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Proceedings of the

Conference on Environmental Management and Economic Growth in the Smaller Caribbean Islands

Wilkey, St. Michael, Barbados
September 17-21, 1979

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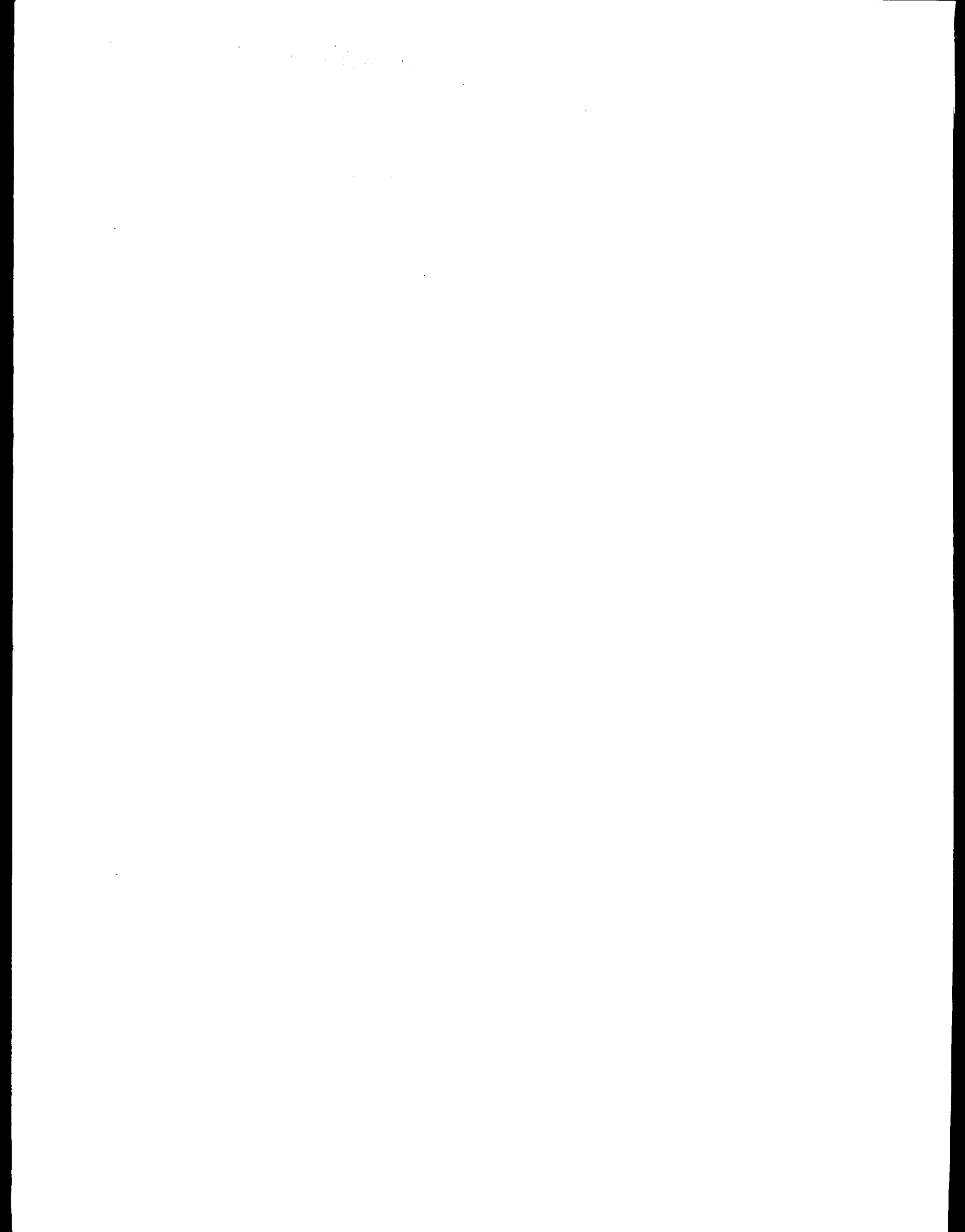
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TRANSACTIONS
AT THE
CONFERENCE ON
ENVIRONMENTAL MANAGEMENT
AND ECONOMIC GROWTH
IN THE SMALLER CARIBBEAN ISLANDS

September 17-21, 1979

Edited by William S. Beller



PREFACE

The "Conference on Environmental Management and Economic Growth in the Smaller Caribbean Islands" brought together for the first time government-designated delegates from the islands to discuss ways to achieve the sound development of their lands.

The Conference took only seven months to organize and hold. In that period, those concerned with it had formulated the programs, arranged for its sponsorship, funding, speakers, facilities, and had invited governments to participate. Five weeks after the Conference ended, the Transactions were in hand: transcribed, edited, typed, and made ready for the printer. In a total period of nine months, the Conference went from conception to the distribution of its published report.

The Conference was accomplished this quickly, first, because it was needed; and second, because those who worked on it, did so unstintingly.

Only a few weeks before the Conference took place, Hurricane David followed almost immediately by Frederick, had swept through the Caribbean wreaking havoc on many of the islands but the most serious damage on Dominica and the Dominican Republic. These events showed in terribly dramatic form how fragile the islands are: how external forces, this time nature's, but other times man's, can profoundly affect these lands. The hurricanes lent immediacy to the work of the Conference, and gave it a symbol.

The international agencies who give or lend funds and resources to assist the smaller Caribbean islands in their development were eager to know the islanders' problems, and find out whether the funds and resources were going where they could do the most good. At the same time, the governments of the smaller Caribbean islands, seriously concerned about the socio-economic state of their citizens and the physical future of their lands, wanted help to allay their worries. Through the commonality of interests, the need for the Conference was established.

The delegates considered the way their islands could develop, discussed the ramifications of the problems, then the help available, and made their recommendations. They could not have accomplished more.

The delegates spoke as representatives of their governments but without obligating their governments. This had to be because many issues were developed during the Conference, and governments had no opportunity to relay instructions. Nevertheless, the unanimous recommendations the delegates made came from influential and policy-making officials, well-informed about the issues, positions, and problems of their islands.

Editing these Transactions was a pleasure and a frustration: a pleasure because with somewhat more leisure than in Barbados, I could read the presentations and listen to the tapes, and again experience the excitement of the Conference, and comprehend more fully the hopes, human understanding, astuteness, and brilliance shown by many who participated. Alas, editing was a frustration because there was room and time enough to publish only a portion of the discussions. Selecting the most important was the chore, and I chose those that appeared to reflect best the deliberations of the delegates, and some that offered help to their governments.

There was another frustration I must share: the difficulty in transferring to paper the color, viability, and emotion the speakers gave to their thoughts.

I therefore edited the discussions as little as I could in order to retain the speakers' development of their ideas. Where I made changes, they were only for the sake of brevity or to improve clarity in the written form.

How can one assign proper credit for this Conference without naming all who appear in the list of participants, and a few who do not?

Trevor Louis Boothe served as the Secretariat for the Conference; additionally, he actively took part in the sessions, to the benefit of all of us. Were it not for him, and the UNEP/ECLA/Caribbean Environment Project office, we would have had a Conference with a lesser program and very few governments represented.

The members of the Caribbean Islands Directorate of the U.S. Man and the Biosphere (MAB) Program worked hard to initiate and design the Conference, structure its sessions, and serve as their Vice Chairmen/Rapporteurs.

To Cruz A. Matos, Officer-in-Charge, United Nations Development Programme, Trinidad and Tobago, goes much of the credit for arranging for many of the speakers to appear on the program. His wise and patient counsel also helped us avoid the pitfalls open to those who would organize an international meeting.

Donald King, Oscar Olson, and Russell Burns of U.S. MAB, and Jose Lizarraga and Jaime Hurtubia of the United Nations Environment Programme gave the encouragement that was essential for us to attempt to put such a Conference together in the allotted time. Strong encouragement and help also came from Robert Otto of the U.S. Agency for International Development.

O.K. Yhap and the Caribbean Development Bank gave the Conference unexcelled facilities. Beyond that, Mr. Yhap made program suggestions that figured heavily in the success of the Conference.

Jill Sheppard, Executive Director of the Caribbean Conservation Association, made all the arrangements in Barbados. She went far beyond this activity, helping us solve sensitive matters of protocol and of press relations, and procuring for us needed experts and resource papers. We can not easily repay her, nor the CCA.

On Phylis Rubin's shoulders fell the task of coordinating all the Conference arrangements that U.S. MAB was involved in; and at the Conference, coordinating arrangements with the Secretariat and with CCA. She never stopped, and I hesitate to contemplate how the Conference arrangements would have fared had she not been in Barbados.

Natalie Lee, untiringly and with boundless good humor, discussed papers with their authors, transcribed all the relevant tapes of the Conference, and directed and arranged for the entire production of the Transactions--all within five weeks. For assigning Natalie to this task, we are indeed grateful to the Publishing and Reproduction Division of the U.S. Department of State.

This ends the printed list but not the unprinted one, nor the extent of the gratitude the sponsors and supporters of the Conference extend to all who helped.

William S. Beller
Program Chairman

TABLE OF CONTENTS

	Page
Conference Program	vi
Conference Participants	xi
Some Abbreviations Used	xvii
SESSION I	1
SESSION II	29
SESSION III	55
SESSION IV	107
SESSION V	128
SESSION VI	179

CONFERENCE ON ENVIRONMENTAL MANAGEMENT AND ECONOMIC GROWTH IN THE SMALLER CARIBBEAN ISLANDS

Conference Program

MONDAY, SEPTEMBER 17

- 8:45-9:00 a.m. Introductory Remarks: William S. Beller, Program Chairman
- 9:00-10:00 a.m. Welcoming Remarks and Keynote Speech: The Honorable Billie Miller, Minister of Health and National Insurance, Barbados. "Basic Human Needs in Smaller Caribbean Islands, and Socio-Economic Goals of the Region's People"
- 10:00-10:15 a.m. Coffee break
- 10:15 a.m.-Noon SESSION I
- Development process: the options. What are the choices the smaller islands have for economic growth?
- A. Review of existing strategies
 - B. Alternative strategies
- Chairman: Robert Creque, Senior Administrative Officer, Ministry of Natural Resources and Public Health, Tortola, British Virgin Islands
- Vice Chairman/Rapporteur: Fuat M. Andic, Professor of Economics, University of Puerto Rico, Rio Piedras, Puerto Rico
- Author of Resource Paper: Dr. Courtney Blackman, Governor, Central Bank, Bridgetown, Barbados
- Noon-1:15 p.m. Lunch
- 1:15 p.m. Honored Address: The Honorable Sally Angela Shelton, American Ambassador to Barbados, Grenada and the Commonwealth of Dominica, American Minister to Saint Lucia, and United States Special Representative to the State of Antigua, St. Christopher-Nevis-Anguilla, and St. Vincent
- 2:15-3:00 p.m. SESSION II
- Growth limiting factors, and carrying capacity: How do the natural and human resources of a small island constrain its economic growth, resources such as water, energy, and land?
- Chairman: Jeffrey Dellimore, Caribbean Development Bank, and St. Vincent
- Vice Chairman/Rapporteur: Ariel Lugo, U.S. Council on Environmental Quality, Washington, D.C.

Authors of Resource Papers:

1. Simon Jones-Hendrickson, College of the Virgin Islands, St. Thomas, U.S. Virgin Islands
2. Kenneth Snaggs, Executive Director, PLIPDECO, Port of Spain, Trinidad and Tobago

3:00-3:15 p.m. Coffee break

3:15-4:45 p.m. SESSION II (Continued)

TUESDAY, SEPTEMBER 18

9:00-10:30 a.m. SESSION III

Accountability: how do different development strategies affect, or how are they affected by

- A. Natural resources and environmental matter--land use; coastal and soil erosion; pollution including oil spills; disposal of solid wastes?
- B. Social and cultural matters--population pressure; rapid changes in technology; values, attitudes, and societal structure?

Chairman: Senator John Connell, President, Caribbean Conservation Association, St. Michael, Barbados

Vice Chairman/Rapporteur: Eapen Chacko, U.N. Ocean Economics and Technology Office, United Nations, New York, New York

Author of Resource Paper for "A": Ivor Jackson, Town Planner, Government of the British Virgin Islands, Tortola, British Virgin Islands

Authors of Resource Papers for "B":

1. Allan Harris, Trinidad and Tobago Institute of the West Indies, Port of Spain, Trinidad and Tobago
2. Dawn Marshall, Institute of Social and Economic Research, University of the West Indies, Cave Hill, Barbados

10:30-10:45 a.m. Coffee break

10:45-Noon SESSION III (Continued)

Noon-1:15 p.m. Lunch

1:15 p.m. Honored Address: William G. Demas, President, Caribbean Development Bank, St. Michael, Barbados

2:15-3:00 p.m. SESSION III (Continued)

- C. Case histories: the shape of accountability, a visual presentation by the Chairman, Vice Chairman/Rapporteur, and the Author of the Resource Paper

Chairman: Pedro A. Gelabert, Chairman of Environmental Quality Board of Puerto Rico, San Juan, Puerto Rico

Vice Chairman/Rapporteur: Máximo J. Cerame Vivas, Professor of Marine Ecology, University of Puerto Rico, Mayagüez, Puerto Rico

Author of Resource Paper: Allen D. Putney, Principal Investigator, Eastern Caribbean Natural Area Management Program, Christiansted, St. Croix, U.S. Virgin Islands

3:00-3:15 p.m. Coffee break
3:15-4:45 p.m. SESSION III (Continued)

WEDNESDAY, SEPTEMBER 19

9:00-10:15 a.m. SESSION IV

In view of the carrying capacities of smaller islands and factors of accountability, what are the alternative strategies or possibilities for development?

A panel discussion with all the Session Chairmen

Chairman: Trevor Louis Boothe, Coordinator, UNEP/ECLA/Caribbean Environment Project, Port of Spain, Trinidad and Tobago

Vice Chairman/Rapporteur: Anthony Boatswain, Ministry of Finance, Trade Industry and Planning, St. George's, Grenada; Lawrence Wilkinson, Ministry of Finance and Planning, Bridgetown, Barbados

10:15-10:30 a.m. Coffee break
10:30-11:30 a.m. SESSION IV (Continued)
11:30 a.m.-1:00 p.m. Lunch
1:00 p.m. Site Visits

THURSDAY, SEPTEMBER 20

9:00-10:30 a.m. SESSION V

Toward a sound development of smaller islands:

- A. Opportunities for technical cooperation among Caribbean islands
 - 1. In joint development programs
 - 2. In joint monitoring and research programs
 - 3. In sharing information

Chairman: Trevor Gordon-Somers, Regional Representative, United Nations Development Programme, Georgetown, Guyana

Vice Chairman/Rapporteur: Arsenio Rodriguez, Scientific Expert, UNEP/ECLA/Caribbean Environment Project, Port of Spain, Trinidad and Tobago; Elinor Gittens, Caribbean Environment Project, Port of Spain, Trinidad and Tobago

Author of Resource Paper: Dr. Juan A. Bonnet, Jr., Director, Center for Energy and Environment Research, University of Puerto Rico, San Juan, Puerto Rico. Delivery: Modesto Iriarte, Center for Energy and Environment Research, University of Puerto Rico, San Juan, Puerto Rico

Presentations by several international bodies

10:30-10:45 a.m.

Coffee break

10:45-Noon

SESSION V (Continued)

Noon-1:15 p.m.

Lunch

1:15-2:45 p.m.

SESSION V (Continued)

- B. Opportunities for international assistance and cooperation, specifically, technical, financial, and training and education.

Presentations by and discussion with major international donor groups in the Caribbean:

- British Development Division in the Caribbean
- Canadian International Development Agency
- Caribbean Development Bank
- Inter-American Development Bank
- Organization of American States
- Rockefeller Brothers Fund
- United Nations Development Programme
- U.S. Agency for International Development
- World Bank

Chairman: Crispin Sorhaindo, Secretary, Caribbean Development Bank

Vice Chairman/Rapporteur: Trevor Louis Boothe

2:45-3:00 p.m.

Coffee break

3:00-4:45 p.m.

SESSION V (Continued)

FRIDAY, SEPTEMBER 21

9:00-10:30 a.m.

SESSION VI

Summary session: approval of written reports of Vice Chairmen/Rapporteurs; plans for follow-on work; guidelines for future efforts.

