

UCLA

Electronic Green Journal

Title

Environmental Protection Efforts in a Developing Country: The Case of Guyana

Permalink

<https://escholarship.org/uc/item/86f3q49b>

Journal

Electronic Green Journal, 1(13)

Authors

Lakhan, V. Chris
Trenhaile, A. S.
LaValle, P. D.

Publication Date

2000

DOI

10.5070/G311310391

Copyright Information

Copyright 2000 by the author(s). All rights reserved unless otherwise indicated. Contact the author(s) for any necessary permissions. Learn more at <https://escholarship.org/terms>

Peer reviewed

Environmental Protection Efforts in a Developing Country: The Case of Guyana

V. Chris Lakhan

A. S. Trenhaile

P. D. LaValle

University of Windsor, Canada

.....
This paper demonstrates that after decades of environmental resource exploitation, degradation and contamination of Guyana's environment, the government, democratically elected on October 5, 1992, inherited a legacy of environmental problems which include the cumulative adverse effects of unbridled logging and mining, heavy metal contamination of soils and sediments, poisoning of water resources, pesticide contamination, highly polluting liquid and solid wastes, and losses of life sustaining ecological resources. To deal with potential environmental problems and to take remedial actions toward existing problems the government, for the first time in Guyana's history, enacted environmental protection legislation, passed environmentally-related acts and laws, and embraced sustainable development goals.

While various acts and laws are aimed at environmental protection, this paper, nevertheless, emphasizes that environmental degradation and contamination will continue unabated unless the government addresses several constraints, among them administrative neglect and unethical practices, fragmented environmental institutions, inadequate monitoring and enforcement capabilities, inherited foreign debts, irresponsible environmental practices of multinationals, and a paucity of environmental education programs.

Ever since Sir Walter Raleigh fired the imagination of European explorers with his 1596 book, *The Discoverie of the Large, Rich and Bewtiful Empyre of Guiana*, the environment and resources of Guyana have been indiscriminately and irresponsibly exploited. Prior to 1992 there were inadequate or nonexistent laws and legislation to prevent the exploitation and degradation of Guyana's abiotic and biotic resources. When the Peoples Progressive Party/Civic (PPP/Civic) came to power on October 5, 1992, the government that was formed inherited a legacy of environmental problems, including the cumulative adverse effects of unbridled logging and mining, heavy metal contamination of soils and sediments, poisoning of water resources, pesticide contamination, highly polluting liquid and solid wastes, and losses of life-sustaining ecological resources.

Although in 1992 Guyana was one of the most indebted countries in the

world, with debt consuming more than 80 percent of generated revenues (Jagan, 1994) the new government, nevertheless, embarked on several initiatives to protect the country's environmental resources, and to enhance the quality of the existing environment. This paper assesses the environmental initiatives of the PPP/Civic government, which has been the main political party in power since October 1992. To be able to evaluate objectively the government's efforts at environmental protection it is necessary to provide an account of historical anthropogenic activities that contributed to the deteriorating environment inherited by the PPP/Civic. First this paper provides an account of research methodology, and a brief overview of Guyana's environment and resources.

Remarks on Research Methodology

Since 1990, the authors and various graduate students from the University of Windsor have been engaged in a program of environmental monitoring and environmental management in Guyana. Other than establishing two research stations to systematically obtain measurements on environmental variables, supporting data and documents have also been obtained from various government agencies, libraries, archives, and previous field investigations in Guyana (for example, Singh and Lakhan, 1994; Lakhan et al., 1995; Lakhan and LaValle, 1996).

A more elaborate environmental research program was initiated in 1997 when the Canada Caribbean Research Group provided financial support to the senior author to conduct a study on environmental concerns and environmental protection efforts in Guyana. To facilitate successful completion of this research a thorough assessment was made of all existing published and unpublished environmental material. In addition, face-to-face interviews were conducted with citizens, officers of non-government organizations, and government personnel concerned with environmental protection efforts. Some results of an empirical survey assessing the personal concern of citizens for Guyana's natural environment can be found in Lakhan and LaValle (1998-1999). This paper is a brief summary of an objective and comprehensive analysis of all communicated information, collected data, and written material on environmental concerns and environmental protection efforts in Guyana.

Overview Of Guyana's Resources And Environment

Guyana, formerly British Guiana, is a tropical country located on the northern coast of South America between 00 41' N and 80 33' N and 560 32' W and 610 22' W. With a territory of 214,970 square kilometres, Guyana is approximately the size of Britain, but has a population of only 900,000.

