzi, Project Finance and Facilitating Telecommunications Infrastructure
Development in Newly-Industrializing Countries, 12 Santa Clara Computer & High Technology
94 Joseph F. Brodley, Joint Ventures and Antitrust Policy, 95 Harvard Law Review. 1523, 1526
(1982), cited in Christopher J. Sozzi, Project Finance and Facilitating Telecommunications
Infrastructure Development in Newly-Industrializing Countries, 12 Santa Clara Computer &
95 Christopher J. Sozzi, Project Finance and Facilitating Telecommunications Infrastructure
Development in Newly-Industrializing Countries, 12 Santa Clara Computer & High Technology
the state retaining ownership interest in company assets96. Thus, such agreements can result in the state providing for the public interest through ultimate control, and the private corporation providing business know-how and needed capital97.

Finally, another option to Portfolio Investment is project finance, existing in various forms, but most commonly either as Build-Operate-Transfer (BOT) or Build-Own-Operate (BOO) models98. In the BOT model, a foreign investor supervises the construction and operations of a project facility for a certain amount of time, and later transferring ownership to the state99. Under the BOO model, the foreign investor retains ownership of the facility indefinitely100.

In sum, all of the above foreign investment options provide ample flexibility for a Cuban transition government to encourage needed investment while protecting the interest of the Cuban people. Most importantly, such investment options will promote the transfer of environmental technology that will be required to address Cuba’s environmental needs. Also, direct investment creates a long-term commitment to the domestic business. Because it is more difficult to pull out the investment, such investors are also more likely to stay and weather difficult times. Lastly, direct investors will have the option of directly managing the business and will thus be better able to protect their interests. Thus, direct investment in Cuban infrastructure will provide Cuba with the dual advantages of capital and technological support, while allowing foreign investors to retain greater management control over operations101. For these reasons, foreign investment and technology transfer may be advantageously used by a new Cuban government.

96 Id. at 445-46.
97 Id. at 446.
98 Id. at 448.
99 Id.
100 Id.
101 Id. at 443.
Quality of Environmental Technology

A transition-era government will also need to consider the quality of the environmental technology being introduced into Cuba. In other Latin American countries, such imports have been criticized as “end of pipe” technology, designed to deal with already-generated waste\textsuperscript{102}. For example, United States companies have exported old and outdated technologies, no longer appropriate for the U.S. market, to foreign markets\textsuperscript{103}. Such technologies are useful in treating existing waste, but are criticized as encouraging continued production of wastes and shifting the focus from waste minimization. In fact, some critics insist that imported environmental technology should center on waste minimization technology, which is better suited to a country in the process of industrialization\textsuperscript{104}. A transition government will need to address these questions as it measures the forms of investment it will promote.

Foreign Investor Concerns

The other side of the coin in creating these transactions will be foreign investors themselves. Several key factors will determine the extent to which foreign investors will be willing to make capital investments or transfer environmental technology to the nascent Cuban market.

Foreign investors who seek to enter foreign markets require “transparency,” which refers to a clear, open and fair set of investment policies\textsuperscript{105}. Transparent policies clearly establish and publish all relevant rules applying to foreign investors\textsuperscript{106}, thereby providing them with the necessary information with which to make informed investment decisions. In this manner, investors will be able to estimate the costs (and risks) associated with the investment. Thus, if Cuba’s

\textsuperscript{102} National Law Center for Inter-American Free Trade, Disparities Between Law and Practice in the Management of Hazardous Waste in the U.S. and Mexico, p. 83 (1995).

\textsuperscript{103} Id.

\textsuperscript{104} Id.

\textsuperscript{105} Id. at 111-112.

\textsuperscript{106} Id. at 112.
transition government seeks to attract investors, it will have to create a legal and regulatory framework that will be transparent to investors.

An Emerging Cuban Environmental Market

Worldwide, the environmental technology and consulting industry is seeking new markets, as existing markets are either stagnating or shrinking. In the U.S., for example, several sectors of the environmental technology industry, particularly the hazardous waste industry, are struggling. The only projected growth areas for the industry are in foreign markets, including a transition-era Cuba. In Latin America, the sale of environmental goods and services expanded to $7 billion in 1995, and is predicted to grow to twice that level in the next five years. Based on these expected demands, the U.S. Department of Commerce has developed a Latin American Environmental Initiative to promote environmental technology exports to Latin America, that will presumably include a transition-era Cuba as well.

In fact, many of the largest potential Cuban customers may include public sector agencies, such as environmental and energy authorities. Other potential opportunities will also exist in the private sector, especially among major multinational corporations that follow corporate environmental standards. The largest portion of the market may involve provision of environmental equipment and services to petroleum, chemical, and petrochemical industries, as well as the processing, collection, transportation, and recycling of waste.