Chairman: Robert Creque

Vice Chairman/Rapporteur: Edward L. Towle, President, Island Resources Foundation, St. Thomas, U.S. Virgin Islands

10:30-10:45 a.m.	Coffee break
10:45-11:30 a.m.	SESSION VI (Continued)
11:30 a.m.-Noon	<u>Closing Remarks:</u> William S. Beller
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Elinor Gittens
Arsenio Rodriguez

UNITED STATES
William Beller
Russell Burns
Eapen Chacko
Ariel Lugo
Kenton Miller
William Moody
Robert Otto
Sally Shelton

U.S. AGENCY FOR INTERNATIONAL
DEVELOPMENT
Robert Otto

U.S. COUNCIL ON ENVIRONMENTAL QUALITY
Ariel Lugo

U.S. ENVIRONMENTAL PROTECTION AGENCY
William Beller

U.S. MAN AND THE BIOSPHERE PROGRAM
Russell Burns

U.S. VIRGIN ISLANDS
Simon Jones-Hendrickson
Allen Putney
Edward Towle
Judith Towle

UNIVERSITY OF MICHIGAN
Kenton Miller
Allen Putney

UNIVERSITY OF PUERTO RICO
Fuat Andic
Máximo Cerame-Vivas
Modesto Iriate

UNIVERSITY OF THE WEST INDIES
Christine Barrow
Dawn Marshall

VENEZUELA
Isabel Bacalao
Ixora Perozo

WORLD BANK
Murray Ross

LIST OF BARBADOS SECRETARIAT
Tessa Jardine
Natalie Lee
Phylis Rubin
Julia St. John
Heather Welch

SOME ABBREVIATIONS USED

AID	(U.S.) Agency for International Development; also US AID
BVI	British Virgin Islands
CARDI	Caribbean Agriculture Research Development Institute
CARICOM	Caribbean Community
CCA	Caribbean Conservation Association
CDB	Caribbean Development Bank
CEER	Center for Energy and Environment Research
CEP	Caribbean Environment Project, a joint project with UNEP and ECLA
CFTC	Commonwealth Fund for Technical Cooperation
ECLA	Economic Commission for Latin America
EDF	European Development Fund
LDC	Less developed country
MAB	Man and the Biosphere Program
MDC	More developed country
PAHO	Pan American Health Organization
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP/ECLA/CEP	See individual abbreviations
UNESCO	United Nations Educational, Scientific, and Cultural Organization
US AID	See AID

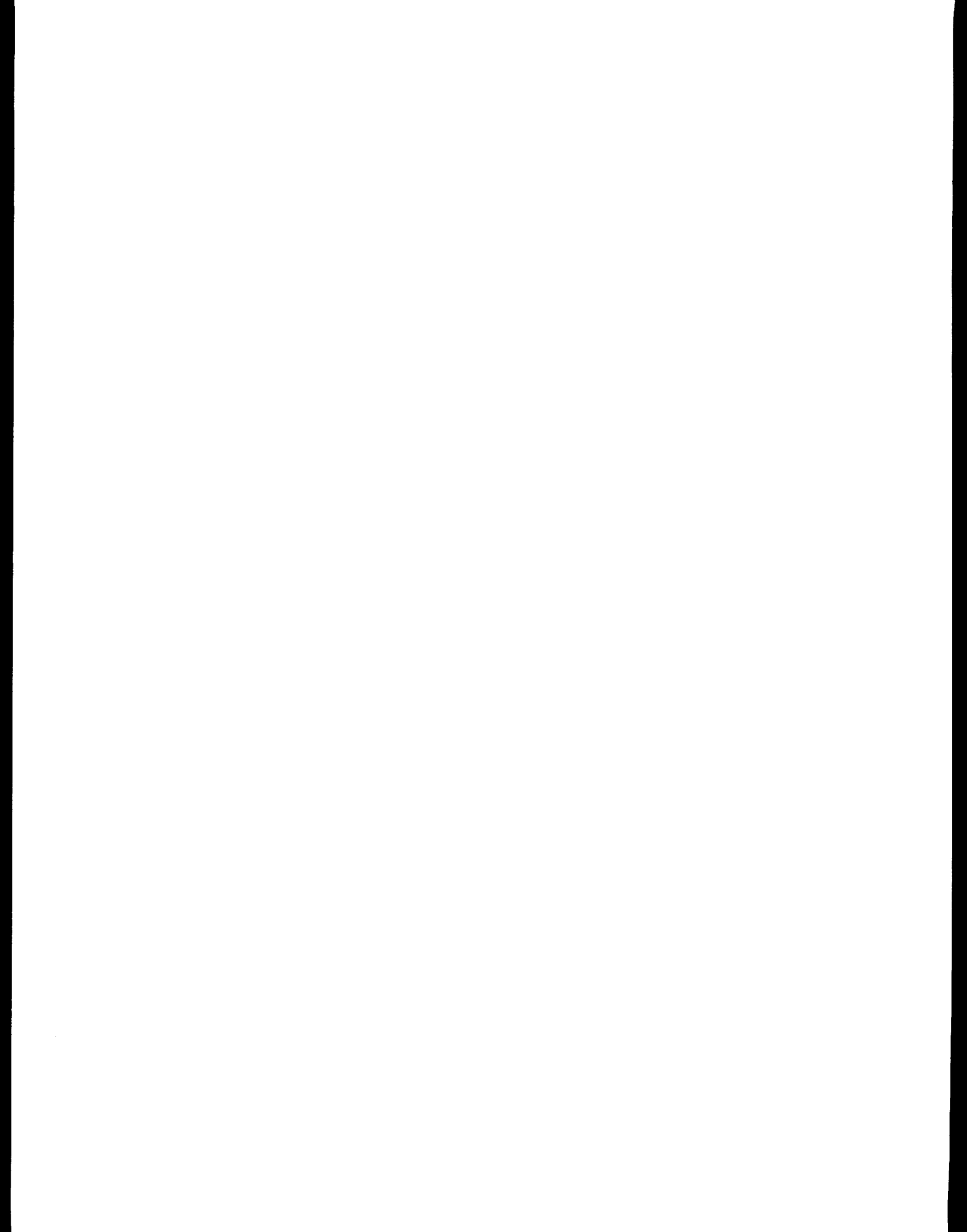
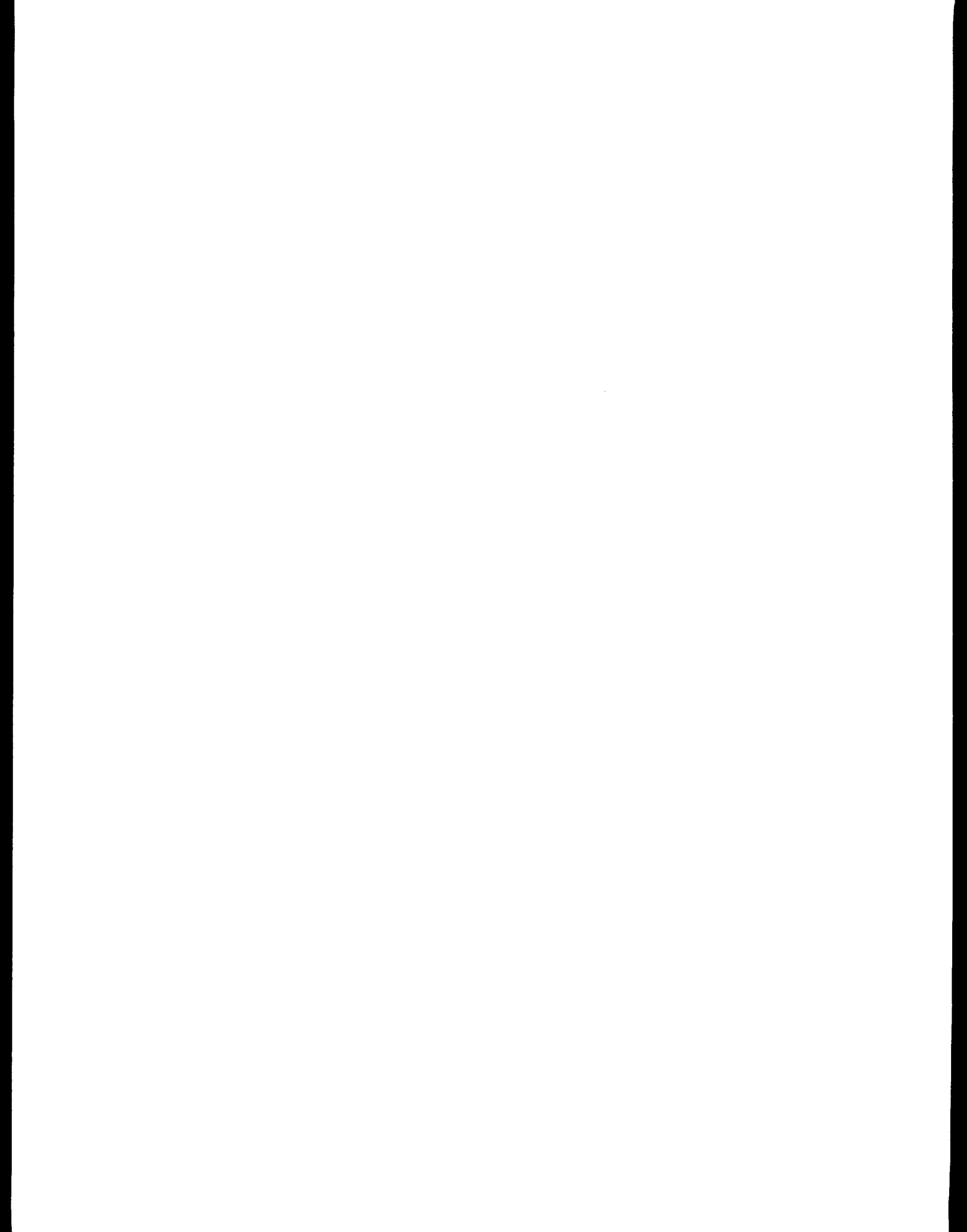


TABLE OF CONTENTS

Session I

	Page
INTRODUCTORY REMARKS, William S. Beller	3
WELCOMING REMARKS AND KEYNOTE SPEECH, The Honorable Billie Miller	6
THE ECONOMIC CHOICES FACING THE SMALLER CARIBBEAN ISLANDS, Dr. Courtney N. Blackman	11
INTRODUCTION OF THE HONORABLE SALLY ANGELA SHELTON, Program Chairman	17
HONORED ADDRESS, Ambassador Sally Angela Shelton	18
THE ENVIRONMENT AND THE GUIDELINES FOR PROJECT EVALUATION, Contributed Paper, Fuat M. Andic and Ramon J. Cao-García	22
SUMMARY OF SESSION I, Fuat M. Andic	28



CONFERENCE ON ENVIRONMENTAL MANAGEMENT AND ECONOMIC GROWTH IN THE SMALLER CARIBBEAN ISLANDS

Introductory Remarks

Distinguished guests, honored delegates, most valued participants, ladies and gentlemen:

We are now beginning the "Conference on Environmental Management and Economic Growth in the Smaller Caribbean Islands." I am William S. Beller, Program Chairman.

Speaking for the sponsors, I want you to know we are very pleased you are here; indeed, welcome you to work together on this hospitable island of Barbados.

Some of you may have been torn between staying at home to help your islands recover from the ravages of the recent hurricanes, or coming to Barbados to help find ways to build sound futures for your islands. In environmental matters, this stress between present and future concerns is seemingly always with us. We may ask, for example, how much of our environment should we put in jeopardy, and how much of our natural resources should we expend for our citizens who may have desperate needs for food, shelter, health care, and employment. On the other hand, how much of these resources should we conserve for future generations?

These questions, though, may themselves bias the answers. We may be able to use our environment and natural resources without significantly foreclosing on the realistic hopes of any generation. This premise supports the linking of environmental management to economic growth, and has resulted in the present Conference.

We define "smaller islands in the Caribbean" as those having areas less than 10,000 square kilometers, and populations less than 500,000 people. Fifteen islands and island systems fit this definition. We have invited their governments to send delegates to Barbados. This is a technical meeting designed to learn how such islands can develop in a sound fashion through their own energies, through cooperating with other Caribbean islands, and through the help of international organizations.

The development problems of smaller islands may differ significantly from those of larger ones. The small islands are probably much less stable; for example, small changes in their environment, or in the economic structure of the islands, or in cultural perceptions can have profound and linked effects. Not present are the buffering attributes of large areas of land, of many strong industries, and of many widely different value systems. As a result, officials on the smaller islands have to draw their plans much more wisely than people who live elsewhere. These islanders do not have the luxury of making many mistakes in judgment.

In discussing this Conference, Arsenio Rodriguez of UNEP/ECLA/CEP said, "the problem is the solution." I am taking the liberty to interpret this to mean that from the point of view of the international organizations, if they could learn what the major problems of the smaller islands are, then these organizations could effectively focus the help they give the islands.

From the point of view of the islanders, the solution, of course, is

the problem. It seems, therefore, that if the international organizations are seeking to have the problems of the smaller islands defined; and if the islanders already know their problems and are looking for the solutions, our duties this week are simply those of a matchmaker. This, indeed, is an important part of the work of the Conference.

Even if a marriage is brought about, the partners should go into it knowing the capabilities and limitations of each. To help do this is also an important part of the Conference.

At this point, I should like to highlight an observation made by a panel of experts. They met in Founex, Switzerland, in 1971, to prepare for the Stockholm Conference on Human Environment. They noted that the environmental problems of the developing nations fall into two categories. In the first are problems stemming from the lack of development; these are the problems indicated earlier of poor nutrition, bad water, no shelter, no jobs; they reflect the socio-economic poverty of the people.

In the second category are problems akin to those of the industrialized nations, whose environmental difficulties stem from the process of development itself. Although these problems are probably less important in the early stages of a nation's development, the panel said they would rapidly increase in significance. This will happen as new methods of agriculture are introduced, as coastal areas are developed, as urban centers grow, as new and heavier industry appears, as new roads are built and land is cleared, as populations increase, as farmers leave their villages for jobs in the cities.

In this Conference, we hope to stress the environmental problems brought about by the development process; but not neglecting those brought about by natural disasters. In this regard, tomorrow afternoon we shall see slides that show some of the effects of Hurricane David on Dominica.

With an island's development, we perceive economic growth; not in the narrow sense of an increase in gross national product, which figure can be misleading, but in the growth in the economic well-being of all the citizens. Driving this development process are the needs and aspirations of the people. Our keynote speaker will address some of these issues.

This Conference is divided into two major parts. In the first, we look at the choices the smaller islands have for their development. We look at their carrying capacities, and at the constraining forces such as limited amounts of water, energy and land; and finally, at the environmental costs of the several strategies for development.

In the second part, we look at the opportunities for regional and international cooperation, and at the help that international donor groups can give. We may also suggest the type of help that is needed.

To get the most advantage out of this Conference, we have designed it so that the delegates will have full opportunity to exchange ideas. At the sessions, distinguished experts will present their resource papers. Then under the leadership of the Chairmen, and in the light of the session topics, the delegates and participants will be encouraged to take up the issues and questions raised by the resource papers, and by the delegates and participants, themselves. The Vice Chairmen/Rapporteurs will note the significant points made and conclusions reached for inclusion in the Conference Transactions.

At the final session of the Conference, the reports from each session will be read, and approved or corrected. Proposals for future work will be endorsed.

Some suggestions that could come forward could involve oil spill contingency planning, establishing minimum environmental standards for various types of pollution, inventorying marine natural resources, setting up an information system with the industrialized nations with respect to their environ-

mental studies and standards, seeking research and data uniquely important to the smaller Caribbean islands, and correspondingly, setting up a data-retrieval system.

Hurricane David is not the only turmoil that has recently come to the Caribbean. Nations newly independent are seeking to learn what futures they want for themselves; and other nations, longer independent, are wondering whether the future before them is the one they want. Whatever future an island's people decide they want is the one that we hope this Conference will help them reach. We are prescribing no rates of growth; only an awareness that with all change there are payments that have to be made.

This search for values is well illustrated by a release from the Republic of Guyana, which was issued about the time it became independent. Edward Towle of the Island Resources Foundation in the U.S. Virgin Islands, brought this to my attention in one of his recent papers.

"This grass roots revolution . . . seems to engulf the psychic being of the Guyanese nation . . . with a growing awareness of the beauty and power of indigenous ideas, things, institutions and values . . . an enchantment that can only come from things Guyanese In the field of art there has emerged a new approach to things of the land . . . to recreate . . . in a world of aesthetics, the essentials of our roots."

I shall now turn to enjoy one of the pleasures and privileges of being Program Chairman for the present Conference--that of introducing our keynote speaker. I would point out, though, that the speaker listed in your program, the Honorable Lionel Craig, Minister of Housing, Lands and the Environment of Barbados, told us of his profound regret, which we share, that he is unable to appear.

In the several years that our present speaker has directed her Ministry, she has taken many strong and creative steps to protect and enhance the environment of Barbados. Under her direction, for example, Barbados is completing a national oil spill contingency plan. Our speaker has in her charge public health engineering, which service is now constructing the first sewage project for the whole of Bridgetown. She is also responsible for building a much needed pulverization plant for the sanitary disposal of garbage. These examples illustrate only a small part of her wide-ranging interests.

Our speaker is a barrister and an attorney, educated in Barbados and in England. She is a member of Parliament for the city of Bridgetown. Her subject, which rightfully is the keynote for this Conference, is: "Basic Human Needs in Smaller Caribbean Islands, and Socio-Economic Goals of the Region's People."

I have the delightful honor and pleasure of presenting to you, the Honorable Billie Miller, Minister of Health and National Insurance for Barbados.

**WELCOMING REMARKS AND ADDRESS BY THE HONORABLE BILLIE MILLER
MINISTER OF HEALTH AND NATIONAL INSURANCE, BARBADOS**

**Basic Human Needs in Small Caribbean Islands and
Socio-Economic Goals of the Region's People**

Welcome

Mr. Chairman, distinguished guests, ladies and gentlemen.

It is indeed a pleasure for me to welcome the delegates and observers attending this Conference on Environmental Management and Economic Growth in the Smaller Islands of the Caribbean.

First, I must apologize on behalf of my colleague, Mr. Lionel Craig, Minister of Housing, Lands and the Environment who was scheduled to welcome you to the Conference and deliver the keynote address, but who is unable to attend because of ill health. It is, however, no hardship for me to undertake this pleasant duty, since the subject is one which is dear to my heart.

As you are no doubt aware, the Conference is sponsored by the Caribbean Development Bank, the United Nations Department for International Economic and Social Affairs, UNESCO, the UNEP/ECLA/CEP, and the U.S. Man and the Biosphere Program. I have observed from the Conference program that very important and relevant topics will be deliberated upon. No doubt, some of you are visiting our fair isle for the first time, and I must indeed warmly welcome you. I trust that the Conference timetable will enable you to find time to sample some of the island's beauty.

The Conference has been designed to help officials from the small Caribbean islands formulate some of their important resource problems, and to help give the islanders, as well as other parties, an insight into planning for the sound future of the islands. It will also examine strategies and choices open to the small islands for their development, and promote the concept of the sound growth of the islands from both an environmental and economic point of view.

During the Conference, the speakers will try to show the various strategies and choices the smaller islands have for their development, and review specific examples of these. They will then seek to show some of the factors limiting growth, and the consequences or accountability, these islands experience when using different strategies. Following this, they will invite discussion of ways to insure the sound growth of the islands, both from an environmental and economic point of view, and show that the two viewpoints may reinforce each other. Finally, they will discuss the assistance that can be furnished through self-help, regional cooperation, and international agencies.

The speakers who will be addressing you are all experts in their fields, and I am sure that great benefit will be derived by all of you during the course of the Conference. I am satisfied that out of your deliberations many meaningful strategies can be formulated for the environmental management and economic growth of the islands. It gives me great pleasure to welcome you both to Barbados and to this Conference. It is my hope that your efforts will meet with resounding success. I now declare the Conference open.

The topic on which I have been asked to speak, Basic Human Needs in Smaller Caribbean Islands and Socio-Economic Goals of the Region's People, is a very challenging and thought-provoking one. It is, or indeed should be, the aim of all good governments everywhere to insure that the basic human needs of

their populations are met within the limits of their resources. The basic human needs of Caribbean peoples, as of people everywhere, are food, adequate shelter, and clothing. In addition, the provision of adequate health care, full employment, education, social services, and a stable economic system within which they can properly provide the basic necessities of life for themselves and their offspring, and recreational facilities are also of importance.

For the purpose of this Conference, the smaller islands have been defined as those having areas less than 10,000 square kilometers and populations less than 500,000. Included in this categorization are Antigua, Bahamas, Barbados, British Virgin Islands, Cayman Islands, Dominica, Grenada, Martinique, Guadeloupe, Montserrat, Netherlands Antilles, St. Kitts-Nevis-Anguilla, St. Lucia, St. Vincent, Turks and Caicos, and the U.S. Virgin Islands. Basically, all these islands are agriculturally oriented, with some degree of dependence on tourism. In a few cases some measure of industrial development is occurring, but it is safe to say that agriculture remains the mainstay of the economy of most of these islands.