Settled in the early eighteenth century by the Dutch, and captured by the French, Guyana was finally ceded to the British in 1814. The expansion of European settlements resulted in the introduction of thousands of slaves and indentured labourers to work on the plantations (Smith, 1962). Aside from Guyana's approximately 3 percent indigenous Amerindians, most of the population is comprised of the offspring of immigrants who were brought as slaves from Africa or as indentured labourers from Madeira, China, and India (Lakhan, 1990).

Before the establishment of settlements by the colonizers, more than 80 percent of the country was covered by tropical forests. The richness of the biodiversity of Guyana has been documented by several early authors, among them Walter Raleigh (1596), Schomburgk (1840) and Francis and Mullin (1922). According to Schomburgk (1840, p. 28-29), "few countries on the surface of the globe can be compared with Guyana for vigour and luxuriance of vegetation." Although unregulated utilization and exploitation of the country's natural resources resulted in damage or destruction of numerous diverse ecological communities, Guyana still harbours "nearly 8,000 species of flora, of which half are endemic. There are also nearly 1,200 vertebrates, of which 728 are birds, 198 animals, 137 reptiles, and 105 amphibians" (NEAP, 1994, p. 30).

Legacy Of Environmental Problems

Environment and Development from Colonizing Settlements to Independence

Guyana's environmental problems can be traced not only to the indiscriminate exploitation of natural resources by the colonizers, but also to ill conceived, uncoordinated, and environmentally unsound development strategies in the post-independence period. Several authors (for example, Beckford, 1972; Parenti, 1989; Watts, 1990; Fried, 1991; Bauzon, 1992) have explained the linkages between colonialism and environmental exploitation and degradation. According to Bauzon (1992), colonialism left a legacy of economic despoliation and environmental degradation because the colonial powers were not interested in broad based economic development. The colonial system laid the foundation for environmental problems by controlling trade, labour, and resources. The practices by the colonial settlers and administrators did not assign any priority to the environment unless they were pecuniary (Parenti, 1989), and the plantation owners calculated their first priority according to the advantages of the individual estate (Rodney, 1981).

Commenting on the colonial economy before Guyana gained its

independence in 1966, Jeffrey and Baber (1986) stated that foreign companies had a profound influence on draining the natural resource wealth of the country and controlling the political and economic life of the colony. With the absence of environmental laws and regulations, the planters employed environmentally destructive policies. For instance, to remain productive the plantation required a constant acquisition of land and in its expansion left behind an environment that remains impoverished to this day (Mintz, 1991). The ill-planned and uncoordinated expansion schemes of nearly all colonial developers can be blamed for many of the water control problems experienced in Guyana today (Lakhan, 1994).

Environmental Degradation in the Post-Independence Period, 1966-1992

Environmental degradation and constraints to environmental protection prevailed not only in the colonial period but were also exacerbated when Guyana attained its independence from Great Britain in 1966, after 152 years of colonial rule. The Peoples National Congress (PNC), the government in power between 1966 and 1992, was bent on cutting ties with its colonial past and, therefore, focused on state ownership and central planning. The government and its development planners expected the economy to grow out of the utilization of indigenous natural resources. Several national plans were implemented. An examination of the national development plans of Guyana for the periods 1966-1972, 1972-1976, 1976-1981 and 1983 reveal that all the plans were devoid of ecological measures and no funds were allocated for environmental protection. The various plans stipulated the development of many large-scale land, water, and forestry resource projects, which degraded or destroyed ecological communities throughout the coastal and interior environments. According to Mandle (1982) and Hope (1985) the ruling regime was preoccupied with augmenting the power of the PNC, and used the development plans to control every sector of Guyana's society.