Business opportunities will also arise out of Cuba's many unmet environmental needs, such as: (1) treatment of solvents, oils, and paints, (2)

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108 Id.
109 Id.
111 Id.
112 Id.
treatment of heavy metals, acids, resins, adhesives, silicon and plastics, (3) waste
confinement technology, (4) recycling hazardous and non-hazardous waste, and (5)
waste collection/transportation. Other opportunities may exist in the recycling of
hazardous wastes for newly-created Cuban industries, provided that the proper
technical, marketing, economic, environmental, and regulatory incentives are in
place. In sum, such business opportunities may be aggressively pursued by foreign
investors, because Cuba, like the rest of Latin America, will present a potentially
lucrative market for environmental products
and services\textsuperscript{113}.

Uncertainty during Transition

Despite the potential market, foreign investors may be reluctant to invest
in a transition-era Cuba due to its probable economic instability triggered by a
transition to a free market system and an enormous foreign debt. Also, because
foreign investment will be entering a Cuban free market for the first time since the
1950's, few economic indicators will exist to predict how foreign investors will fare
in a new, potentially volatile, Cuban market.

Other uncertainties that may impede foreign investment may include: (1)
limited availability of public sector financing, (2) insufficiently-developed capital
markets, (3) potential lack of long term financing in the local and international
markets, (4) potential lack of adequate mechanisms to cover political, financial and
legal risks of investment in Cuba, (5) reliability of demand and revenue forecasts,
(6) inadequate funding for feasibility studies and preliminary design and
engineering\textsuperscript{114}, and (7) unfamiliarity with a newly-created Cuban legal system.

\textsuperscript{113} "Pressures to Protect Environment and promote sustainable development policies in Latin

\textsuperscript{114} Derived from National Law Center for Inter-American Free Trade, Disparities Between Law and
Legal Factors

A key factor in creating the demand for environmental technology and services will be the degree to which Cuban environmental law clearly sets standards and criteria and enforces them. As previously mentioned, a clearly-defined environmental law will assure both Cuban business entities and future investors of transparency, and greater ease in complying with the law. New clear definitions and environmental standards will also promote a market for waste confinement/treatment sites and other infrastructure. For example, such regulations may include a list of hazardous waste substances and approved treatment/disposal methods and container requirements. Lastly, drafting of a statute requiring cleanup hazardous waste sites in Cuba, many polluted by foreign joint ventures that currently operate in Cuba, will trigger more demand for environmental services and equipment.

This is because the environmental technology market differs from other types of markets, in that demand is driven by government action in the form of environmental legislation, regulations, standard-setting, and enforcement\textsuperscript{115}. In developing countries, limited enforcement will deter increased demand for environmental technologies\textsuperscript{116}. In such nations, domestic industries may not comply with environmental laws or may choose to pay fines, rather than invest in environmental technology\textsuperscript{117}. In sum, a free Cuba’s environmental market, like that of the United States environmental market thirty years ago, will evolve into a sophisticated and competitive market only after environmental regulations are developed and enforced. If this is the case, foreign investors will be have sufficient incentives to invest in the Cuban market.

\textsuperscript{116}\hspace{1em}Id.
\textsuperscript{117}\hspace{1em}Id.
Public Relations and Participation

The ease with which foreign investors will participate in the Cuban market will be dependent on public perception, as previously discussed. Thus, investors may win public support for proposed projects by encouraging participation by Cuban communities and by demonstrating the benefits, both economic and health-wise, of the proposed operation. In this way, local concerns would be addressed in the early stages, before a substantial investment is made, thereby hopefully avoiding a loss to both parties.

VII. Conclusion

A transition-era Cuba will face a substantial challenge in adequately addressing its environmental problems, a legacy of the Castro regime's neglect and mismanagement. As a problem with a solution based in foreign technology, foreign investment and environmental technology transfer will play a large role in addressing Cuba's environmental needs. Such investment, which tends to create long-term transactional relationships, will benefit the fragile Cuban economy while providing needed technology.

Such benefits are largely dependent on the Cuban officials of the New Republic, who will need to develop new policies and laws that will promote both environmental protection and economic growth. These two societal goals need not compete with each other and may be attained concurrently. The success of such policies, however, will also be based on foreign investors who, as evidenced by their efforts in other Latin American countries, will have substantial interest in developing an environmental technology/treatment market in Cuba. Together, a transition government and environmental technology providers may work together to promote creation of a system that will protect Cuba's environment and benefit the Cuban economy as well.
About the author

Aldo Leiva is an attorney in Miami, Florida, focusing his practice on civil litigation and business transactions. Mr. Leiva was born and raised in New York, NY, and has attended Binghamton University (B.S.), University of Massachusetts (M.S.), and the University of Arizona (J.D.). In addition to his legal practice, Mr. Leiva devotes his energies to researching Cuban policy issues and is currently writing a comprehensive history of the Cuban War of Independence. In this capacity, Mr. Leiva has written several policy articles and has been a featured speaker at the Annual Meeting of the Association for the Study of the Cuban Economy. Mr. Leiva is a member of the Cuban Studies Association, Association for the Study of the Cuban Economy, Cuban American Bar Association, and the Florida Bar.

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