All governments in the area are trying, within the limits of their resources, to provide the basic human needs of the people. Much emphasis has been placed on agriculture, fisheries, housing, public health, education, and social services. Indeed a large proportion of governments' budgets is spent on provision of basic human needs.

In the Caribbean, as in all other areas in the world, there are many constraints--physical, economic, and political--on the realization of the people's goals. The environment of the Caribbean islands, while generally being accepted as a blessing, may also prove to be a bane. One has only to look at the destruction caused by Hurricane David in Dominica and neighboring territories and La Soufriere in St. Vincent to see evidence of this. The lush vegetation, marvelous beaches, and pleasant climate may all be lost in one hour's battering by nature. Hurricanes are, however, only one of a series of natural disasters to which the area is exposed. Volcanic eruptions, tidal waves, and earthquakes are also ever-present dangers to which the territories' governments and peoples must give urgent attention in planning any meaningful development strategy.

The rapidly growing populations in the region, coupled with the overall size of the territories, is also another constraint. With all the good will in the world, governments and people in the area must realize that there is only so much on which they operate. In past years emigration provided a safety valve in releasing some of the unemployment and social problems of the area. In recent times, however, the doors of almost all the developed countries are slowly closing. This is leading to increasing social, economic, and political pressures in the region, and may be an explanation of many of the deviant groups which are surfacing in many areas.

A further constraint is the area's dependence. The region is not self-sufficient in any of the major life-supporting areas. A pattern of dependence is one of the legacies of the colonial past; it has shaped the present of all of the islands, and unless some major decisions are implemented, it will also shape their future course. One of the major paradoxes which exists in the area is that while the islands are all mainly agriculturally oriented, they are none of them self-sufficient in food production, but, in fact, import a large proportion of food for local needs while exporting their major crops to developed nations. This policy, in addition to subsidizing agriculture and related industries in the developed nations, also causes a drain on precious foreign reserves. The rich countries currently consume a large proportion of the world's natural resources, while many of the countries where the resources come from, are left with little for their own domestic use, and in some cases paid very low prices for their exports. The developing countries are subsidizing the greed of developed countries.

Extreme inequality in the distribution of income in our region is also a limiting factor in the realization of many of the people's goals. This is in part another legacy of the colonial past, which with its rigid class and

economic distinctions has left extremes of wealth and poverty which are only now being assaulted by governments.

Another very important factor which inhibits the realizations of the goals of most of the people is the attitude of the people themselves. The work ethic is not very well developed in the majority of Caribbean people. The tourist propaganda of "sun and fun-loving, easy-going natives" seems to have been adopted by the broad masses of the population, with the result that recent salary increases with the resulting price spirals has not led to increased productivity.

This then is the background against which we have to plan for our region's future. We are seeking development to alleviate malnutrition, disease, unsanitary living conditions, to ensure that all our people will have adequate food, housing, education, medical care, and an equitable share of our countries' resources. In the words of Dr. Moslafa Tolba in his 1979 World Environment Day message--

"All our tomorrows depend on today. We must do all we can today to ensure that the environment tomorrow and the days, years and decades after may continue to provide all peoples not only with the things that make life possible, but also those things that make life worth living. This will be the primary objective of the new national development strategy which the nations are now seeking to shape, and just as surely it is the primary objective of sound environmental management without which any development strategy is bound to fail."

The Caribbean seems to be coming somewhat belatedly to the understanding that it is a part of the world environmental crisis. Indeed, in the Caribbean many of the features of this crisis are magnified. While the Caribbean is technically a part of the developing world, the expectations of many of its inhabitants are, nevertheless, of a standard of living approximately on a level with that of developed countries; its population growth rate is being increased by the limitations on immigration into the United Kingdom and North America; its urbanization rate is high, owing largely to the resistance of its young people to working on the land; its natural resources, whether renewable or not, are severely limited. A detailed survey of the environmental crisis in the Caribbean in relation to that of the rest of the world, might well yield some very alarming results. The smallness of scale of the Caribbean, exacerbated by its inability to speak with one voice in the councils of the world, tends to cause it to take last place when matters of action are being discussed at the international level.

In order to overcome some of these seemingly overwhelming obstacles, prompt decisive action needs to be taken at the intergovernmental level. A growth process that benefits a small wealthy minority and widens the gap between the rich and the poor can no longer be equated with development. Old concepts of development aimed at increasing the GNP of a country are gradually giving way to new ideas which stress the fulfillment of the basic needs of the poor, reflecting such measures as unemployment, inequality of income distribution, education, nutritional standards, and housing.

The social setting, including the economic and cultural institutions which provide the framework within which human activity takes place, is an integral part of the environment. A state of acute poverty or denial of basic human needs may drive people to such desperate action for their survival that they may cause permanent damage to the environment in which they live. Depletion of soil nutrients through overgrazing of marginal land and widespread destruction of forest resources caused by a desperate search for fuel are examples of environmental damage caused by widespread poverty.

Transnational corporations operate in many countries through a vast network of subsidiaries, affiliates, and associates, and control much of the world's trade and exploration of natural resources. Such corporations are interested mainly in maximizing their profits, and sometimes deplete natural resources

rapidly in one country while holding similar resources in another as reserves. Often raw materials are not processed in the country of origin, but are exported, sometimes at fictitious prices, to avoid national taxation for further processing in its own plants in other countries. Such corporations by their very nature, ignore environmental and other social costs that do not enter into their calculations of private profits.

We have no right to jeopardize the options of the future. We have to realize that the future of our children will be grim indeed if we do not insure that development proceeds without devastating the environment, the resource base on which development depends. We must not let our eagerness to possess a better life now create an inhospitable world for the generations which will follow. Our aim should be to leave our region better, or at least as good as we received it, for the generations to come. This goal will be little more than an illusion unless we are willing to take ourselves to task, to ask the difficult questions, to make the hard choices, to take the moral initiative which our solemn bond of solidarity with the future demands. It will not be an easy undertaking.

In the next 20 years, life as we know it on this planet will change by awesome proportions; the facts are staggering. By the year 2000, the population of the globe will double, energy consumption will triple, and the demand for food will have escalated 112 percent. Never before in the history of human civilization will such demands have been made on our planet and its resources. Never before have we been asked to demonstrate more enlightened expertise, more vision, and more courage.

In the Caribbean we have to take a long hard look at the means of achieving the people's goals. It is an astounding task, but we must not let its magnitude deter us. New ways of dealing with our problems must be found. Solutions based on a realistic study of the region and its peoples must be sought and implemented. We must seek to break the tradition which has existed for too long in this region of swallowing hook, line, and sinker the options and ideologies which have been imported wholesale from the developed countries, and which, in some cases, have been unsuccessful even in their country of origin. The new Caribbean man demands new and relevant strategies.

There is need to take a multisectoral, interdisciplinary approach when considering the question of environmental management. Efforts for the protection and promotion of the human environment must become an integral part of efforts for the development of a more productive, rich, and humane society. In the Caribbean region where there are still major problems with water supply, liquid wastes and excreta disposal, solid waste management, industrial waste, pollution control, pesticide control, beach pollution, occupational health and housing, massive programs must be undertaken to improve the quality of life for the large proportion of the region's people who still exist on the fringes of poverty.

However, the picture is not an entirely gloomy one. Efforts are already underway to seek solutions to the many problems facing us. An example of what is being undertaken is the U.N. Environment Programme/ECLA/Caribbean Environment Project, which is currently developing an action plan for the area. This plan is intended to provide the framework for integrating environmental considerations into development plans.

It is hoped also that this Conference will assist in some measure in highlighting the problems, and hopefully arriving at solutions. A look at the agenda shows that most of the areas on which I have touched will be investigated. The development options will be outlined; the question of accountability, together with the growth limiting factors, will be discussed; the natural resources and social and cultural environment will be highlighted; and case histories on the matters of land use, coastal and soil erosions, and pollution, with particular reference to oil spills and disposal of solid wastes, will be investigated.

I think it is only fitting that I should close with the first principle

of the Declaration of the U.N. Conference on the Human Environment enunciated at Stockholm in 1972--

"Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well being, and he bears a solemn responsibility to protect and improve the environment for present and future generations."

I trust that your deliberations here will in some measure assist in the achievement of this objective.

THE ECONOMIC CHOICES FACING THE SMALLER CARIBBEAN ISLANDS

Dr. Courtney N. Blackman*

By any measure of economic progress, the seventies have not been good years for the English-speaking less developed countries (LDCs) of the Caribbean. Like other developing countries in the region and elsewhere, they were hard hit by the sharp rise of commodity prices in 1973 and the oil crisis of 1974; 1975 saw the deepest world economic recession since the Great Depression of the 1930s with disastrous consequences for these frail economies. As if all this were not enough, Mount Soufriere erupted with disastrous consequences for St. Vincent's economy and Hurricane David demolished Dominica. With one or two exceptions, it is arguable that the economies of the LDCs regressed rather than progressed over the past decade.

In many instances, the economic setbacks can be attributed to pure bad luck. In some cases, however, the wounds have been self-inflicted as a result of divisive politics and inadequate economic management. To be fair to the politicians, they have not been well served by economists in the region, who for the entire decade have indulged themselves in irrelevant and sterile ideological debate on the relative merits of capitalism and socialism. A great act of will is required to get the show back on the road.

I have been asked to examine existing strategies of economic development in the Caribbean and to suggest alternative strategies. In this paper I will give a brief critique of the conventional wisdom of economic development in the region. I am afraid that the circumstances of the LDCs are so straightened that I do not perceive alternative strategies. I see only a return to well-tried and fundamental principles of economic management. Management is about the direction of the efforts of people, and this is what my essay will be about--the development, not the use and hence the abuse, of people.

THE CONVENTIONAL WISDOM

Three basic strategies for economic development have been thrust upon the LDCs over

the last decade. The CARICOM Secretariat and Caribbean Development Bank have pushed economic and political integration; the New World Group has argued for closure of the economies and indigenization of institutions; the Marxist-Leninists have recommended central planning and socialization of the economy. The conventional wisdom in the Caribbean contains elements of all three strategies. The unsatisfactory performance of the economy requires a brief examination of the premises underlying these strategies.

There is growing recognition that economic integration has perhaps been oversold as a strategy for economic development in the region. Many regional civil servants seem to believe that small size in itself is a cause of underdevelopment and that the creation of larger economic and political units will accelerate economic development. A great deal of effort therefore has been spent in the establishment of regional economic institutions which have not always lived up to expectations and have been a source of frustration to LDC leaders as well. Many of the LDC politicians see an institution like the Caribbean Development Bank as a relative failure because it rightly insists on being a bank and not a benevolent society.

As I have argued on several occasions, large size is not a cause nor even a prerequisite of growth. There are many large countries which are poor and many small countries which are rich, and so the mere creation of a larger unit will not of itself ensure economic growth. In fact, as we have found in the region, the resolution of political and economic differences among the territories dissipates much of the energy which might otherwise be directed toward economic development. Indeed, many of the personnel concerned with regional activities might be more creatively employed at home. Moreover, the focus upon integration has led the individual islands to overlook the true sources of growth.

This is not a case against integration; it is a case rather, for the correct uses of integration. Economic and political integration is not an end in itself; it certainly

* Governor of the Central Bank of Barbados.

does not cause growth. It is true, however, that there are many activities--economic, political, and social--which are enriched and improved by cooperation. Such cooperation should be encouraged whenever the opportunities arise. The present shutdown of the University of Guyana for lack of funds is an excellent example of the cost of going it alone in activities which lend themselves to regional cooperation. Before moving on, let me say that this point of view is beginning to emerge more and more from the CARICOM Secretariat.

The basic premise of the New World Group is that underdevelopment in the Caribbean stems from the persistence of the plantation system, a system surviving to this day in the guise of the multilateral corporation. The road to growth they conclude, must lie in the destruction of the plantation system. In George Beckford's words, "To put the matter bluntly, the plantation system must be destroyed if the people of the plantation society are to secure economic, social and political and psychological advancement." This kind of thinking led to the recommendation of policies which I would describe as "reactive nationalism." The New World Group was concerned about the deleterious effects of dependency on metropolitan economies which inhibited structural change in the region and hence a lot of talk about "backward and forward linkages."

The most serious drawback of the New World approach is that, although it provides a credible theory of underdevelopment, it sets out no operational theory of economic development. Their programs are reactive rather than progressive--nationalization of foreign companies, creation of cooperatives out of sugar plantations, various varieties of state ownership, etc., programs carried out more in ideological fervor than with any serious calculation of their consequences.

The structuralist approach of the New World Group has some merit in that it provides an excellent long-term perspective in which to examine economic problems. However, concepts like "structural change" and "backward and forward linkages" have little operational content. They use essentially long-term concepts and do not suggest the immediate steps to be taken to achieve them.

The emphasis of the New World Group on closure of the system as a necessary condition of economic growth is perhaps their blindest spot. In fact, as a cursory reading of General Systems Theory will reveal, closed systems do not grow; only open systems grow. Closed systems tend towards their most probable state--disorder. The truth of this

statement is becoming increasingly evident in the region.

The Marxist-Leninist solution is for me the saddest of all. As a young economist 15 years ago, I was moved by Lloyd Best's appeal that Caribbean economists examining regional problems from a Caribbean perspective and in a framework of Caribbean values. I have never understood why some Caribbean economists should find so much attraction in an economic model, conceived in early industrial Europe and first tested in pre-industrial Russia. What is even sadder is that the empirical evidence of its forced application in Eastern Europe and elsewhere seems to have been completely ignored.

The effect of the Marxist-Leninist influence in the Caribbean has been to promote an affection for centralization and an increased state participation in the economy under the catchword, "occupation of the commanding heights." Ironically, the logic of Lenin's phrase has been entirely missed since it suggests that once a few peaks were held, it would be unnecessary to occupy the foothills. "Commanding heights" in the Caribbean vocabulary seems to include the broad plains as well.

Again, General Systems Theory teaches that excessive centralization in a living system, such as an economy, reduces its flexibility of response to outside influences. This may explain why some economies in the Caribbean have fared so badly in the recent international economic upheavals. An important theorem in General Systems Theory is that variety is needed to deal with variety. A monolithic organizational structure can hardly survive in the varied and hostile environment which surrounds us in the Caribbean.

GETTING DOWN TO FUNDAMENTALS

The innings of Sir Garfield Sobers which I best recall was his last century at Lords. He was still recovering from a serious knee operation and his fitness was suspect. He himself knew that after the long layoff, his reflexes might be not as quick, his footwork might be a little slower, his wrists a little less supple. In that situation, the great man went back to first principles. The razzle-dazzle was left behind in the locker room; the strokes were played with the emphasis on results rather than rhetoric. I now invite the LDCs to return to first principles and to forget the rhetoric.

Economic development, in its most radical formulation, describes the process by which more persons in a society are progres-

sively enabled to carry out a larger number of productive activities in an increasingly effective manner. This proposition rests on the premise that people are the roots of economic development, the irreducible minima in any economic system. The deficiency in the three strategies discussed above is that the emphasis has been placed on structures rather than on people. The large institutions, like Caribbean Food Corporation, the Caribbean Investment Corporation, the State Trading Corporations, and other parastatal institutions are now put forward as our salvation. Indeed, under the Marxist-Leninist program the brilliant individualism of the West Indian would be subordinated to the needs of the state.

In the remainder of my paper I will develop in an informal manner the logical implications of the proposition stated at the opening of my last paragraph, and of my premise that people are the roots of economic development. I shall depart somewhat from my brief in that I will not present alternative strategies. The circumstances of the LDCs are so straightened and urgent that we cannot indulge ourselves in choosing between alternative strategies. Like Sir Garfield, we must return to firm and tried principles of human experience. Hopefully, the next generation of West Indians will be affluent enough that their sons may debate long into the wee hours of the morning the relative merits of socialism and capitalism.

For easy reference I shall repeat my basic proposition: Economic development, in its most radical formulation, describes the process by which more persons in a society are progressively enabled to carry out a large number of activities in an increasingly effective manner. I shall underline "more persons in a society," "a larger number of productive activities," and "in an increasingly effective manner."

PEOPLE INVOLVEMENT

Our first concern then will be to involve an increasing number of people in the economic life of the country. This means that we must plan upwards rather than downwards. An obvious first step should be to go out and find out what people are presently doing and see if we can enable them to do it better. The more successful people are in doing whatever they are doing, the greater the likelihood of their having to employ other people to assist them. The next step is to identify those people who are not at work but who are capable of producing. Of course, their productivity will be very low at first. In such cases, both trade unions and govern-

ments should be extremely careful about the imposition of minimum wages in areas of high unemployment. It is better to have people at work than to have them idle, since work is necessary for the fulfillment of human beings.

Increasing the productivity of existing people and placing idle persons into work involves the identification of those factors which inhibit productivity in each special circumstance. This is not a task for academics with cosmic theories about "structural change" and "occupation of the commanding heights." It is a task for practical men who have themselves been involved in similar types of activity--getting together with people at various levels to discover what bottlenecks must be removed and what log-jams freed up--to permit an increase in output. Maybe a bridge should be built across a ravine; maybe a well will have to be dug; maybe a road will have to be laid; maybe public transportation may have to be provided.

It is at this point that the services of central authorities are needed. In the West Indies there is far too great a tendency for people at the center to determine what other people need and what they ought to do. In extreme cases even their dress and diet are prescribed.

In many cases, of course, some kind of financing will have to be provided. I use the word "financing" and not "loans." One does not make loans to poor people but gifts. During my stay in the United States I never ceased to wonder at the fact that gifts to wealthy people were known as "incentives," while gifts to poor people were termed "handouts." But the best gifts are those which enable the poor people to develop to the stage where they may make loans.

In some cases we will have to teach new skills to enable people to carry out specific tasks. The emphasis here should be on training programs that help people do things better in the immediate future. There is far too much emphasis in the Caribbean on lengthy training programs in foreign countries which in the end make the student unfit to work in his original field of endeavor. It has been a source of frustration to me that we are unable to send staff to the community college or to the university campus to learn specific skills over a short interval and at convenient periods. To do a course in statistics, one must enroll in an economics degree program; to learn about cost accounting, one must enter a program leading to A.C.C.A., etc.

Training in specific skills does not obviate the need for improvement in the general

level of education in this society. This is where the long-term programs carried out by the central government are important. But even here the programs must be pragmatic. If the Russians, starting from a base of certainly less than 30 percent literacy in 1917, could achieve almost total literacy by the 1960s, and if the Japanese, starting in the 1860s, with an even lower percentage of literates and burdened by a most complicated script, could achieve almost total literacy by the 1950s, there is no excuse for the level of illiteracy which still persists in the Caribbean.

You will note that I have nowhere used the expression "optimal," a word so dear to the heart of academic economists. I do not know what the optimal rate of increase of output is in any country and I do not really care. I do not think anyone else knows either! In the words of Professor Herbert Simon, I am prepared to "satisfice." I shall be pleased whenever I do better today than I did yesterday.