Although environmental concerns were at the forefront of opinion polls at the time (Baden and Stroup, 1990), development and state policy planners ignored, deliberately or otherwise, the sustainability debate of the 1970s and 1980s, and they neither fostered nor promoted environmental initiatives. Instead, the government spent large amounts of money to showcase ill-conceived development projects such as state farms, and water diversion projects (Lakhan et al., 1990). As in the former Soviet Union, secrecy and government propaganda ensured that there was no open debate about environmental issues arising out of development projects (Medvedev, 1990). Instead of focusing on contemporary practices of establishing a symbiotic relationship between the environment and the economy, the PNC administration promoted several dysfunctional policies, which were directly

responsible for environmental degradation. Researchers (for example, Lakhan et al., 1988) have alluded to the fact that in the 1970s and 1980s development policies were made in Guyana which were either dreamed up by the President or borrowed from countries which lack Guyana's natural resource base. For instance, in assessing its failures the Guyana Ministry of Agriculture (1983, p. 1) claimed that "a headlong plunge is made into a new crop or variety without testing in local ecosystems, only basing projections on what others have done after research within their environment." Other than promoting environmentally unsound projects, the government also ignored environmental problems by neglecting to sign many multilateral treaties, which would have prevented the irresponsible utilization of resources. For example, the government of Guyana did not sign the 1971 Convention of Wetlands of International Importance Especially of Waterfowl Habitat, and the 1983 International Tropical Timber Agreement.

With no concrete development plans after 1983 the economy struggled on a chaotic, haphazard basis, much to the detriment of the people and environment of Guyana. One of Guyana's most celebrated cases of pollution came as no surprise to environmentalists and natural resource managers when, in 1987, the Ministry of Health placed the entire country on red alert in response to widespread thallium sulfate poisoning (Stabroek News, 1987). This was largely the result of the use of thallium as a rodenticide on sugar cane crops by the state-owned Guyana Sugar Corporation. To understand the magnitude of this hazardous occurrence it is worth noting that the World Health Organization recommended against the use of thallium in 1973. Nevertheless, the Guyana government deliberately used this banned substance on its crops because it was economically attractive to purchase. The claim was made that the Guyana Sugar Corporation had enough thallium in storage in 1987 to kill the entire population of Guyana (Singh, 1988). This and other banned toxic substances have placed the entire population at risk. Research conducted by Lakhan (1993) has found not only thallium, but also high levels of cadmium, lead, and zinc in the soils and sediments of coastal Guyana.

To alleviate problems of an impoverished and indebted economy, the cash-starved administration agreed to follow the 1989 International Monetary Fund (IMF) sponsored structural adjustments and economic liberalization program. As a consequence, many large local and foreign investors were encouraged to develop Guyana's natural resources. Lucrative mining and forestry concessions were granted to foreign multinationals with dismal environmental track records. Colchester (1994; 1997) provided a comprehensive account of the foreign corporations engaged in the reckless exploitation of Guyana's mineral and forestry resources. The reported

economic gains were therefore achieved at tremendous environmental cost.

Efforts at Environmental Protection

When the PPP/Civic administration assumed power on October 5, 1992, and reaffirmed its interest to follow the 1989 IMF sponsored economic liberalization program, it was faced with the massive problem of dealing with decades of environmental neglect, unregulated development, uncontrolled resources depletion and environmental degradation. To take remedial actions toward existing environmental problems and to avert potentially adverse environmental effects, the government decided to embrace sustainable resources management and environmental conservation. Although the government was faced with a massive burden of foreign debts inherited from the previous administration, the late President Jagan, nevertheless, declared on March 11, 1994 at the Caricom Intersessional Meeting his willingness for Guyana to promote sustainable development, protection of the environment, biodiversity, and environmental equity (Jagan, 1994). In an earlier speech on January 27, 1994 to the Caribbean Group for Economic Cooperation and Economic Development, the President stated that "we see democracy and development as being interrelated, and the key to achieving our goals of social and ecological justice" (Jagan, 1994a, p. 4-5).

To demonstrate its commitment toward environmental protection the government formulated, for the first time in the history of Guyana, a National Environmental Action Plan (NEAP). The government recognized the need for sustainable development and environmental protection because the objectives of the NEAP (1994) include:

- (a) conserving and utilizing the environment and natural resources of Guyana for the benefit of both present and future generations, based on the principle of the exercise of sovereignty,
- (b) maintaining ecosystems and ecological processes essential for the function of the biosphere to preserve biological diversity and to observe the principle of optimum sustainable yield in the use of renewable natural resources and ecosystems, both on land and on sea,
- (c) ensuring prior environmental assessments of proposed activities which may significantly affect the environment,
- (d) ensuring that conservation is treated as an integral part of the planning and implementation of development activities, and

(e) instituting punitive measures to deter possible violations of environmental norms.