DECISION MAKING AND MANAGEMENT

The carrying out of a larger number of productive activities involves an increasing number of decisions. An increasing number of decisions involves the participation of more and more decisionmakers not less and less. For this reason, I have been greatly disturbed by the trend towards centralization in the management of Caribbean economies. Unless more and more people are brought into the decisionmaking process at the lower levels, the top decisionmakers will not be in a position to make the strategic decisions required to move the economy forward, and paralysis in governmental activities is sure to set in.

This trend toward centralization does not derive only from the Marxist-Leninist doctrine but also from the desire to "rationalize" the operations of organizations. Such strategies grow out of the minds of academic economists. They believe that the concept of "economies of scale" which they learn in their textbooks and which, indeed, has a limited relevance in manufacturing, is transferrable to the management of human organizations. I shudder whenever a politician or bureaucrat tells me that he intends to "rationalize" an institution, he really means that he intends to render it less effective.

In fact, institutions do not function on a rational basis since the people who inhabit them are not the rational decisionmakers who populate the textbooks of economic theory. As a matter of fact, it is extremely difficult to determine precisely what makes

one institution perform well and another badly. Only long experience and careful study of existing institutions can give us any clues.

The need for more decisionmakers means that there must be a conscious effort to develop a technical and managerial cadre. In this respect, West Indian Governments are too casual about securing the technical and managerial inputs into economic development. The hemorrhage of skilled West Indians to North America has only now begun to strike us as a serious matter. Far too often salary scales are pitched too low to attract adequate top management. Millions of dollars have been lost in recent years by statutory institutions, a situation which might have been avoided by the appointment of competent accountants. Development plans seem far more concerned with the construction of buildings than with the development of key human resources. Managerial development has also enjoyed an extremely low priority at the University of the West Indies.

Even more important than the appointment of managers is their retention. Like other people, managers need room to grow. Highly trained personnel should not have their activities subjected to picayune inspection and be treated like office boys of politicians and senior bureaucrats, whether in the cause of an "ism" or otherwise.

Careful manpower plans should be prepared throughout the region for the systematic development of a managerial class. This, of course, will give full recognition of the need to bring on personnel from the ranks below. Again this kind of development will only occur if responsibility is deliberately pushed further and further down in the organization.

DOING THINGS BETTER

The last operative phrase "in an increasingly effective manner" implies that we should always be learning how to do things better and better. This will most obviously involve progressive improvements in technology and methods of organization. Here the message of Schumacher is most relevant. We must use those technologies and methods of organization which suit our circumstances. This involves, above all, thinking for ourselves. This means that our bureaucrats and technicians must develop a much deeper understanding of the areas for which they are responsible. Only in this way can they decipher which technologies and methods will fit into our circumstance and which will not. In this respect, common

sense is frequently our best guide. Too often thousands and thousands of dollars are spent on prefeasibility and feasibility studies when a reasonably intelligent and experienced official might have come to a similar conclusion in 5 to 10 minutes.

Since management is the scarcest resource in the Caribbean, we should, logically economize in its use. However, we in the Caribbean are inclined to create large and complex organizational structures in the name of consolidation and rationalization. The effect here is to create complexity out of simplicity. The more complex an organization, the more difficult it is to manage and the greater the managerial resources required for its management. Unlike the case of manufacturing, there are no economies of scale in administration. Indeed, there are many activities where increasing size quickly results in diseconomies, e.g., hospitals become increasingly inefficient as they exceed 1,000 beds; the quality of schools deteriorates very rapidly after the size of 500; the quality of service in a hotel probably falls away after 400 rooms. In fact, there are many areas where, as Schumacher reminds us, "Small is Beautiful." Improved technology will involve the importation of ideas and people from the outside world. An unfortunate development from the New World position has been a distinct increase in chauvinistic policies throughout the region. We have overreacted to the days when jobs of any importance were held by expatriates; we have moved in the opposite direction and now suffer from an inadequate inflow of ideas and personnel into our societies. The result is stagnation, especially regrettable in the area of academics. Even within the region we have stifled the free-flow of personnel from one island to another. It would be a simple thing to have mutual agreements among the territories permitting the free movement of skilled manpower.

We should also make sure that the new technologies and methods of organization which we introduce are compatible with existing structures and social processes. All societies have a conservative dynamism built into them which causes them to reject arrangements which might produce unacceptable disruptions in the system. To minimize the traumatic effects of such rejection, new programs should be of what I will call a "euristic" variety. In other words, we should introduce them in such a way as to benefit from early feedback about their consequences so that timely adjustments can be made. Sweeping changes in organizational methods frequently threaten to destroy the entire structure; there are quite a few examples of this in the region.

The final word on doing things better has to do with the political role. In my viewpoint, the most necessary reform needed in the region is a separation of political from the operational activity. The political function is clear-cut. It is to establish the goals and broad policies of organizations; to determine with top management the criteria of performance; to monitor performance through the insistence upon timely financial and operational reports, and to punish nonachievement of goals or departure from policy. It is not the political function to determine how the day-to-day operations of an organization should be conducted or to make staff appointments below the level of top management. The practice of political intervention in statutory corporations throughout the region derives from the belief that such intervention is required to exercise control over their operations. In fact, effective control of an organization is never possible from within. Levers are only useful when one stands some distance away from the object to be moved; otherwise there would be no place to put the fulcrum!

CONCLUDING REMARKS

I have not dealt in this paper with issues such as which industries the LDCs should concentrate on and which they should not. These are not difficult problems. Such choices will depend on the natural resources within each island, its peculiar history, its peculiar culture, and the random opportunities which come its way. Clearly, if there are good beaches, an island will look to tourism; if there is a lot of agricultural land but little water, an island will try to develop its water resources and go into agriculture; if fish abound around its shore, it will look to fishing; if multinational corporations are interested in manufacturing on that island, it will examine the proposition in the light of its values and goals. There are also many international agencies which are prepared to come in to help islands examine or discover new economic possibilities.

But all of these strategies will fail unless the human resource is equal to the task. Some aspects of human resource development are quite straightforward. We must see that children are properly fed so that they do not suffer brain damage long before they get to school; we must try to give them the best primary and secondary education possible; we must try to give our people the best care we can afford when they are ill; we must try to house them and provide as fine public services for them as we can. But these goals can only be achieved

if our institutions function effectively, that is, if they function in such a manner as to allow our people to be creative and so fulfill themselves.

I have therefore placed great emphasis in this paper on the importance of good management. Management is the art of working through people to achieve the common goals

of the group. It is important that these goals be humane, that is, in the service of people. Public institutions which are used to advance the goals of political parties per se or the enrichment of a small group of people, will not result in the economic development of people. In short, if the goals of development are not humanely conceived, we will not have true development.

INTRODUCTION OF THE HONORABLE SALLY ANGELA SHELTON

By the Program Chairman

This past spring, I met the Honorable Sally Angela Shelton. She had been nominated to a high position in the U.S. Department of State, and was awaiting Senate confirmation. I told her about this Conference. She immediately volunteered to cooperate in any way she could. At the time, she didn't know we'd ask her to talk.

This past May, Ms. Shelton was sworn in as American Ambassador to Barbados, Grenada, and the Commonwealth of Dominica, American Minister to Saint Lucia, and U.S. Special Representative to the States of Antigua, St. Christopher-Nevis-Anguilla, and St. Vincent.

Since that time, she has become personally involved--in addition to professionally--in the problems of Caribbean nations to the extent the United States can be of assistance.

Ms. Shelton was Deputy Assistant Secretary of State for Inter-American Affairs with responsibility for Mexico, Central America, and the Caribbean from July 1977 until October 1978. Earlier, she had been Legislative Assistant for Foreign Policy to Senator Lloyd Bentsen of Texas.

She was graduated Phi Beta Kappa from the University of Missouri with degrees in French and Political Science. She later earned a Master of Arts in International Relations from The Johns Hopkins School of Advanced International Studies. She was a Fulbright Scholar at the Institute of Political Sciences in Paris.

I must stop here. Ms. Shelton earlier informed me that a plane is waiting to take her to Dominica to help furnish aid to that hurricane-devastated country. She is pausing only long enough to give her promised address to us.

I have the privilege of presenting to you the Honorable Sally Angela Shelton, who will give an Honored Address.

HONORED ADDRESS BY THE HONORABLE SALLY ANGELA SHELTON
AMERICAN AMBASSADOR TO BARBADOS, GRENADA
AND THE COMMONWEALTH OF DOMINICA
U.S. SPECIAL REPRESENTATIVE TO THE STATES OF ANTIGUA,
ST. CHRISTOPHER-NEVIS-ANGUILLA, AND ST. VINCENT

Ladies and Gentlemen

I would like to express my deep appreciation to the sponsors of this Conference for having extended the honor of inviting me to address the distinguished participants gathered here today. It is a real pleasure to see all of you. I see a number of old friends in the audience and I look forward to making some new ones during the duration of your sessions here. I congratulate all of you, those who have done the planning as well as those who are doing the participating, for your interest in and work on a subject which is highly complex, frequently controversial, and always costly. I refer of course to environmental quality. Surely the challenges posed by the relationship between economic growth and environmental quality are of enormous importance to all of us and certainly highly deserving of special focus being received here today.

I would like to initiate my remarks with a brief discussion of U.S. policy towards the Caribbean and more specifically towards the Eastern Caribbean. The United States has been accused, with perhaps some degree of justice, of neglecting the Caribbean over the years. Newsweek magazine has said that Washington policy-makers were bemused by the sun and sand image of the Caribbean islands as winter resorts for North Americans. To the extent that that ever was the case--and I'm not sure it was--it certainly is no longer. It has partly been the rise of the nations of the Caribbean to independence--beginning with Jamaica, Guyana, and Trinidad after the demise of the West Indies Federation, then Barbados in 1966 and the Associated States beginning in 1974--that has brought the area to the forefront. But it has also been the growing awareness of Washington policy-makers that the Caribbean, and in particular the smaller islands of the Eastern Caribbean, have serious developmental problems that are not going to go away with an independence grant, and a good year or two in the world banana market or sugar market. The underlying problems are structural; they are serious; and their solution will depend on a concerted effort by these countries in close collaboration both with their neighbors and more developed countries such as the United States. In this regard, the United States is prepared to make substantial amounts of economic assistance to the countries of this area.

There are those of you who may ask why. Why in fact should the United States care about what happens in the Caribbean. I would respond that the ties that bind us are many and of long-standing. They are historical, they are institutional, they are cultural, they are political and economic. My country is itself a Caribbean nation; many of your fellow countrymen live in my country; the Caribbean is, in a real sense, our third border. We must care and we do care, deeply, about what is happening in the Caribbean. And I am seeing a greater and greater focus by Washington policy-makers on the Eastern Caribbean as a subsystem within the larger Caribbean whole--a subsystem which has a set of characteristics and problems and challenges different in many respects from those of the rest of the Caribbean--yet at the same time, a subsystem within which each country has its own particular history, culture, political, and economic realities. There are clearly parallel problems and concerns among the countries of the Eastern Caribbean.

The focus and priority that Washington is placing on the Eastern Caribbean have sharpened our awareness that all is not well in these beautiful

islands. High rates of unemployment and underemployment, particularly among the young, emigration of skilled labor; low, if not negative, rates of economic growth; dependence on one or two export commodities for foreign exchange; and the need to import expensive energy resources all pose serious economic challenges to the nations of this area.

The administration of President Jimmy Carter has attempted to develop a new policy towards the Caribbean. Shortly after President Carter was elected, the State Department and Agency for International Development undertook a review of our Caribbean policy. Out of that review has come a new approach, and a new and higher priority for the Caribbean within our overall foreign policy structure. Let me just briefly enumerate a few concrete results of that review.

-- First, visits by Cyrus Vance, Terry Todman, Andy Young, and Phil Habib.

-- Second, we worked to establish, in conjunction with the World Bank, the IMF, the IDB, and the CDB, the Caribbean Group for Cooperation in Economic Development--a multinational consultative group consisting of both donor and recipient governments. This group has the objective of both rationalizing and increasing assistance to the Caribbean and has just this summer completed another successful meeting--a meeting, I might add, which recognized the specific needs of the Eastern Caribbean and called for a greater share of economic assistance to be transferred to this area.

-- Third, the establishment and funding of the Caribbean Development Facility (CDF), under the aegis of the Caribbean Group. The CDF concentrates on assistance which is fast-disbursing and which therefore provides recipient countries with substantial balance-of-payments benefits, in addition to helping them continue important development projects. At the first pledging for the CDF, over US\$110 million was pledged of which 30 percent was the U.S. contribution.

-- Fourth, we assisted Jamaica and Guyana to survive critical balance-of-payments problems and get them on the road to recovery.

-- Fifth, we have supported the development of truly regional programs and projects, as well as the concept of common services for the small states of the Eastern Caribbean. Our assistance in this area, as most of you know, is channeled through regional organizations, in an effort to support greater efforts at regional economic cooperation. We have channeled substantial funds through the Caribbean Development Bank, as well as other institutions such as CARICOM, the East Caribbean Common Market, the Caribbean Epidemiology Center, the Caribbean Examinations Council, the University of the West Indies, the Caribbean Agricultural Research and Development Institute and the Caribbean Food and Nutrition Institute. These institutions will play a key role in shaping future development and its implications for the environment.

U.S. interest in and concern for the question of environment and development stems from recognition of the fact that the poor are most affected by degradation of the natural resource base. Furthermore, poverty is one of the major causes of physical environmental degradation in the developing world (e.g., intensive exploitation of limited resources such as fuelwoods, over-fishing, inadequate waste disposal, etc.). Poverty may also be a cause of the failure of national institutions to adequately manage their natural resource base.

While small island states face many unique problems, we believe much can be learned from our experience and our mistakes. The United States has had to, and continues to, pay the price of pollution and natural resource degradation which resulted from a history of unbridled economic expansion. While the United States has enjoyed relative prosperity as a result of this growth, we have recently begun to pay for what economists refer to as externalities. Billions of dollars have been spent on rectifying environmental problems and billions more will be spent to address critical problems such as treatment and disposal of toxic wastes, industrial and human wastes, management of forests and other renewable natural resources, and the like. Our experience with the disastrous Great Plains dust bowl in the 1930s taught us that a failure to heed crit-

ical environmental factors can lead to significant economic and social dislocation. The failure to protect other unique resources such as the Great Lakes and the fisheries of the northwest and northeast have resulted in the requirement for extremely expensive protection and rehabilitative measures against industrial and municipal polluters. Conversely, early conservation work such as the establishment of major parks and nature reserves has resulted in significant regional and national economic and social benefits which will continue to be enjoyed for generations to come.

The peoples of the smaller islands of the Caribbean are very much dependent on their natural resource base to sustain and advance their programs of economic growth. Adequate water supplies for farming and industry, raw materials for both export and local consumption in employment-generating activities, productive soils for agricultural development, and a healthful, stable ecological base are all necessary to promote balanced economic growth. Without this carefully managed resource base, hopes for substantial growth, or even subsistence, are dimmed.

It is with this broader picture in mind that we have recently entered into an agreement with the ECCM Secretariat for a major new program in agricultural planning and project development in the Windward and Leeward Islands. This planning will draw upon the findings of other programs we are supporting with the Caribbean Agricultural Research and Development Institute, the Caribbean Food and Nutrition Institute, and the CDB, and will give special attention to environmental concerns.

The United States welcomes this further opportunity to discuss the economic and social prospects of the smaller islands in terms of their needs for assistance in solving the many complex problems of environment and development. The urgency of this issue should not be underestimated. There are many facets of these problems which can be addressed through cooperative action on national, regional, and international levels. We hope during this week to become better informed as to the critical environment and development issues facing the nations of the Eastern Caribbean region and expect to learn how the United States may play a role in assuring equitable, sustainable, economic growth in the context of a healthy environment.

I would, at this point, like to announce that in response to the desires of a number of governments in the Caribbean, President Carter's senior science advisor, Dr. Franke Press, will lead a high level U.S. Government delegation to Barbados next month for consultations with representatives of the governments of this area and their regional institutions, such as the Caribbean Development Bank. We believe that this will be an important step towards greater cooperation in the area of science and technology.

It is most timely that this Conference will be identifying opportunities for technical cooperation addressing priority environmental concerns and the framework for sustainable development. I hope that the findings of this Conference will contribute to substantive discussions next month, concerning areas for increased collaboration between my government and the governments and institutions represented here.

Other speakers have already noted the risks of natural disasters inherent in the Caribbean environment. We have been deeply distressed by the eruption of La Soufriere in St. Vincent last April and the more serious disaster caused by last month's hurricane devastation in Dominica. I just returned a few days ago from my third trip to Dominica since the hurricane hit on August 29th. I had gone over to consult with the government and to review the relief effort which my government had initiated. As severely damaged as Dominica is, I was heartened by the spirit and resilience of the Dominican people who quickly began to organize themselves into tackling the reconstruction effort; they have clearly shown the will and the fortitude to begin the gigantic task before them. Among other things, they face a variety of continuing environmental problems, including the need for reforestation. We will do our best along with other donors to give them the tools they need for their long and arduous challenge.

I must excuse myself at this time to join Admiral Knoizen and fly to Dominica to consult with the Prime Minister regarding major Seabee involvement in the rehabilitation effort which we are initiating today.

In closing, I would like to express my appreciation once again for your inviting me to be with you today and you have my every hope for a highly successful conference.

(Contributed Paper)

THE ENVIRONMENT AND THE GUIDELINES FOR PROJECT EVALUATION

Fuat M. Andic and Ramon J. Cao-Garcia*

INTRODUCTION

Economic policy decisions in any country always have political, social as well as economic consequences. These have been all the more significant as the states have come to assume a major role in guiding and shaping the economies of their countries. Hence, not only is it desirable, but also inevitable that criteria other than purely economic be taken into account in determining public choices.

Both at the decision-making level as well as in the preparation for the decision-makers, i.e., economic planning, the major decisions make use of what is known in literature as cost-benefit (C/B) analysis. Be it at the general macro-level or at the micro-level, i.e., in the evaluation of individual projects, economic efficiency as well as financial soundness have emerged as key determinants, but the acceptability of most projects now will have to depend upon their ability to meet certain other standards in terms of C/B criteria.

One of the crucial elements yet to be worked in as a quantitative element in project evaluation or in C/B analysis are the environmental factors and standards. It needs hardly any recapitulation that expansion of agriculture, fishing, forestry, industry, rapid urbanization, development of transport schemes, production and the use of energy which could all be lumped together--be it simplistically--as economic growth, place severe restraints on the environment, and the rhythm of expansion of such areas affects the environment in different degrees. It is, therefore, obvious that any development endeavor cannot afford to bypass the environmental implications of any economic project and/or plan. Yet, the inclusion of environmental considerations and parameters is a fairly new and almost an infant variable in the C/B analysis approach to economic planning.

For quite some time the environment was considered too much of a trivial aspect to be included in project evaluation. The reasons are manifold. But perhaps the most striking reason is that the environmental

damage that may ensue did not appear to have a relevant social cost, simply because, in more cases than not, the saturation levels had not been reached. And even in those geographical regions where the environmental damage appears to have long-lasting implications, the problems had not become socially important, simply because the availability of unused land and the possibility of mobility were conducive to bypassing such problems.

This is what an economist called a type of "cowboy economy," which is still in existence in some regions of the world. Agricultural practices in some developing countries are such that they cause erosion of the fields, which in turn degrades the land; peasants then move on to and prepare other tracts of land for exploitation. Even if nature does not restore the productivity of the soil, some other location is found, which easily replaces the environmentally damaged area. The problem emerges when additional land tracts become continuously scarce and/or technological conditions restrain or make the transfer of the production activity impossible. When the environmental damage is done, and there is no mobility, the problem becomes acute.

Environmental considerations also gain relevance with the process of economic growth. In societies faced with choices and with growing awareness of the implications of different economic activities on environmental quality, the public as well as the decision-makers will have to foresee and assess the environmental consequences of projects from the time of their conception to the level of planning and implementation. At the extent that the society becomes more affluent and its planning horizon expands, environmental quality gains uppermost importance.

It is inevitable that economic affluence and the maintenance of environmental quality lead to the emergence of a paradox, referred to as the "project paradox." Namely, some of the projects that are responsible for the increasing affluence of the society may also be considered undesirable concomitantly, simply because they degrade the environment. Therefore, one of the important tasks and perhaps the most difficult one of project

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evaluation and C/B analysis is to detect and forecast and to take such changes into account at the stage of project evaluation. This, in essence, is why environmental considerations are increasingly gaining importance in C/B analysis.

ENVIRONMENT AND THE GUIDELINES FOR PROJECT EVALUATION

In any industrial project evaluation, the environmental considerations must accomplish two main purposes. One is to prevent the deterioration of natural resources so that such resources can continue to be the basis for further economic development. The second is to evaluate and provide for adequate warning of the environmental effects of project development. The first purpose is nothing else but to seek guidelines to avoid depletion and destruction of project areas so that the future is not left without such resources and that the conditions are assessed for the prevention of harm to related resources. The second purpose calls attention to undesirable side effects, and the aim is to articulate the consciousness that the rate of return of industry in a particular project and the socio-economic return to the society may be quite different. In other words, total expected costs (including environmental costs) must be weighed against total expected benefits.

Environmental considerations, when they are incorporated into project evaluation, will have to be treated as an economic entity or an economic parameter. In other words, it must be demonstrated that this particular entity has the attributes of scarcity, priority, and alternative uses.

As was said in the previous section, environmental considerations have been so far excluded--except in rare occasions--from economic analysis, mainly because the current analytical tools are still in a rudimentary stage for such an analysis. The difficulty arises not so much from the conceptual standpoint but more from the technical standpoint. However, this does not imply that the conceptualization of environmental impacts is free from pitfalls. The essential or prime difficulty is that many environmental judgments do not have to deal with the imperatives of survival, but with the differences in values, differences in substance, and differences in timing. It is obvious that the poor or the unemployed would value a particular job more, say, than environmental esthetics, with the hope that the environmental damage can be repaired later on. It goes without saying that a project in the micro-sense or a development in the macro-sense cannot be given recipes

as to the environmental parameters that must be worked into the equations. These are subject to critical review in various stages of political decision from voters to decision-makers. It is, however, feasible to have a set of guidelines by which evaluations of projects or C/B analyses can be made with a certain degree of greater sophistication than what we are accustomed to.

A report prepared by the World Bank, "Environmental, Health, and Human Ecologic Considerations in Economic Development Projects," lists the environmental guidelines as follows:

1. Natural resource linkage: this step includes environmental considerations from the extraction of a natural resource to the time that it enters into a projected plant; e.g., in the case of extracting a mineral or oil, the special problem to be worked into the C/B analysis would be spillage, storage, transportation and refining operations. In every stage the undesirable effects must be quantified and worked into the cost side of the C/B analysis.
2. Process: analysis of alternative possibilities for unit operations and conversions.
3. Site assimilative capacity: the purpose of this principle is to analyze and to interpret a proposed location, and its natural resource characteristics; and to sustain an operation with the environmental impacts clearly designated. For instance, in a given location where the project's waste cannot be assimilated without destroying the existing water quality and use, the cost calculation must include a required new water quality program.
4. Waste management: the analysis of the project must include economic and technical analyses of all outputs, including by-products, and the cost of wastes for treatment, recycling and assimilation. It is desirable to place emphasis on use of the waste material, wherever possible; the assimilation back to the natural ecosystem should be considered as last resort. In the case of pollution, the weighting of costs and benefits will have an added element on the cost side, whereas re-use may increase the value on the benefit side.
5. Operation and control: any project with environmental implications requires monitoring the process, and designing control devices. Data compilation, and expertise in environmental engineering

pertinent to the industrial project, would enter into the final cost side of the evaluations with due benefits being integrated into the social benefits.

6. Social aspects: no C/B analysis would be complete without the previews and possibly quantification of the social implications generated by project investments, such as employment of a large labor force, influence on immigration and changes in land-use patterns. Cost calculations of social aspects may include both quantitative and qualitative parameters. The cost of providing adequate worker housing is, e.g., one of the quantitative elements, whereas cultural changes induced by relocating worker-families would be a qualitative one.

7. Health aspects: this step would deal with the need to monitor and maintain the health and welfare of project employees in and adjacent to the project facility. An attempt to quantify health aspects by simply assessing the economics of worker-days lost through absenteeism or the cost of medical clinics to provide cures would miss the most important cost of human discomfort. An assessment of this cost would have to be traded off against the illnesses associated with non-productive economies with poor levels of health due to poverty.

8. Optimization: This analysis will have to be all-encompassing with respect to the costs of various alternatives for protecting environmental values and for protecting natural resources, which willy-nilly augment traditional costing procedure in order to accomplish overall optimum project design.

Nature has scarcity built-in. What we have considered from time immemorial as free goods, such as air, water, etc., are no longer free when we reach the threshold conditions that lead to a change of state and inability to carry on previous functions. The C/B analysis can only indicate the consequences of choice; whether these choices are accepted or rejected is a matter of policy decision which, in the ultimate analysis, is bound to remain outside the scope of traditional or modified--with environmental considerations--C/B analysis.

The subsequent section gives the basic model to be used in providing the decision-maker with a better tool for evaluation and decision.

A BASIC MODEL

The evaluation of an investment project has to begin with a definition of social

priorities. This is what is usually called an objective function, and anything that increments this function is regarded as a project's benefit, while anything that reduces the value of the function is considered a cost. Environmental guidelines, as discussed in the previous section, will have to be included at this stage, in order to assess the environmental effects of the project, as well as the costs to be incurred in following such guidelines.

This process of defining the costs and benefits of the project, forces the analyst to identify the external effects that are expected to be generated by the project's activities. Here social constraints are integrated into the analysis, since, if the project does not satisfy such constraints, it should be abandoned. By social constraints is meant the set of political, cultural, or other institutional restrictions that any project has to meet in a given country.

If it is found that the project's activities do not violate any social constraint, then the next step is to proceed to combine its costs and benefits to obtain an estimate of the project's net social benefits over its life span, and to integrate those values in a final single figure. Standard techniques are available for this purpose, such as the present value of the net benefits, the internal rate of return, and the C/B ratio, among others. The advantages and disadvantages of each of these techniques have been extensively discussed in the literature, and no attempt is made here to summarize them. Any of these techniques provides a summary value of the social net benefits of the project under consideration, and this figure can be compared with the equivalent estimates obtained for other projects in order to establish priorities for the execution of investment decisions. This is what is called confronting a project with the decision criteria and allows for deciding whether a particular project should be rejected or implemented.

The accompanying figure presents a diagrammatic summary of the process outlined in these paragraphs. This analysis, sketchy as it is, could provide us with the theoretical basis for the consideration of the case of small island LDCs, because it provides a framework that allows for an integrated evaluation of the environmental and socio-economic effects of a project.

SMALL ISLAND LDCs: SPECIAL PROBLEMS

A small island LDC presents unique features that have to be taken into consider-

ation when performing a C/B appraisal of a project. First is its size, which stamps a character of irreversibility to some projects that would be reversible in a larger country. Secondly, islands, by definition, are surrounded by the sea; so the sea becomes the natural isolator, as well as the natural conductor of environmental effects caused by neighboring areas. These two special characteristics are of sufficient importance to merit separate consideration:

1. Size and irreversibility of investment projects. The fact that a country has a small size could give a character of irreversibility to some large, or even medium-sized, investment projects, introducing levels of uncertainty that are not present in larger economies. For the sake of illustration, let us assume that a small island decides to establish an oil refinery on its shores. Because its internal market is limited, such a project will have to depend on exporting a large proportion of its production. Furthermore, such a project will certainly generate modifications in the economic structure of the island: some traditional outputs will be abandoned and new products will be manufactured as a consequence of the establishment of the refinery.

The important thing here is that the economy will be reshaped with the implementation of the project. If the project fails, then it could become impossible for the island's economy to readjust its production patterns in the short run. In a larger economy, a failure of this sort would imply the decay of a community, but the affected individuals have the alternative of migrating to another community within the country. As a result, the affected individuals need not suffer an irreversible damage. But in a small island economy, people will not be able to migrate to another community within the island, simply because the failure of a project affects the whole country.

A similar line of reasoning applies to the probability of environmental accidents. In a large country, an accident of this sort would affect only a limited portion of the country's total area; but in a small island, the accident could affect the whole country. Such probability has to be taken into consideration when the project is under evaluation, and weighed more heavily as the size of the country becomes smaller.

The effects of the changes in the patterns of social evaluation that occur with economic growth are also expected to gain

relevance with decreases in the size of the economy. The smaller the economy, the faster is the rate with which social changes are expected to spread, and the sooner is the emergence of the phenomenon of the "project paradox."

2. Spillovers and the sea. As stated previously, in small island LDCs the sea is the natural isolator as well as the natural conductor of neighborhood environmental effects. As a result, some adverse environmental effects that spill over the borders in continental countries are assimilated by the sea, reprocessing the polluting agents without generating any harm. Also, the sea might force the pollution agents to be kept within the boundaries of the pollution generating country, internalizing in this way all the adverse by-products of a project.

But the sea could also transport the environmental damage to other shores. In this case, the pollution generating country imposes a cost on its neighbors. Because this cost is not paid by the country where the project is located, there will tend to be incentives for ignoring such a cost when the project is under evaluation.

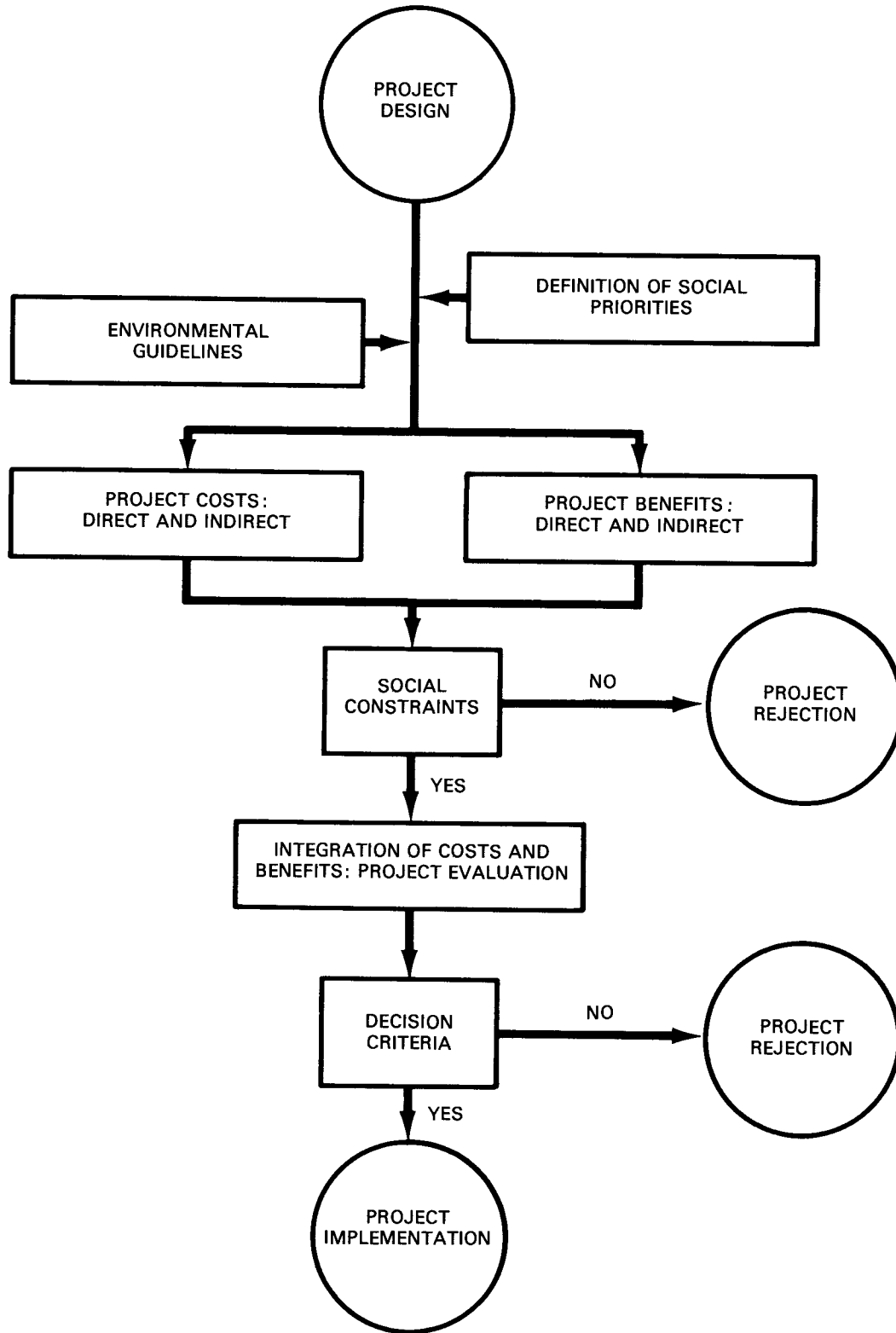
Consequently, regional agreements have to be reached as to how to incorporate this cost into the methodology of project evaluation. Two mechanisms are available: either (a) an agreement is reached as to the maximum levels of industrial discharges that any country can dump into the sea--which amounts to incorporating the cost as a social constraint--or (b) a mechanism is enacted for compensating the affected countries--which amounts to incorporating the cost among the environmental guidelines. In any case, neighboring countries should use a standard procedure for evaluating these effects when analyzing the costs and benefits of a project.

SUMMING UP

What this paper emphasizes are the following points:

1. Environmental considerations will have to be included in assessing the costs and benefits of development projects.
2. Environmental factors will have to be treated as costs, direct and/or indirect, of a project, and the decision criteria on any project will have to be determined with such factors duly considered.
3. The type and size of the economies where the projects are located introduce variations into the consideration

FRAMEWORK FOR EVALUATING THE ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS OF A PROJECT



of environmental factors in a C/B analysis; for,

a. the size of the country can make the project irreversible, changing the cost considerations in project appraisal;

b. the size of the country gives greater importance to regional spillover effects; and

c. the characteristic of an island economy can enhance the regional spillover effects depending upon the role played by the sea.

4. International regional guideline agreements, therefore, acquire all the more importance in project evaluation.

In short, the purpose of this paper was to discuss the basic analytical tools of project evaluation and the incorporation of environmental parameters into traditional cost-benefit analysis. It attempted to develop a frame of reference into which environmental considerations are worked and criteria and standards are discussed to enable the decision-maker to take such considerations into account during the planning and appraisal stages of development projects. It identified environmental and related human ecologic effects and their costs and benefits and reviewed such procedures from the point of view of small island economies.

BIBLIOGRAPHICAL NOTE

In this paper we refrained from making footnotes. The paper is based on the following works, and the reader is referred to them for general as well as detailed analysis.

- P.W. Barkley and D.W. Seckler. Economic Growth and Environmental Decay: The Solution Becomes the Problem. New York: Harcourt, Jovanovich, 1974.
- W.J. Baumol. "On the Social Rate of Discount." Am. Ec. Rev., 1968
- W.J. Baumol and E.E. Oates. "The Use of Standards and Prices for Protection of the Environment." Swed. Jour. Econ., 1971.
- F.L. Cross, et al. "Environmental Aspects of Site Selection for a Petroleum Refinery." Proceedings, 4th N. Eastern Regional Antipollution Conference. Univ. R.I.
- P. Dasgupta, et al. Guidelines for Project Evaluation. New York: United Nations, 1972.
- R. Dorfman & N. Dorfman, eds. Economics of the Environment: Selected Readings. 2d ed. New York: Norton, 1977.
- IBRD. Environmental, Health and Ecologic Considerations in Economic Development Projects. Washington, D.C.: 1974.
- A.V. Kneese and C.L. Schultze. Pollution, Prices and Public Policy. Washington, D.C.: Brookings Institute, 1975.
- I.M.D. Little and J.A. Mirrlees. Manual of Industrial Project Analysis in Developing Countries. Paris: OECD, 1969.
- E.S. Mills. The Economics of Environmental Quality. New York: Norton, 1978.
- E.J. Mishan. Cost-Benefit Analysis. London: Allen & Unwin, 1971.

SUMMARY OF SESSION I

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The heavy emphasis on the importance of good management to achieve the common goals of the islands and Dr. Blackman's criticism of the three basic strategies for Caribbean economic development--a) economic and political integration, b) the view of the New World group--the basic premise being that underdevelopment stems from the persistence of the plantation system, and c) the Marxist/Leninist view recommending central planning and economic socialization--led to a lively discussion and certain degrees of criticism from the floor.

It was pointed out that Caribbean economists were not wrong in looking into development problems, taking the economic realities of the Caribbean as the point of reference and examining them through their own eyes.

The logical outcome of the paper, i.e., whether the economists misled the politicians was discussed at great length. The speaker emphasized that the region should undertake a systematic development of a managerial class in order to enhance a cadre of decision-makers. The question was then raised as to how managerial decisions should be separated from political ones. The speaker's viewpoint was that managers should be free from political intervention if this were not possible then whatever system a country chose, the institutions would fail to work and hence the goals would become unattainable. Thus in the Caribbean the issue becomes not so much how to plan or who is to plan but rather the application of well-tried principles of economic management.