To attain the objectives of the NEAP, in June 1996, the government passed the Environmental Protection Bill in the National Assembly. The President stressed to the National Assembly that the legislation was aimed at sustainable development of Guyana's resources, while it also reflected the country's awareness of its responsibility to all of humanity. To support the various objectives of the Environmental Protection Bill the Guyana Environmental Protection Agency was formally launched on June 5, 1996. In addition to the Environmental Protection Bill the government also introduced a number of other environmental initiatives, among them a National Forestry Action Plan, and a National Energy Policy. The government also became a signatory to several international agreements, including the Convention on Biological Diversity and the Convention on Climatic Change. It is also worthwhile to mention that the government of Guyana embraced the Rio Declaration on Environment and Development and the relevant chapter of Agenda 21, and the Rio Forest Principles as adopted by the United Nations Committee for Economic Development. At the June 24, 1997 meeting of the United Nations General Assembly which was held to review the Rio Declaration on the Environment, the President of Guyana, Sam Hinds, declared "the reality confronting our people in 1992 was a deformed dependent economy with weakened infrastructure, inadequate social services, wide scale poverty and unemployment, scarcity of skilled professionals, a narrow production base, low productivity, huge deficits and a massive debt burden. Despite these, the new administration from the start of the building process strongly embraced the principles of the 1992 Earth Summit in Rio" (*The Guyana Update*, 1997).

Since Guyana did not have the financial resources to promote sustainable development and environmental protection, the government sought the assistance of various international agencies to develop its capacity for environmental management. Assistance for natural resources management and environmental protection has been obtained from the British Overseas Development Agency, the German Agency for Technical Cooperation, the Inter-American Development Bank, and the World Bank. The German Agency for Technical Cooperation is funding a geographical information systems project for natural resources management while the British Overseas Development Office is working on a national forest policy. In December 1996 the Inter-American Development Bank announced the allocation of US\$1.5 million in non-reimbursable financing for Guyana's Environmental Protection Agency and to improve the environmental protection capabilities of the Guyana Forestry Commission and the Guyana Geology and Mines Commission. In addition, in May 1997 the World Bank

agreed in principle to disburse US\$6 million for the creation of a system of environmental protection in the country's rainforest regions. Environmental institutions such as the World Wildlife Fund and the Smithsonian Institution are also actively involved in various environmental endeavours. For example, in September 1996 the Washington-based World Resources Institute launched Sizer's 1996 study titled, *Profit Without Plunder: Reaping the Revenue from Guyana's Tropical Forests Without Destroying Them*. This study is aimed at charting the way for the careful use of Guyana's forests while maintaining ecological and cultural values (Sizer, 1996).

The government also established a Natural Resources and Environment Advisory Committee (NREAC), which holds weekly discussions on issues pertaining to natural resources and the environment. The NREAC includes members from the Land Use Planning Unit; the Heads of the Energy Agencies; members from the Institute of Applied Sciences and Technology and the Hydromet Department; the Acting Director of the Environmental Protection Agency; the Commissioners of Forestry, Geology, and Mines, Lands and Surveys; and the Presidential Advisor on Science, Technology and the Environment. The NREAC examines environmental and resource policy before decisions are made by the Guyana Cabinet.

Analytical Appraisal

While Guyana must be commended for accepting the challenge to foster and promote environmental initiatives, it should be emphasized that the inherited legacy of environmental problems and current environmental abuses will not disappear with the mere presentment of a National Environmental Action Plan, the enactment of an Environmental Protection Bill, passage of environmental laws, and the acceptance of sustainable development goals. Success in environmental protection, an endeavour never contemplated before, will depend on addressing effectively several issues and constraints, including administrative neglect and unethical practices, fragmentation of environmental institutions, shortages of professional and technical environmental personnel, paucity of financial resources, and the uncontrolled development practices of local and foreign investors.

Since previous administrators did not assign any priority to environmental protection, it is not surprising that up to this day there still exists, at all government levels, a preponderance of short-sighted administrators who have outmoded beliefs that environmental protection is not important for economic and social advancement. Compounding the problems of administrative neglect are the questionable and unethical transactions of some administrators who wilfully ignore existing environmental laws and

regulations for personal gains. One often cited example of incentives and conflict of interest is that of the Guyana Forestry Commission (GFC) where the Chair of the Board single-handedly negotiated logging commissions with foreign companies (Colchester, 1994). The secret and controversial manner in which many forestry concessions have been given prompted the World Bank (1993, p. 45) to claim that "the GFC seems to be the perfect example of the capture theory of regulation, that is, a regulatory agency controlled by the industry that it is supposed to regulate." Another well-publicized example of the lack of accountability of administrators can be found in the termination of the appointment of the interim Executive Director of the Guyana Environmental Protection Agency for allegations of improper actions (see Persaud, 1994; and *Guyana Times*, Dec. 1996). Without citing other cases of questionable practices, it is worthwhile to mention that the President of Guyana acknowledged on Guyana State Television that widespread corruption exists in several of the country's agencies (*Indo Caribbean World*, 2000, p. 8).