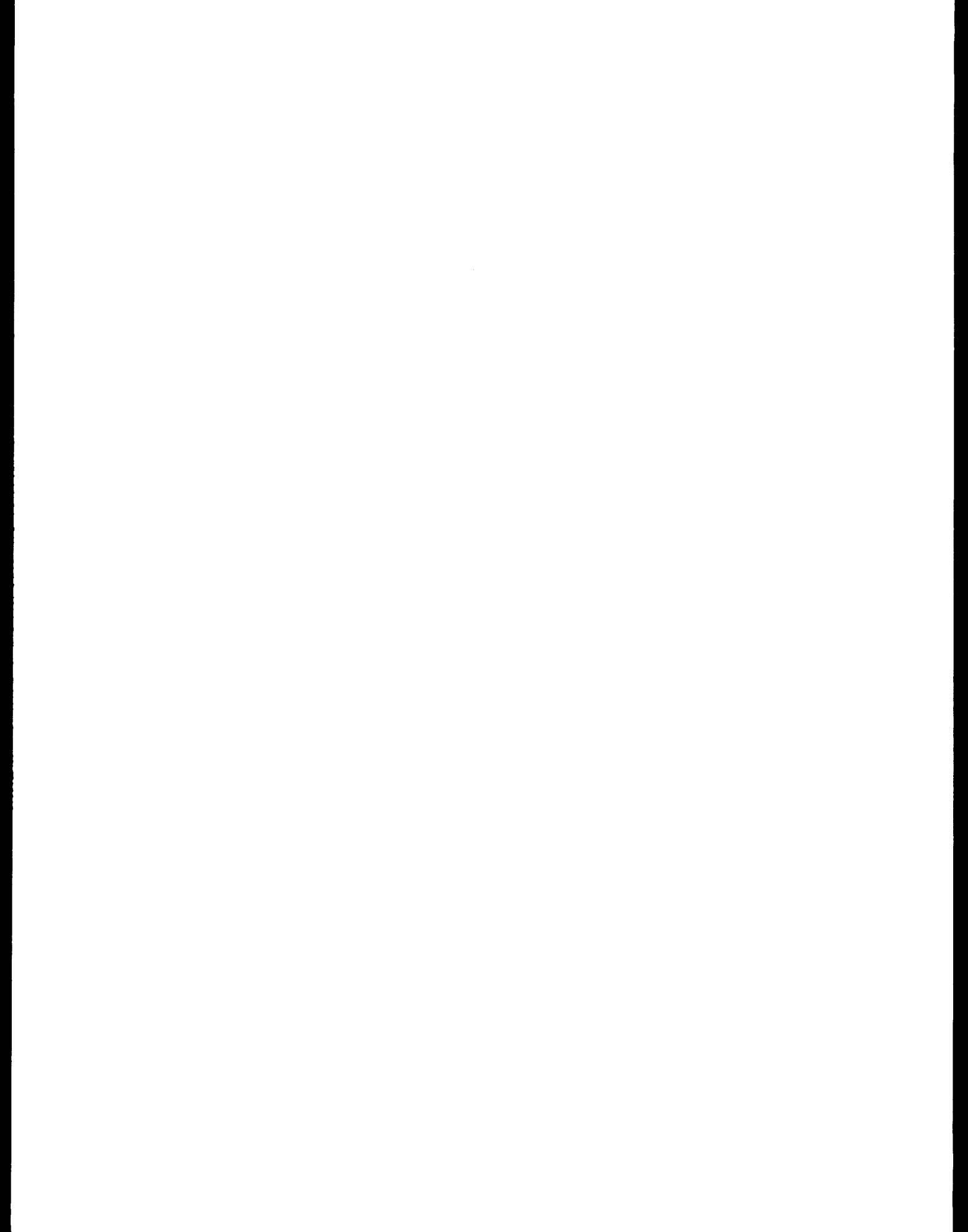
It was asked out from the floor that since state's participation into economic activities in the small Caribbean islands has been growing, was this tendency due to lack of the private sector's involvement in the development process, and if so should something be done about it. The speaker pointed out that he was not against state participation, in fact he welcomes it. The matter, however, he emphasized is that the state could not possibly do everything and the degree of state participation into the economic process could only be determined according to the needs of the individual countries.

He summed up his position by reiterating that if the decision-making managerial cadre can direct the efforts of people; if given country, in fact, possesses such a cadre, then the process of economic development--the process by which more persons in a society are progressively enabled to carry out a larger share of productive activities in an increasingly effective manner--will take place.

TABLE OF CONTENTS

Session II

	Page
FACTORS CONSTRAINING GROWTH OF MICROSTATE ECONOMIES, S. B. Jones-Hendrickson	31
NATURAL AND HUMAN RESOURCE CONSTRAINTS - TECHNICAL ASPECTS, Kenneth Snaggs	42
CONSTRAINTS ON HUMAN ECOSYSTEMS, Contributed Paper, Ariel Lugo	51
SUMMARY OF SESSION II, Ariel Lugo	53



FACTORS CONSTRAINING GROWTH OF MICROSTATE ECONOMIES

S.B. Jones-Hendrickson*

INTRODUCTION

Oscar Wilde was reputed to have said that "An economist is a man who knows the price of everything and the value of nothing." (Daly, 1977:4) In this paper, I hope to avoid the Wilde rebut and deal with some issues which are of concern to the smaller Caribbean islands. I hope that my development of some of the fundamentals will be beneficial to the policy decisionmakers and other members of the political directorate in the smaller Caribbean islands.

From an operational point of view, the organizers of this "Conference on Environmental Management and Economic Growth in the Smaller Caribbean Islands," have defined the "smaller islands" as those having areas less than 10,000 square kilometers and populations of less than 500,000 people. This numerical classification includes Antigua, Barbados, British Virgin Islands, Dominica, Martinique, Guadeloupe, Montserrat, Netherlands Antilles, St. Kitts-Nevis-Anguilla, St. Lucia, St. Vincent, Grenada, and the U.S. Virgin Islands.

What are the interlocking forces which put these countries into the category of the "smaller Caribbean" countries? The arbitrary measures of area and population size seem to have taken precedence over other critical factors in the characterization of these smaller Caribbean islands. In the groups there are "more developed countries" according to some economists' standards; there are colonies; there are governments of transformation; there are governments in transition; in general, they are an odd lot of entities, harbingers of people who cherish common aspirations.

At the Caribbean Research Institute (CRI) of the College of the Virgin Islands, our fundamental thrust is on the dynamics of the Microstate Economies. The sociology, the economics, the politics, in sum, the full thrust of "micro-ness" is being operationalized. We are not hamstrung by the area and population definition of the smaller Caribbean islands. We call them

Microstate Economies (MSEs). We characterize them as (1) small states with limited land area, limited resources, and populations; (2) politically autonomous or internally self-governing with the determination to be accepted as separate and distinct entities; and (3) having an urge to move as far and as fast as possible into the category of "developed" countries.

Our definition seeks to be all embracing and there could be problems with such a position. However, at the Caribbean Research Institute, we are devoting our efforts toward an understanding of the Microstate Economies of the world, with special emphasis on those Microstate Economies in the Caribbean. To articulate and concretize some of the critical underpinnings of what we perceive of the MSEs, we have launched a journal called Microstate Studies.

In this spirit, we view the Conference as one of overarching importance in the formulation of solutions to the critical problems of survival in the Microstate Economies of the Caribbean.

In the last part of our definition of "Microstate Economies," we center on the issue of "having an urge to move as far and as fast as possible into the category of 'developed' countries." Within this urge and desire lies the salient issue that I wish to deal with in the paper, namely: How do the natural and human resources of a Microstate Economy constrain its economic growth? The focus of the paper will be on four resources, i.e., water, human, energy, and land (WHEL). In section two of the paper, I review some of the features of constraints inherent in the four resources as they are perceived by some scholars. Section three poses the counter-question, namely, are water, human, energy, and land constraints to economic growth? The final section of the paper assesses the evidence presented and cites some points of departure which decisionmakers and other members of the political directorate may wish to consider in the formulation of policies geared to confronting the issues of constraints to economic growth in the Microstate Economies of the Caribbean.

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WATER, HUMAN, ENERGY, LAND:
CONSTRAINTS TO ECONOMIC GROWTH

The countries which this Conference is calling the smaller Caribbean islands, but which we choose to call Microstate Economies, are now receiving a tremendous degree of coverage in the literature of political economy. Central to the analysis of the current focus are the questions of size, political autonomy, and economic viability. We will deal with these issues in section three. It is safe to say, nonetheless, that Caribbean MSEs are now on the agenda, they have been removed from the backburner. In this regard, the focus of attention may be germane in terms of ideas for the political directorate in the countries in question.

Although the countries under discussion now fall under the analytical categories of water, human, energy, and land, they have been discussed in the literature of political economy as dependent-underdeveloped economies. The term is being used in the sense of Jones-Hendrickson and Bourne (1977: 1-2), namely that the countries:

are dependent on the rest of the world-- a euphemistic term for the capitalist world--as suppliers of their imports of basic foodstuffs and intermediate goods, as markets for exports which constitute a large part of the domestic production, and as providers of finance for private and governmental consumption and investment expenditures.

Dos Santos (1973) fortifies this definition by defining dependence as a "situation in which the economy of certain countries is conditioned by the development and expansion of another economy to which the former is subjected."

Our focus, in this paper, on the resources of water, human, energy, and land of the Caribbean MSEs has to be seen in the context of the dependent-underdevelopment of the countries. From that point of view, the question that we have been given has to be analyzed against this politico-economic relief. In other words, to understand how the natural and human resources of a Microstate Economy constrain its economic growth, we have to root this question in the politico-economic reality and social relations of the countries in focus. We will now discuss each of the resources beginning with water.

Water

Over a 3-year period, 1975-1978, a group of Caribbean social scientists undertook a study of Caribbean Public Enterprises. The

study was under the auspices of the Institute of Social and Economic Research (ISER), Jamaica, and the Institute of Social Studies (IDS), Guyana. The work was funded by the Social Science Research Division of the Canadian International Research Council. I undertook a study entitled "An Analysis of the Production and Provision of Water Services in the Microstate Economies of Antigua, British Virgin Islands, St. Kitts-Nevis-Anguilla and Montserrat." The work was a companion piece to one on which I am working for the U.S. Virgin Islands.

Essential to my contention about the production and provision of water services in MSEs is the notion of economic growth. Economic growth is defined, for our purposes, as an increase in a country's gross national product (GNP). In other words, if there is visible evidence of increases in the production of final goods and services in a country during a specified period, we take this to indicate economic growth. That is a big picture or a macroeconomic view. From a microeconomic view, economic growth implies some sustained increase in per capita income or per capita gross domestic product (GDP). This latter definition is encroaching on the territory of the human resource/population aspect. We will discuss that aspect later.

Now that we have the economic growth aspect clear, let us determine why water resources may be considered a constraint to economic growth. Currently there are no accurate records on water consumption in the entire Caribbean. In the larger Caribbean countries there has been some pretense regarding the collection of water data, but as my colleague Karl Theodore (1977) has demonstrated for the Trinidad water situation, the data are more apparent than real. There is a growing body of evidence, however, that as the Caribbean demand for water increases, thousands of liters of water are needed to accommodate the demand in agriculture, industry, and domestic consumption. The increasing demand has a major complication. This results from the increases in consumption due to population growth.

Five sources of water are characteristics of our region, like most regions. They are precipitation; surface water; stored water (water in the top soil); ground water (water at deeper levels than stored water); and sea water. In the MSEs under discussion, these five sources vary from island to island. The topography of the islands has significant impacts on the quantity of water that is attracted to and that is retained in the islands. On the one hand there is mountainous Dominica that attracts and retains a great deal of water, has rivers and in which, therefore, water may not be a problem. On the other, there is Anguilla, Barbados, the Netherlands

Antilles, the British and U.S. Virgin Islands which are "flat," have chalk and limestone formations, and which do not attract or retain adequate quantities of water.

The seasonal and cyclical nature of precipitation in the Caribbean buttressed by the topographic features of the microstates in question have established marked modes of precipitation. The hurricane seasons and the hotter months of a year are clearly distinguishable from the drier months of a year. This dry/hot seasonality in precipitation has good and bad effects. Water is needed for consumption, farming, industry, and so on. But when it comes in terms of floods or hurricanes, the same master which normally aids in agricultural production, turns into a demon of destruction. The recent experience of Dominica and Hurricane David graphically illustrates our point.

There is no hardcore evidence that the lack of water in the Caribbean MSEs drove decisionmakers to institute water-enhancing and water-saving devices. It seems that it is more from the point of view that necessity is generally the mother of invention. In Antigua, Anguilla, and the Virgin Islands most houses have some kind of water catchment. Through this medium the water services which are linked to the health component of economic growth and development are enhanced.

Run-off water is invariably collected in ponds, dams, and lakes in many of the MSEs. The method is rudimentary at best but it serves to augment the water supply in some of the islands. In the case of St. Kitts, for years, dams or "sluices" were integral parts of trapping water on the sugar estates. The method is falling in disuse, but it still has some adherents among agriculturalists in the region.

Ground water is the main source of water in many of the islands. No accurate data exist on the quantity that is available in the MSEs. However, partial evidence indicates that a sufficient quantity exists which, if adequately mined, could solve some of the water inadequacies in some of the islands. Here, for example, we cite the work of Christmas (1977) and his ground water assessment in St. Kitts. In Montserrat and St. Croix, Virgin Islands, there have been some high-yielding wells. A problem from which many of the islands suffer is the poor and inadequate transmissibility of the aquifers. The water yield is constrained, and compounding the problem is saline intrusion. Antigua, Anguilla, St. Thomas, and Tortola in the Virgin Islands also suffer from saline intrusion.

In those entities where water demand

continues to outstrip the supply and where, as a result, there are inherent constraints on economic growth, water desalination technology is in vogue. The larger Netherlands Antilles, Bermuda, the Virgin Islands, and Antigua have desalination plants which are geared, ostensibly, to augment their water supply. Given the state of the arts vis-a-vis the technology, and given the political culture under which many of the plants were purchased, none of the desalt plants is functioning according to capacity requirements. In fact, as in the case of the U.S. Virgin Islands and Antigua, the plants are more often, than not, under repair.

All things being equal, the microstates under discussion do have adequate water. Water surrounds the islands. Rainfall is relatively adequate. There are some rivers, perennial and intermittent streams. Some of the islands have good sources of ground water. Paradoxically, however, the water resource in the MSEs is inadequate for the region's demand. The problem is inadequate water management, outmoded water technology, or inappropriate modern technology. Domestic and industrial pollution of the rivers, water table, and seas around the islands, among other inadequacies, have all combined to effectively impose some constraints on water services.

There are statistical data which indicate that the demand for industrial and domestic uses of water is rising in the Caribbean MSEs. The revitalization of sugar in St. Kitts and Antigua, the expansion of agricultural crops in the Windward Islands, and the new thrust in food production in the region per se, will all make additional demands on the water table. From available statistical data, also, we know that a growing individual of about 75 kilograms needs about 10 times his/her weight in water per annum. Given the increasing population in the MSEs, given the drive to increase food production, and given the inadequate water supplies, it becomes readily apparent that the inadequate water resource is a constraint to economic growth. To the extent that we perceive of a positive link between water resources and economic growth, the constraints of inadequate water services could have resultant constraints on economic growth in the islands. We will return to this issue in section three. Let us now turn to human resources.

Human Resources

Economists describe human resources as people who are capable of taking part in the production process. The general Western definition of the production process is all of

the activities outside of the household which, indirectly or directly, provide goods and services to the household sector when and where they are required. The use of people in the production process is termed labor. Human resources are crucial in the production process. The production process is the core of economic growth. Implicitly, human resources, like natural resources are crucial in economic growth.

Human resources, labor, or population could be seen as a constraint to economic growth in the MSEs if the Malthusian argument regarding the differential growth in population and food supply is accepted. The Reverend Robert Thomas Malthus was so struck with human misery that he felt forced to develop some logical explanation for human suffering. The oft-mentioned Malthusian doctrine first published in an anonymous Essay on the Principle of Population in 1798, caused a great deal of controversy. When it was revised and published under Malthus' name in 1803, Malthus established his famous doctrine. Simplistically, Malthus contended that the unchecked breeding of man causes population to grow by a geometric progression, whereas the food supply can only grow by an arithmetic progression at the very least. In other words, population tends to grow 1, 2, 4, 8, 16, whereas food supply grows 1, 2, 3, 4, 5, and so on.

This Malthusian doctrine has a number of adherents among those scholars and commentators of and on the MSEs of the Caribbean. It is argued that population is growing too fast, while everything is being imported to feed the burgeoning population. This population growth, as a consequence, is causing havoc on economic growth. There has been no real economic growth, since population growth, combined with inflation, has served to constrain economic growth.

Many economists suggest that there is a positive relationship between the decline in the population growth rate and economic growth and development. From this it is inferred that development could be a mechanism for controlling the population. In other words, development may be used as a tool to curtail human resources. The evidence is still controversial, however, regarding the role development or economic growth plays in terms of population. Economists have not been too successful at accurately predicting short-run perturbations in population growth. They have been able to give some general explanation pertaining to the relative rates of growth between population growth in "developed" and "developing" countries. However, when it comes to fully understanding the dynamics of population growth in MSEs, such as those in the Caribbean, economists have a long way to go.

At the crux of the population-economic growth issue is the so-called "low-level equilibrium trap" as developed by Nelson (1956: 894-908). The argument inherent in the low-level equilibrium trap (LLET) is the classical approach to population/human resources and economic growth. Increasing population growth in the MSEs in question means that more of the countries' efforts must be devoted to food production. In this respect fewer resources will be set aside for other factors of economic growth and development. If the region still continues to suffer from nutritional inadequacy, as indeed the CARICOM Health Desk has indicated, then the productive capacity of the population may still decrease.

Fundamentally, it means that a rapid increase in the labor force will force the economies to devote larger and larger amounts of their little savings to equip the human resources in the countries. In essence, what all this amounts to is the following: a high birth rate, even if it is counterbalanced with a high death rate, results in a skewed age composition of the population with too many people not contributing to production. Or to put it another way, too few persons contributing to production. In the Caribbean, and specifically in the Caribbean MSEs, there is, in general, a bimodal population distribution. Between ages 0-14 there is one mode and between 45-64 there is another mode. It may be inferred that persons between the ages of 15-44 suffer from a very high depending ratio: a large group of older people, and a larger group of young people (see figure 1). This situation amounts to a high ratio of consumers (the two modes) to highly productive workers (age 15-44). Since many of the children may not survive to working age, they are in effect cutting into the economic growth of the countries.

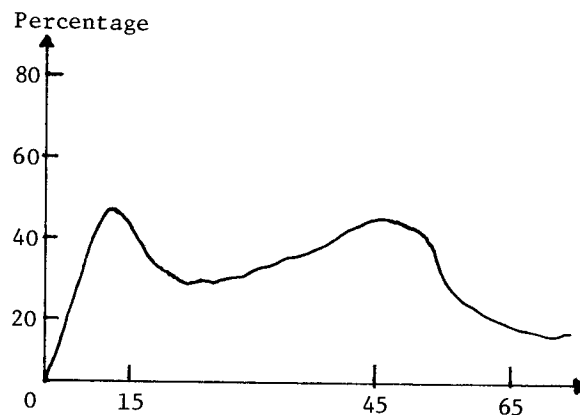


Figure 1: A Hypothetical Approximation of Distribution of Population in the Caribbean by Age

Note: Data for the Eastern Caribbean MSEs are skewed to the right.

Consequently, the classical argument is, "rapid population growth may prevent the economic development that would otherwise be the 'cure' for the demographic change," (Edel, 1973: 36). Increasing population may constrain economic growth, bring on stagnation and starvation, if it is accepted that the move to higher economic growth is contingent upon low levels of population growth. How does all of this relate to the low-level equilibrium trap (LLET)?

In figure 2 we illustrate levels of production per capita on the horizontal axis. Rates of economic growth are depicted on the vertical axis. Let us assume that population growth rates (Pr) are increasing above subsistence income level. This is in keeping with the early stages of development thesis. Assume that these population growth rates begin to decline at per capita production \$M. Let us further assume that the economic growth rate of production (Yr) is greater at higher levels of per capita production than at lower levels of production. We arrive at this assumption because if the MSEs have high income levels, public policies may steer more funds into capital expenditure for growth and development purposes.

The arrows point to levels of unstable equilibrium in that they pinpoint the direction to which per capita production will flow, at given levels. For example, at a given level between subsistence and a per capita income of \$N, the rate of population is higher than that of production. In this respect, the system is driven back to the subsistence level, arrow two. When the economic growth rate (Yr) is above \$N per capita, economic growth rate (Yr) will exceed population growth rate (Pr). In this case, economic growth will be perpetual and population growth rates will continue to fall.

This somewhat fairy-tale analysis is the low-level equilibrium trap (LLET) as formulated by Nelson (1956). The analysis leads to the conclusion that there will be a stable equilibrium in the system at subsistence level. This equilibrium trap can be destroyed only if an economy increases its income level beyond \$N per capita. LLET is sometimes discussed as if it is an iron-law of nature; a "China Syndrome" from which developing countries cannot escape on their own accord. Recent demographic discussion seems to confirm this Malthusian discussion for developing countries. Of course, there is always foreign aid which can provide the magic level to catapult the trapped countries beyond the critical minimum subsistence level. The acceptance of LLET has led into some of the population control and family planning measures. To the degree that this simplistic argument of

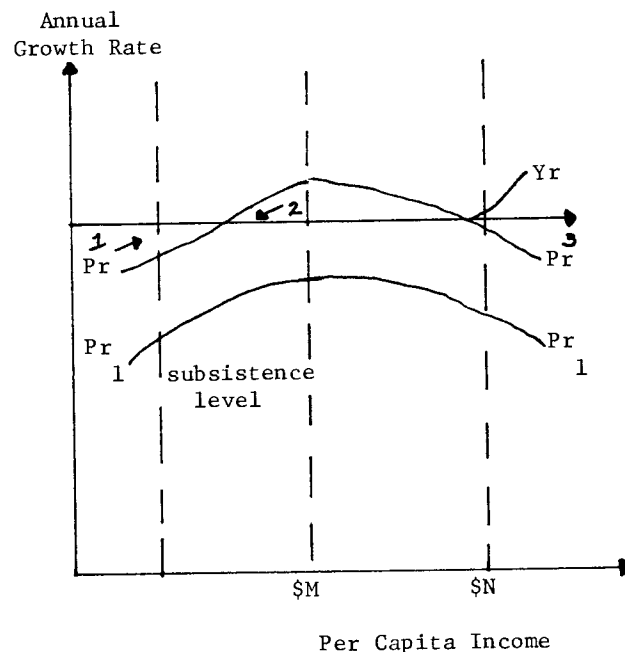


Figure 2: Low-Level Equilibrium Trap. (After Edel, 1973: 37)

LLET is accepted for granted, the population human resources nexus is a constraint on economic growth in MSEs. But, are human resources really a constraint to economic growth in the Caribbean MSEs? We will return to this issue in section three. Now let us concentrate on the third resource: energy.

Energy

Less than a year ago our Ecological Center of the Caribbean Research Institute mounted a conference entitled "Energy Self-Sufficiency and the Virgin Islands." The concerns of that conference are particularly germane to the concern of energy as a resource constraint in the economic growth of MSEs. In that CRI conference, the concerns were that:

Ninety percent of energy requirements in the Virgin Islands is met by the importation of petroleum. This fuel provides electrical and heat energy as well as water. Wind and solar power abundant in the Virgin Islands, provide negligible energy at this time. Self-sufficiency requires heavy use of wind and solar power, . . . and extensive modification of current consumption patterns. (The questions were posed) Is energy self-sufficiency a reasonable alternative for an already developed tourist economy? Will increased self-sufficiency mean increased political and economic freedom?

The concern of that conference could be

rephrased to apply to the MSEs of the Caribbean. Since the Virgin Islands are part of the MSEs in question, it is instructive to reflect on the conclusions of that conference. By and large, there was no consensus of opinion on the aspect of energy self-sufficiency in the Virgin Islands. Many people felt that there was a definite need to utilize wind and solar energy and reduce the dependence on petroleum. Implicit in this reduction of dependence on petroleum is the nature of the stultifying effect that inadequate energy resources could have on Caribbean MSEs. Of course, this peculiarity only obtains because of the nature of energy using equipment in the area. The region is so locked into metropolitan technological aspirations that any energy crisis must have a stagnating effect on economic growth.

This issue of energy and economic growth is primarily a reaction to the Arabs offensive in attempting to get "a piece of the rock" in the Prudential parlance. The "energy and growth debate" (Daly, 1977) harks back to the developed world's "reaction to the energy crisis (which) has been essentially to seek more energy at any cost," (Daly, 1977: 129). For the so-called developed world, breeder reactors and the development of fission power have assumed top priority as the energy source for the world's future (National Council of the Churches of Christ in the USA, 1975). Linked to this Plutonium Economy argument is the "growth versus no growth" (Mishan, 1976) thesis of the "developed" countries.

The developed countries have a problem of energy and economic growth. In addition, those countries have a problem of limiting their economic growth so that they could provide some level planning in their economies and eschew levels of conspicuous consumption. Five sets of view have been advanced against the proposition to limit growth in the developed countries (Daly, 1977: 129-130):

- (1) "Energy growth is necessary to maintain employment."
- (2) "Unless energy production grows, the poor will be forever frozen at low levels of energy consumption and will never have the benefits of 'energy slaves' or household appliances."
- (3) "Developed countries need more energy because the population growth rate requires it."
- (4) "Developed countries need energy growth for defense and military deterrence."
- (5) "Developed countries need energy

growth to clean up the pollution and recycle the wastes that have resulted from past economic growth and will result from future growth. Developed countries need to grow so that (they) will be rich enough to afford the cost of cleaning up."

In a scathing attack on these five arguments, Daly (1977) contended that the five sets of views were really a smokescreen geared to maintaining special interest in the developed countries. The arguments, he notes, are fallacious for several reasons. First, "the energy sector is the most capital-intensive sector of (an) economy and offers the least new employment per dollar invested of any major sector." Second, it is better "to help the poor (by putting) more money in their hands through a minimum-income program, perhaps in the form of a negative income tax," than to assume that a trickle-down approach to development would assist them. Third, "the association between energy growth and economic growth, even as conventionally measured, is very loose." By and large, there is no unequivocal argument for the linking of economic growth and energy growth.

Energy as a constraint to economic growth in Caribbean MSEs differs from the issue in the developed Capitalist economies of North America and Europe. There, as many Western economists have argued, the question is economic growth under what regime? The issue is economic growth and quality of life as some see it, according to Solow (1977). Goldman (1977) sought to show that even in non-Capitalist economies the problems of energy, pollution, and economic growth are intimately linked. In developing countries, and specifically Caribbean MSEs, we concur with Daly (1977: 148) that it is

absolutely a waste of time as well as merely backward to preach steady-state doctrines to underdeveloped countries before the over-developed countries have taken any measures to reduce either their own population growth or the growth of their per capita resource consumption.

For the Caribbean MSEs, economic growth is desirable. Some energy is also desirable. However to effectuate energy growth according to the dictates of U.S. norms is patently foolish and myopic. While the lack of adequate energy resources is a definite constraint on economic growth, a prior question is important. What economic growth levels are desirable in MSEs? We suggest that the policymakers in the MSEs of the Caribbean have to take into serious view the capacity of their economies for economic growth, the dependence that energy can generate, and the welfare needs

and aspiration of their people. They have to determine the full meaning of "small is beautiful." In their case, small quantities of energy may be a constraint to economic growth, but they may also be less harmful to their civilization. Finally, let us turn to land.

Land

In the act of four "constraints" to economic growth, land area in the Caribbean MSEs poses a definite problem to their economic growth and potential. In terms of metropolitan norms, the Caribbean MSEs are handicapped. They are too "small," so the saying goes. People do not have space to move about. There is no room to run and play without bumping into each other. One scholar from the larger Caribbean, sociologist Orlando Patterson, claims that they would not be caught in an MSE for more than a week.

This naive understanding of the Caribbean MSEs derives from a static view of the countries in question. If the countries are viewed from a dynamic perspective, the size issue does not, in itself, become a constraint. More about this later. In the region the issue of size and economic growth constraint was first systematically raised by William Demas (1965). He claimed that "the alternatives open to small countries in the contemporary world are much more circumscribed than those open to larger countries," (Demas, 1965: 39). Viewed in this metropolitan-oriented view, the Caribbean MSEs are in fact doomed. They are small vis-a-vis the USAs of the world, they have burgeoning populations, their natural resource base is meagre, their energy levels are inadequate, and in sum, they will continue to be what V.S. Naipaul facetiously called the area "the Third World of the Third World."

We are not naive to believe or subscribe to the view that land area does not pose a severe constraint to the Caribbean MSEs. While the arable land cannot be viewed in a simple Ricardian schema, there is sufficient evidence that much of the land is not currently suitable for agricultural purposes. Lack of arable or cultivable land in the MSEs in question poses a serious problem for the masses. This has developed from a system of unequal economic and social relations in the MSEs. Over the years, peasants have been deprived of access to fertile acreages. Many of their acreages have been monopolized by elites in the islands and by foreign companies. In essence, the peasants have no other recourse but to cultivate marginal lands. The inevitable result of this practice has been the continuous erosion of the land, deforestation, soil exhaustion, and continued misery for the poor.

That the physical size of the Caribbean MSEs is a constraint to economic growth, is a commentary on the obvious. It seems logical to assume that if the countries had greater degrees of freedom to exercise crop rotation, to let lands lie fallow while other areas are under cultivation, that the production of food for the domestic market would have been less susceptible to external market conditions. However, since the consumption patterns of many of us in the region is away from cassava and onto wheat, since we must have caviar in our "bar-shops," all of the four resources mentioned--water, human, energy, and land--are perceived as constraints to economic growth. For too many in the region, economic growth is that type of growth which permits a stereo, washer and dryer, color television, the omnipresent car, and all of the other perquisites of the metropolitan suburban household. We aspire to consume what we have not produced.

In our 2 x 4 islands we want superhighways, such as exist in St. Croix, Virgin Islands. Nevertheless, we clamor for an agricultural base. We want skyscrapers, large parking lots, the usual concrete jungles to accommodate our wants and desires; we import almost everything. When all is said and done, are the resources really constraints to economic growth in the MSEs? We are eternally optimistic and as a consequence, we take a positive view toward water, energy, human, and land resources relative to economic growth. Let us explore these points some more.

WATER, HUMAN, ENERGY, LAND RESOURCES-- ARE THEY REALLY CONSTRAINTS TO ECONOMIC GROWTH IN MSEs?

Decisionmakers in the Caribbean MSEs could be confronted with a mammoth problem if they perceive of economic growth in the same manner as Capitalist countries. In this respect their planning insights for the future may be "cloudy" as far as the constraining effects of water, human, energy, and land resources are concerned. But are these four factors really constraints in the sense that their combined effects restrain, check, confine, and repress economic growth? I suspect not. These factors are necessary restraints to economic growth, but they are not all-encompassing barriers to economic growth. What evidence is there to justify this view?

In the case of water the problem in the Caribbean MSEs stems from peoples' misunderstanding and misuse of water resources. As I have indicated elsewhere, "the mores and culture of a people can augment the quantity (and quality) of water that penetrates the

surface soils to the subsoils. This is not to suggest that the capacity of the soils can be increased; . . . a better soil structure can be promoted, dry land farming can be encouraged, and other water-saving techniques can be put into effect." (Jones-Hendrickson, 1978: 4).

Water need not be a constraint to economic growth in the region if there is the institutionalization of "modes of action" which encourage citizens of the various states to treat water as a critical life resource. On my many frequent trips to my home (St. Kitts), I shudder when I see young and old alike turn on taps and let piped water run indiscriminately. Mark you, I was once part of that water-wasting culture. There is hope for change.

Another example of the misuse of water resources is in the case of St. Thomas, Virgin Islands. Between 1976 and today, the water situation has taken a hazardous turn. And yet the demand for water has increased precipitously over the period. One would have imagined that the people in authority would have encouraged the population at large in the ways of developing a water consciousness. There has been much rhetoric: action has been a commodity in shortage.

Some quantity and quality of economic growth is required in the Caribbean MSEs. Water has a definite role to play in this scenario. We are of the opinion that new ideas have to be brought to bear on the matter to mitigate the inherent constraints of water on economic growth. If water has to be transported from one state to another, as is true between Puerto Rico and the Virgin Islands, then this method should be explored. Water's constraint on economic growth impinges on water management, technology, hydrology, chemistry, engineering, economics, and culture. This multifaceted approach to the solution of water's constraint is of paramount importance in minimizing and eliminating its constraining effects on economic growth. Hence, while we recognize that it is a constraint, we believe it could be managed within certain limits.

From the perspective of human resources as a constraint to economic growth, the aged arguments of too few, and paradoxically, too many persons come to mind. It is sometimes argued that the islands do not have the requisite manpower to mount, manage, and maintain specific projects. By the same token, it is contended that there needs to be checks on the population growth because the Malthusian spectre could overtake the economies. I believe that every adversity has within it the seed of an equivalent or greater benefit. On the one hand, if the inadequate human resources pose a problem to economic growth,

we have to ask ourselves some serious questions regarding income distribution in the economies concerned. In other words, when we perceive of this economic growth, what kind of economic growth are we thinking of, and for whom is the economic growth destined?

In whatever strategies of economic growth opened to the decisionmakers in the MSEs, the question of the allocation and specific redistribution of the economic benefits must be brought to the forefront.

The human resources constraining effects were raised by the U.N. Conferences on Population in Bucharest, and on Food in Rome. But while they were more concerned with carrying capacity of countries, our concern here must be on the type of human resources in the Caribbean MSEs. In a nutshell, when we view human resources as a constraint on economic growth, from what social relations paradigm are we operating?

Of the four resource constraints under discussion, human resources are the main ones that lead us into neo-Malthusian and neo-Marxian debates. Human resources could be linked to poverty. If there are many people in an economy who do not contribute to production, then human resources may be seen as a constraint instead of a companion tool to economic growth. Daly (1977: 153-154) demonstrated that Malthus viewed human resources and poverty from the literal Latin meaning of proletariat, namely "those with many offspring." In the full Roman sense of the word, proletariat means "the lowest class of a people, whose members, poor and exempt from taxes, (are) useful (to economies) only for the procreation of children." To many commentators of the economic situation in the Caribbean MSEs, this Malthusian syndrome is discernible in the region.

Human resources, to the extent that they could be a constraint on economic growth, are different in the Marxian poverty situation. To Marx, the social relations of production, and not the proliferation of the proletariat, were the results of poverty. In other words, when population growth exceeded production and poverty was visited on the masses, it was the social relations of the economies which were fundamentally responsible for the poverty. It was not because there were too many people in the economy.

Those who view human resources (many people) as a constraint to economic growth, are implicitly hinting at a Malthusian and neo-Malthusian solution to the problem. Malthusians urge abstinence and neo-Malthusians suggest contraception. Marx saw over-

population as relative to Capitalist institutions. He urges worker solidarity and an overthrow of the Capitalist system. In this respect, it does not make any sense to restrict the numbers of the population.

Basically, the issue of human resources as a constraint turns on two themes: (1) Are there too few people in the MSEs to permit growth to take place smoothly, and (2) are there too many people who are "eating" the surplus of production? In response to the first question, Vaughn Lewis and Patrick Emmanuel (1975) have suggested that the smaller Caribbean countries should seriously consider pooling their human resources to enable them to tackle some of the bottlenecks in economic growth and development. Elsewhere I have suggested that the entire region needs to consider an integrationist approach to development and transformation that puts into effect a Regional Adaptation System and a Local Adaptation System (Jones-Hendrickson, 1979).

The second question centers on the definition of poverty in the MSEs. If poverty is considered in the traditional sense as "low per capita income of a class," where per capita income is the ratio of total income (Y) to total population (P) for the class the Malthusian-Marxian debate may be resolved. Malthus is concerned with explaining the dynamics of population (P) whereas, Marx is concerned with explaining the social relations underpinning income (Y). Those who argue that human resources are a constraint to economic growth are presenting an unidimensional point. Decisionmakers have to treat this issue from a total systems point of view and avoid dogma.

In the Caribbean MSEs, the lack of adequate energy supplies could continue to be a serious threat to economic growth. The islands could continue to have a balance-of-payments problem which stems, indirectly, from rising fuel costs. Decisionmakers in the MSEs have to pay strong attention to shifting consumption patterns to suit the realities of their economies. If they permit unrestrained consumerism which apes the consumerisms of metropolitan countries, they will be the gravediggers of their societies. Survival in MSEs along different lines does not mean reverting to a hoe and machete economy. It does not mean drying fish on the side of outhouses to preserve, as opposed to using a refrigerator. It does mean that each economy has to, in the proverbial sense, "cut its garment according to its cloth."

Energy is necessary for some types of economic growth. Technology is necessary for some kinds of economic growth. It has

to be clearly understood by decisionmakers and others in the MSEs that energy is not "white magic" that will necessarily perform a Midas touch on the economies. It has to be clearly understood that MSEs cannot afford to establish altars to the gods of technology and energy. In the last analysis, one thing has to be brought into sharp relief. If decisionmakers in the MSEs are to create the kind of future that will guarantee the survival of their societies, the path to follow, the turnpike to get on is not that path or turnpike that metropolitan countries now follow. This does not mean that ideas cannot be adopted from the metropolitan experience. It simply means that Caribbean MSEs have to refrain from "what monkey see, monkey do."