Compounding the problems of administrative neglect and malpractices is the fact that the government does not have sufficient or properly trained officers and legislators to monitor environmental problems, and to enforce pertinent legislation. For example, the Guyana Forestry Commission still has only six trained professional foresters to oversee more than 9.8 million hectares of state forests. There are problems in every aspect of implementation and enforcement including, in many cases, the failure to enact subsidiary legislation/regulations to facilitate implementation, the inability to properly monitor and detect breaches of the law, and the difficulty in apprehending offenders, prosecuting offences and imposing meaningful penalties (NEAP, 1994, p. 42). As done in the more developed countries the senior author, in an interview with Persaud (1994), pointed out that monitoring and enforcement will have to be strengthened to prevent environmental abuses.

Adding to the problems pertaining to deficiencies in administrative practices and monitoring capabilities is the fact that Guyana has no central agency to coordinate environmental management, environmental assessment and conservation efforts. Responsibility for environmental matters is therefore fragmented among a number of Ministries of the government and between local and national levels. Several diverse agencies are responsible for environmental protection and management, and resources development. For example, wildlife and fisheries are managed by the Ministry of Agriculture, national parks are administered by Public Works, and forestry, mining and energy are the responsibility of the Guyana Natural Resources Agency. In addition, the Guyana Agency for Health Sciences Education, Environment and Food Policy controls environmental monitoring and environmental impact assessment. This fragmentation contributes to the haphazard and

uncoordinated efforts at environmental protection.

Even if the government is interested and committed to promoting environmental matters and protecting the country's environment it is faced with the problem of allocating scarce financial resources to hire trained environmental personnel, and also to purchase equipment, instrumentation, and facilities for environmental monitoring, analysis and assessment. The magnitude of Guyana's debt burden will act as a major deterrent to environmental protection. According to Jagan (1994, p. 4), the late President of Guyana, "we need sustainable growth, but this will not be attained with the huge debt burden, which consumes nearly 80% of our state revenues, and about 60% of foreign earnings." The President reiterated his recognition of Guyana's debt burden and the country's inability to solve environmental problems when he addressed the western hemispheric leaders at the December 1994 Summit of the Americas. In his address the President declared that "we need growth and eco-justice. However, there will be no solution to environmental questions, for instance, if the boundaries of poverty continue to expand" (Guyana Times, 1994, p. 5). Since there are positive correlations between the debt burden and environmental degradation in the Third World (George, 1988; 1992), the Government of Guyana is faced with the challenging task of promoting and sustaining environmental protection measures.

To alleviate problems of poverty, Guyana is heavily dependent on its natural resources and encourages investors in the forestry, mining and agricultural sectors. With inadequate monitoring and enforcement capabilities, local and foreign multinationals are avariciously exploiting the country's forestry and mineral resources with little or no attention paid to environmental impacts. Without doubt, some companies are reckless in their exploitation of the country's forests and mineral resources. For example, the Canadian-owned Omai Gold Mines Ltd., which started operations in Guyana in 1993, caused the country's worst environmental disaster when its waste water pond broke on August 19, 1995, spilling more than three million cubic metres of cyanide-laden wastes into two of Guyana's major rivers, the Omai and the Essequibo. In addressing the nation regarding the spill from the Omai Gold Mines, the President of Guyana, on August 22, 1995, declared the Essequibo region an environmental disaster zone because of the disastrous implications for the lives of people and for the marine and biological resources in the aquatic systems of Guyana's interior environment (Jagan, 1995). The Committee that investigated the spill blamed Omai Gold Mines Ltd. for faulty construction of the waste pond thereby substantiating claims from the London-based group Friends of the Earth that the wastewater pond was not built to North American standards. While the adverse cumulative impacts of the spill will not be discussed here, it is clear that the reported gains being

accrued by Guyana's economy are achieved at tremendous environmental costs.

The problems of irresponsible environmental practices by foreign multinationals in the mining industry are also prevalent in the forestry sector where, according to the Rainforest Action Network (1996), "Guyana is under siege by greedy lumber companies from Malaysia and Canada that want to get dibs on the fledgling republic's virgin forests, and take advantage of the country's growing pains." Fleming (1995) conducted a study for the World Bank that showed that the royalties, taxes, and forest fees being paid by loggers in Guyana are among the lowest in the tropics, being less than one-tenth of those paid in most Asian and African countries. Apart from 'mining' Guyana's forests, and in the process destroying pristine ecosystems, it must be emphasized that "this kind of forest mining entails a boom and bust pattern of development that can be highly disruptive to employment levels, trade balances, and other factors of macroeconomic stability".

While the impacts of local and foreign investors are escalating environmental problems there has been no widespread opposition from Guyana's citizenry. This can be attributed to the fact that Guyana does not have any entrenched environmental education program. An examination of the education curriculum reveals a paucity of environmental education courses at the primary, secondary and college levels. Only in 1993, did the University of Guyana initiate its first degree program in environmental studies. As far as can be ascertained there are also no community outreach programs to promote environmental education in the country. With the lack of environmental education programs, especially at the pre-University level, together with less than ten inadequately funded non-governmental organizations currently interested in environmental matters, the citizens of Guyana have inadequate environmental education. Lakhan and LaValle (1998-1999), who interviewed 1600 people in Guyana, found that the weak environmental traditions of the country contribute to the low personal concern for the environment by respondents of all ages. Less than 40 percent of all those who were interviewed stated that they were highly concerned for the natural environment of Guyana. Without an educated, vigilant and involved citizenry minimal pressure is applied on the government to become the vanguard of the country's environment. Hence, environmental problems are continuing unabated and the claim of John Blashford-Snell seems appropriate when he stated that "no other country in the world would allow its natural beauty spots to be destroyed in the way Guyana has been doing" (Guyana Times, 1993, p. 7).

Conclusion

While the PPP/Civic government can be credited for making positive and progressive environmental policy decisions for the management and protection of Guyana's environment it is, nevertheless, evident that Guyana is faced with the formidable task of protecting the environment from future degradation. The inherited legacy of environmental problems, and current environmental abuses will not disappear with the mere presentment of a National Environmental Action Plan, the enactment of environmental protection legislations, and the acceptance of sustainable development goals. The present administration's strong desire to protect the country's environment, an endeavour never before contemplated, must now be complemented and strengthened by the execution and enforcement of stated environmental policy goals.

It may be argued that the attainment of environmental policy goals will be an arduous task because Guyana has to utilize its natural resources to improve the economy and the welfare of its impoverished citizenry, while at the same time preventing depletion of resources and contamination of the environment. While the tasks may seem formidable, they are not insurmountable because the principles of sustainable development need not conflict with those of resource utilization and environmental protection. Since economic development and sound environmental management can be complementary aspects of the same agenda, Guyana can ill-afford to allow unbridled exploitation of its environmental resources by large local and foreign investors. The government must have accountable officers and institutions prepared to strictly enforce environmental laws and legislation in order to regulate the actions of companies which engage in businesses that are likely to threaten, disrupt, and pollute Guyana's environment and ecosystems. While the need for investment is critical for Guyana's economic and social advancement, the government must, nevertheless, be cognizant of the fact that irresponsible and uncoordinated development will have serious repercussions on the environment, thereby reducing the quality of abiotic and biotic resources. Furthermore, it must be emphasized that environmental protection and real sustainability can be accomplished with effective education. With sound and systematic environmental education UNESCO (1994, 2) rationalized that people will "develop the understanding, knowledge, skills and motivation leading to the acquisition of attitudes, values and mentalities which are necessary to deal effectively with environmental issues and problems." Many other organizations (for example, World Commission on Environment and Development, 1987) and authors (for example, see Orr, 1992; Smith, 1992; Fien, 1993; Huckle, 1993; Stirling, 1996) have stated repeatedly that education is crucial for environmental protection and sustainable development. According to Stirling (1996, p. 37) "if real sustainability is to become increasingly meaningful and mainstream, rather than devalued and marginalized, education in all forms

and in all sectors has a vital role to play." With the knowledge that environmental education is necessary for understanding the interrelationships between sustainable development and environmental protection it is vital for Guyana to allocate financial resources for environmental education which will certainly promote cumulative gains in environmental protection.

Acknowledgements

Financial support from the Canada Caribbean Research Group is acknowledged. Thanks for field assistance in Guyana are extended to numerous personnel especially Jerome Lakhan, Frankie and Buddy Yamin, Mohan Mangal, Philip Kartick, Mohandat Goolsarran, Paul Rambahal, Joe Ramgobin and Navin Chandarpal.

References

Baden, J. and Stroup, R. (1990). Natural resource scarcity, entrepreneurship, and the political economy of hope. In W.E. Block (Ed.), *Economics and the environment: A reconciliation* (pp. 117-136). Vancouver, BC: The Fraser Institute.

Bauzon, K. E. (1992). Democratization in the Third World - Myth or reality? In K.E. Bauzon (Ed.), *Development and democratization in the third world: Myth hopes and realities* (pp. 1-31). Washington, DC: Taylor and Francis.

Beckford, G. L. (1972). *Persistent poverty: Underdevelopment in plantation economies of the Third World*. Oxford, UK: Oxford University Press.

Colchester, M. (1994). The new sultans: Asian loggers move in on Guyana's forests. *The Ecologist*, 24 (2), 45-52.

Colchester, M. (1997). *Guyana. Fragile frontier. Loggers, miners and forest peoples*. Great Britain and Jamaica: Latin American Bureau, World Rainforest Movement and Ian Randle Publishers.

Fien, J. (Ed.). (1993). *Environmental education: A pathway to sustainability. Geelong*. Australia: Deakin University.

Flaming, L. (1995). *An economic analysis of the timber industry in Guyana: Prospects for strengthening state capacity and private incentives for sustainable forest management*. Washington, DC: Environment Department, World Bank, September 25, 1995.

Francis, W., & Mullin J. (Eds.). (1922). *The British Guiana handbook*. Georgetown, British Guiana: The Argosy Co., Ltd.

Fried, M. (1991). The conquest of nature 1492-1992. *NACLA Report on the Americas*, XXV (2), 5-10.

George, S. (1988). *A fate worse than debt*. London, UK: Penguin.

George, S. (1992). *The debt boomerang: How Third World debt harms us all*. London, UK: Pluto Press.

Guyana Ministry of Agriculture. (1983). *A directional framework for agricultural development 1983-1990*. Georgetown, Guyana: Government of Guyana.

Guyana Times. (October, 1993). Toronto, Canada.

Guyana Times. (December, 1994). Toronto, Canada.

Guyana Times. (December, 1996). Toronto, Canada.

The Guyana Update. (1997). President Hinds makes sustainable development appeal at United Nations. *The Guyana Update* (July 1997). Washington, DC: Embassy of the Republic of Guyana.

Hope, K.R. (1985). *Guyana: Politics and development in an emergent socialist state*. Oakville, ON: Mosaic Press.

Huckle, J. (1993). Environmental education and sustainability: A view from critical theory. In J. Fien (Ed.), *Environmental education: A pathway to sustainability*. Geelong, Australia: Deakin University.

Indo Caribbean World. (February 2, 2000). Toronto, Canada.

Jagan, C. (1994). *Global dilemma. Economic growth, sustainable development and the debt burden*. Georgetown, Guyana: New Guyana Co. Ltd.

Jagan, C. (1994a). Guyana is a free country where democracy prevails and the economy is open. *Thunder*, 26 (1), 3-13.

Jagan, C. (1995). Omai must bear full blame for cyanide spill. Text of an address to the nation on Tuesday, August 22, 1995, Presidential Secretariat,

Georgetown, Guyana.

Jeffrey, H. B., & Baber, C. (1986). *Guyana. Politics, economics and society*. London, UK: Frances Pinter Publishers.

Lakhan, S., Lakhan, V.C., Singh, J.B. (1990). The use of Canadian aid to sustain Guyana's administrative dictatorship. *Caribbean Studies*, 23 (3-4), 69-84.

Lakhan, V. C. (1990). The influence of ethnicity on recreational uses of coastal areas in Guyana. In P. Fabbri (Ed.), *Recreational uses of coastal areas* (pp. 69-81). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Lakhan, V. C. (1993). Heavy metals in the coastal sediments of Guyana. *Research Report, Canada Caribbean Research Group, Toronto, Canada*.

Lakhan, V.C. (1994). Planning and development in the coastal zone of Guyana. *Ocean & Coastal Management*, 22, 169-186.

Lakhan, V.C., & LaValle, P.D. (1996). Resource based recreation of Indo Guyanese in the coastal environmental of Guyana. *Indo Caribbean Review*, 3 (1), 15-34.

Lakhan, V.C., & LaValle, P.D. (1998-1999). Assessing the personal concern of Indo-Guyanese for Guyana's natural environmental. *Indo Caribbean Review*, 4 (1), 21-38.

Lakhan, V.C., Heron, R., & Singh, P.D. (1995). Loglinear analysis of factors which have contributed to the post-independence decline of Guyana's rice industry. *Applied Geography*, 15 (2), 147-159.

Lakhan, V. C., Rawana, D., & Lall, A. (1988). Resource allocation in agriculture: the Guyana experience. *Canadian Journal of Developmental Studies*, IX (2), 235-245.

Mandle, J. R. (1982). *Patterns of Caribbean development: An interpretive essay on economic change*. New York: Gordon and Breach Science Publishers.

Medvedev, Z. A. (1990). The environmental destruction of the Soviet Union. *The Ecologist*, 20 (1), 24-30.

Mintz, S. W. (1991). A bittersweet tale. *Report on the Americas*, XXV (2),

22-29.

NEAP. (1994). *The national environmental action plan*. Georgetown, Guyana: Government of Guyana.

Orr, D. (1992). *Ecological literacy: Education and the transition to a post modern world*. Albany, NY: SUNY Press.

Parenti, M. (1989). Imperialism causes third world poverty. In J. Rohr (Ed.), *The Third World: Opposing viewpoints* (pp. 17-31). San Diego, CA: Greenhaven Press Inc.

Persaud, R. (1994, August 14). University of Windsor mapping Guyana's natural resources. *The Mirror* (Georgetown, Guyana), p. 10.

Rainforest Action Network (1996). Guyana timber frenzy, May-June 1996 Action Alert 120. Retrieved from the World Wide Web: http://www.ran.org/ran/info_center/aa/aa120.html.

Raleigh, W. (1596). *The Discoverie of the Large, Rich and Bewtiful Empyre of Guiana*. Robert Robinson, London. Reprinted by Theatrum Orbis Terrarum Ltd. and Da Capo Press, New York and Amsterdam, 1968.

Rodney, W. (1981). *A history of the Guyanese working people, 1881-1905*. Baltimore, MD: The Johns Hopkins University Press.

Schomburgk, R.H. (1840). *A description of British Guiana*. London, UK: Simpkin, Marshall, and Co. Reprinted by Frank Cass and Co., Ltd., London, 1970.

Singh, J.B. (1988). Business activity and the environment: The case of Guyana Sugar Corporation and thallium sulphate. *Journal of Business Ethics*, 7, 397-400.

Singh, P.D., & Lakhan, V.C. (1994). Water control and rice cultivation by Indo Guyanese farmers. *Indo Caribbean Review*, 1 (1), 67-82.

Sizer, N. (1996). *Profit without plunder: Reaping the revenue from Guyana's Tropical forests without destroying them*. Washington, DC: World Resources Institute.

Smith, G. (1992). *Education and the environment: Learning to live within limits*. Albany, NY: SUNY Press.

Smith, R.T. (1962). *British Guiana*. Oxford, UK: Oxford University Press.

Stabroek News. (1987). Country placed on alert. March 6, 1987, Georgetown, Guyana, 1, 23.

Stirling, S. (1996). Education in change. In J. Huckle, & S. Sterling (Eds.), *Education for sustainability*. London: Earthscan Publications.

UNESCO. (1994). Water: An educational and informative approach. *Connect*, XIX (2), 1-3.

Watts, D. (1990). *The West Indies: Patterns of development, culture and environmental change since 1492*. Cambridge, UK: Cambridge University Press.

The World Bank. (1993). *Guyana. Private sector development. A World Bank country study*. Washington, DC: The World Bank.

The World Commission on Environment and Development. (1987). Our common future. *The Brundtland Report*. Oxford and New York: Oxford University Press.

.....

V. Chris Lakhan <lakan@uwindsor.ca>, A. S. Trenhaile <tren@uwindsor.ca>, P. D. LaValle <plavall@uwindsor.ca>, Department of Earth Sciences, University of Windsor, Windsor, Ontario N9B 3P4 Canada. TEL: 1-519-253-3000 ext. 2183. FAX: 1-519-253-6214.

.....