Some members of the political directorate in the Caribbean MSEs and some misguided technocrats in the region subscribe to the view that it is either more and cheaper energy or back to the caves. This is patently ludicrous. When we consider the holocaust that could be created in the region, when we consider the pollution that large firms already cause in some countries, for example in the case of St. Croix, Virgin Islands, we shudder to think what increased energy supplies have in store. Energy is a constraint to economic growth if that growth is seen as metropolitan-type growth for conspicuous consumption. Decisionmakers in the region would have to decide whether they wish to live in pollution-free economies or in deformities-inducing environments. It is not too late for the leaders in the MSEs to begin to think in terms of strict pollution controls versus the costs and benefits of energy usage vis-a-vis economic growth.

Finally, the question of land as a constraint to economic growth is really a question of size. I do not believe that land, size, in and of itself is a constraint to economic growth. Size is a constraint if it is viewed in the classical sense of size of market. But, to my mind, there are no inherent constraints to economic growth stemming from the "small size" of the MSEs. Last month at a Conference on Integration and Development in the Caribbean, held in Mexico City, I argued that size is not a constraint to economic viability. In fact, I agreed with Lloyd Best (1971: 29) that small countries could attain economic viability if they are capable of discovering and exploiting their resources. (My emphasis.)

On a companion note, Emmanuel (1976: 1) intones that "the central issue of (size) is whether non-viability is inherent in the structure of the people and resources of (Microstate Economies), or whether it is

brought about by the way in which these (MSEs) actually function." "We need to ask ourselves," continued Emmanuel (1976: 1) "to what extent non-viability may be a function of the particular ideological-cultural path a (Microstate) society is following rather than being merely a consequence of limited demographic and/or material resources."

While small size, that is land area, does have constraining effects on economic growth, large size does not guarantee that these constraints will be removed. In the case of India, where I was in the first week of August, the issue of large size and stagnation was supremely illustrated. On the one hand, small size, area of a country imposes severe limitations for growth, but on the other hand, the small size makes certain administrative machinery manageable. There are many small countries around the world today which are managing their economic growth within the confines of their size. Size is not a problem in and of itself. Size, linked with poverty is definitely a constraint to growth, a point Farrel (1979) recently developed.

CONCLUSION

The issue at stake in the question how do water, human, energy, and land (WHEL) resources constrain economic growth, centers on the interaction between the economy and the ecosystem. The economy focuses on the social institutions and the social relations governing those institutions. The institutions and relations delineate who will work, what work they will do, what they will produce, how they will produce, who will benefit, who will own, and who will be owned. The ecosystem centers on the links among the multitude of living organisms which inhabit the environment. In addition, the relationships of the organisms to the physical, biological, and chemical principles of development are critical in the ecosystem. Leaders in Microstate Economies by the uniqueness of their systems have to pay increasing attention to this interaction of the economy and the ecosystem.

The decisionmakers in MSEs have to take a holistic approach to the issue of resource constraint to economic growth. This involves some definite change, and in some sense revolution in thinking. Change is an inexorable natural law. It has to be of a deep and penetrating nature if it is to get to the very sinews of our minds. We in the region have to break out of the trap, the myopic vision, that our developmental paths must be the same as those paths which obtain in the metropole. The MSEs are MSEs. Policies

geared to MSEs have to be conceived, authorities have to be believed, and have to achieve what they set out to achieve.

No decisionmaker in the region conscientiously plans to fail. However, too many fail to plan. Those who continue to blame limitations in water, human, energy, and land resources are following the ostrich. Decisionmakers have to assist in the development of the climate of work; the ability to achieve has to be fostered. As a people we need to learn to look at our problems and constraints with new eyes, new vision, and our own vision. But, looking is not enough. Nobody can live our lives for us. We have to live our own lives, and solve our own problems and shortcomings. We have to develop the habit of converting ideas into reality.

In final analysis, inadequate WHEL resources could be constraints to economic growth in MSEs if the decisionmakers and the people in MSEs convince themselves that there is no way off the horn of dilemma. I am not convinced that WHEL need to be all-embracing constraints. I believe, as I said recently, that

the people in MSEs will have to opt for those levels of social cohesion that go beyond their immediate selves. They have to seek to change their environment. Naturally, they have to take global realities into consideration. It means that the people must be able to decide what is best for them. They have to develop their long-range goal for survival . . . People in MSEs, therefore, have to be creators of circumstances not creatures of circumstances. (Jones-Hendrickson, 1979: 9)

I have a strong suspicion that decisionmakers in the MSEs could turn the constraints of economic growth to companions of economic growth. From where does this optimism come? I believe that in every adversity there is a seed of equivalent or greater benefit. At the Caribbean Research Institute, we believe that Microstate Economies are unique in their problems. The problems of "micro-ness" have to be tackled holistically. Conferences such as this one can help the decisionmakers in MSEs to come to grips with their constraints to transformation.

LITERATURE CITED

- Best, Lloyd, "Size and Survival," in Norman Girvan and Owen Jefferson, Readings in the Political Economy of the Caribbean, Mona, Jamaica, New World Publishers, 1971.

- Christmas, Joseph, Hydrology of an Unconfined Coastal Aquifer System, Basseterre Valley, St. Kitts, unpublished PhD Dissertation, UWI, Jamaica, 1977
- Daly, Herman E., Steady-State Economics, San Francisco, W. H. Freeman and Company, 1977.
- Demas, William, The Economics of Development in Small Countries, with special reference to the Caribbean, Montreal, McGill University Press, 1965.
- Dos Santos, Theotonio, "The Structure of Dependence" in Charles K. Wilber, ed., The Political Economy of Development and Underdevelopment, New York, Random House, 1973.
- Edel, Mathew, Economies and the Environment, Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1973.
- Farrel, Trevor M.A., "Size and Development Revisited: Small States, Microstates, and the Implications of Their Size," Conference on the Politico-Economic Development of Microstates, Caribbean Research Institute, College of the Virgin Islands, April 1979.
- Goldman, Marchal I., "Growth and Environmental Problems of Noncapitalist Nations," in Robert C. Puth, Current Issues in the American Economy, Lexington, Massachusetts, D.C. Heath and Company, 1977.
- Emmanuel, Patrick, "Independence and Viability: Elements of Analysis," in Lewis (1976).
- Emmanuel, Patrick and Vaughn Lewis, "The Political Economy of Independence for Leeward and Windward Islands," Institute of Social and Economic Research, Barbados, 1975.
- Jones-Hendrickson, S.B., "An Analysis of the Production and Provision of Water Services in the Microstate Economies of Antigua, British Virgin Islands, St. Kitts-Nevis-Anguilla and Montserrat," Caribbean Public Enterprises Project, Institute of Social and Economic Research/Institute of Development Studies, Regional Workshop, May 1978.
- Jones-Hendrickson, S.B., "Economic Viability, Size and Political Autonomy," International Conference on Integration and Cooperation in the Caribbean, Centro De Estudio Economicos y Sociales Del Tercer Mundo, A.C. Mexico City, August 20-25, 1979.
- Jones-Hendrickson, S.B., and Compton Bourne, "Subsidies, Tax Reliefs and Public Policy: The Development Aspects," paper read at the Annual Institute, International de Finances Publiques, Congress, Varna, Bulgaria, Sept. 5-9, 1977
- Lewis, Vaughn, Size, Self-Determination and International Relations: The Caribbean, Mona, Jamaica, ISER, 1976.
- Mishan, E.J., "Growth and Antigrowth: What are the Issues?" in Puth, 1977.
- National Council of the Churches of Christ in the USA, The Plutonium Economy, New York, 1975.
- Solow, Robert M., "Is the End of the World at Hand?" in Puth, 1977.
- Theodore, Karl, "Designing a Caribbean Water-Rate," Caribbean Public Enterprises Project, ISER/IDS, May 1978.

NATURAL AND HUMAN RESOURCE CONSTRAINTS - TECHNICAL ASPECTS

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Abstract.--Land is recognized as a strategic resource in economic growth and development. It has inherent qualities as the platform for all human and economic activities and it is the repository of other key resources including soil for agriculture, water, natural landscape and scenic resources for tourism. Improper land use is constraining; proper land use is beneficial.

INTRODUCTION

This paper addresses itself to the questions of limitations to growth and the carrying of certain resources of small island territories. The resources named in the brief are water, energy, land, and human.

And our specific task is to examine how, from a technical point of view, these resources constrain economic growth; the economic viewpoint is taken up by another participant.

Let me start by setting my own limits and indicating the orientation of this presentation. As a Civil Engineer and Town Planner, my treatment of the subject will emphasize the physical planning and development aspects.

My field experience in the Caribbean region is confined almost exclusively to Trinidad and Tobago. Knowledge of the English-speaking (CARICOM) smaller islands is derived from visits, reading, and professional dialogue with persons knowledgeable about these islands. Regrettably, I can claim only scant knowledge of the French-speaking islands of Martinique and Guadeloupe, the Netherlands Antilles, and the Virgins.

One suspects, however, that the remarks that apply to the CARICOM small islands will also apply in large measure to these non-CARICOM territories. So that whatever thesis and framework are developed for examining the situation in one set of territories can be used by participants from the other territories in considering the situation in their

individual islands. Pursuing my physical planning preoccupation, the bulk of this paper will deal with the technical aspects of land as the platform for all human activity and a strategic resource in development.

In this context, the term land includes its natural endowment of soil, minerals, and water resources; characteristics of natural landscape and vegetation; and its marine component of seabed and territorial waters around the islands and the resources thereof.

Other disciplines view land in other ways and these aspects to the definition of land are worth noting. Institutional aspects such as ownership, tenure, individual and societal rights and obligations, and the economic aspects of land as a resource are important as they also affect the use of land and therefore its impact on economic growth.

Over and above the obvious limitations of small size and deficiencies in resources, in a general sense, the problem of land in smaller islands can be looked at from three angles which appear to constrain decision-making on land use and, consequently, limit the manner in which land resources can be used in pursuit of economic development.

First, existing land use patterns and such inefficiencies as are now observable can be traced to the islands' historical experience, an experience which is, perhaps, quite peculiar in its impact on their economic life. It is clear that the patterns of land use which persist from colonial systems of economic organization are inimical to rational resource use.

Throughout their history, and too often

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even up to the present, decisions on the use of island resources have been designed to serve the interest of the metropole or of some company in the metropole and not the islands directly. This has led to distortions in the organization of the resources for productive use which today is most evident in the case of agriculture.

Second, experience shows that change in land use does not come about easily. There is an inertia about land use patterns which defies the most determined effort at change, even when such change is acknowledged as being rational and perhaps beneficial. The inappropriateness and inertia of inherited land use patterns pose a serious challenge to human resources and the political machinery that must deal with the problem of change.

For beneficial change to take place, there must be the political will to change and there must be sufficient understanding and support among landowners, decision-makers and people affected by land use change to put the interest of the community above individual interests.

A third difficulty imposed on the human resources and political machinery of an island state arises from the mere lack of knowledge about land resources. Deficiencies in the technical know-how needed to develop policies and measures on how to use these resources rationally and efficiently often lead to suboptimal results.

The most significant link between land and human resources is that the deficiencies in knowledge and technical know-how are compounded by the actual limits in human resources, quantitatively and qualitatively, in smaller island states.

From the foregoing, the main thesis of this presentation is that land resources play an important role in economic growth and development. This role can be positive if land resources are used rationally and efficiently. Hence, the discussion on opportunities and constraints on rational and efficient land use is seen as relevant and will be developed as our contribution to the general theme of the conference.

GENERAL

The definition of "smaller island" given in the brief is an island having an area of less than 10,000 sq.km. and a population of less than 500,000 persons. Those included are detailed in the following table showing relevant figures for areas, population, and overall density.

Table.--Population Density of Islands

	Area sq km	Population '000's	Density pp sq km
<u>1/</u>			
(a)			
Antigua	441.6	69.8	158.1
Dominica	787.4	76.2	96.8
Grenada	344.5	107.6	312.3
Montserrat	102.3	11.6	113.4
St. Kitts-Nevis	352.2	46.8	132.9
St. Lucia	616.4	108.0	175.2
St. Vincent	384.0	91.0	237.0
Barbados	429.9	241.0	560.6
<u>2/</u>			
(b)			
Guadeloupe	1509.9	333.0	220.5
Martinique	1100.3	344.0	312.6
Netherlands Antilles	984.0	233.0	236.8
U.S. Virgin Islands	341.8	68.0	198.9
British Vir- gin Islands	155.3	11.0	70.8

1/ 1974 data. The Commonwealth Caribbean - A World Bank Economic Report, 1978.

2/ 1972 data. The Changing Face of the Caribbean, Hawkins, 1976.

None of the islands in the group approach the size and population thresholds given in the brief. In fact, together the 13 territories have an area of less than 10,000 sq. km. and a population of just about three and one half times the threshold population--1.75 million.

Always considered a relevant statistic in discussion on economic growth and development, the density figures in the table should be examined a bit more closely. These indicate a range from 71 persons per sq. km. in the British Virgin Islands to 560 persons per sq. km. in Barbados, with an average density over the whole group of 230 persons per sq. km. Five of the islands have higher densities, with Barbados being more than twice the average. The other eight territories are below the average but still higher than the density that would be considered manageable for development purposes. It is interesting

to note, if only because the question of population redistribution on a broader regional basis often surfaces as one avenue toward regional growth and more balanced development, that Belize and Guyana have densities of 5.9 and 3.7 persons per sq. km. respectively.

A corollary of the high density of population is the very low ratios of arable land per inhabitant. In most islands the utilization of available land for agriculture is further limited by rugged terrain on the one hand and coastal wetlands on the other.

Constraints are posed by excessive rainfall in some islands and very low rainfall in others such as the Netherlands Antilles. These extremes of climatic conditions are aggravated by frequent occurrences of natural disasters, especially hurricanes and volcanoes.

Islands possess extensive shorelines which afford opportunities for tourism, intensive fishing, port and settlement development within their coastal areas in addition to traditional coastal activities. But because they represent large proportions of island territories, which are accessible and easy to develop, there is the risk that coastal areas can become too intensively developed. From an historical viewpoint it is clear that the patterns of land use which persist from colonial systems of economic organization are inimical to rational resource use.

On the other hand, independence, which permits a truly rational approach to planning and development, also brings with it difficult choices in resource utilization because of new demands and pressures on the decision-makers to satisfy rising expectations. Small island countries must strive to maximize their development potential no matter how narrow their resource base. To them every development opportunity looks attractive and must be pursued. In the pursuit of development, resources are not always used optimally, nor is there even the time afforded to arrive at rational decisions.

In many respects these pressures are greater on recently independent countries which are compelled to be more self-sufficient than before and to meet certain obligations with which a similar-size piece of territory with comparable resources would not be faced, as part of a larger country. For example, island states are forced to develop a major port and an international airport in order to satisfy transportation demands and to communicate with the outside world. Given the geography of the islands and the

technological demands for operating these facilities, it is conceivable that land and other related resources may have to be diverted from other important uses, such as agriculture and tourism in order to accommodate them.

LAND-GENERAL

Already in the discussion, land has emerged as highly important, if not central, in the question of constraints to economic growth and carrying capacity.

This concern relates not only to the question of small size, and therefore, limited quantity of land resources available to the smaller island, but more so because land, in its very nature, its uses, its ownership, and its management, plays a unique role in economic growth and development.

Land is a natural resource which is considered fundamental to economic, social, and political development. And although there are similarities between land and other factors of production, land is sufficiently different to be regarded as a unique resource.

Except in small amounts and at a considerable price, land cannot be created nor can there be any substitute for land. The land available to an island is fixed, it cannot be transported and its natural characteristics cannot be substantially changed except, perhaps, adversely by environmental destruction. Moreover, the related resources of soil, water, minerals, natural landscape, and vegetation with which land is endowed cannot be added to.

For this reason it is of the utmost importance to smaller island territories that in the utilization of these resources in pursuit of economic growth, decisions are derived from consciously articulated land use policies and based on a sound environmental management approach. Any other basis will eventually result in limiting growth potential and lowering the carrying capacity of these resources. Continental countries have the option of alternative development efforts based on larger quantities of land and a wider resource base. This allows some room for experimentation and error. However, this is not the case for island territories.

It is becoming painfully evident that no nation, regardless of its size and the quantum and variety of its resources, can afford to adopt a cavalier or profligate approach to the use of these resources. And in countries like

the smaller islands which are not only small in size but limited in resource endowment, it is even more crucial to formulate definitive policies on development and hence rational choices in resource use and management.

Though recognized as necessary, this approach is not often found in practice because of the tendency to adopt development models and strategies more appropriate to continental than island circumstances.

The question of energy provides the most convincing case study on this proposition. But it is also seen in the question of land use and, in particular, in the conflicts which arise in the utilization of land for development or economic growth purposes vis-a-vis the environmental, legal, and institutional constraints on such use.

Sound management of land as a resource is necessary because it is scarce and subject to severe competition. Competition arises out of many circumstances. But basically, although certain parcels of land possess characteristics which make them uniquely suited for accommodating particular activities, most land can be used directly, or be adapted for use for different activities. Often use involves extensive modification in the natural features and conditions of the land and nearly always such changes are irreversible. This means that there is an inherent inertia in land use and land use patterns, and remedial measures to correct wrong land use decisions are not implemented.

Reduction in yields or complete loss of agricultural land as a result of incorrect use of land, say for settlement purposes, or the lowering of productive capacity of soil due to man-induced erosion, are examples of conflicts, irreversible changes and difficult-to-correct decisions and actions.

A further complication and one that directly affects the output and capacity of land is the system of land ownership and land tenure. In many fora, and most significantly in the recommendations on land coming out of Habitat, UN Conference on Human Settlements, this has become one of the main issues in the debate on economic growth, development and improvement in the quality of life. Moreover, the issues are very sensitive as can be seen in the following passages taken from the Preamble and recommendations in the Vancouver Declaration.

LAND FOR URBAN AND RURAL SETTLEMENTS

The following is taken from the Preamble:

Land, because of its unique nature

and the crucial role it plays in human settlement, cannot be treated as an ordinary asset, controlled by individuals and subject to the pressures and inefficiencies of the market. Private land ownership may become a major obstacle in the planning and implementation of development schemes.

Hence the pattern of land use should be determined by the long term interests of the community, especially since decisions on location of activities and therefore of specific land uses have a long-lasting effect on the pattern and structure on human settlements. Land is also a primary element of the natural and man-made environment and a crucial link in an often delicate balance. Public control of land is therefore indispensable to its protection as an asset and the achievement of the long-term objectives of human settlement policies and strategies.

Above all Governments must have the political will to evolve and implement innovative and adequate urban and rural policies, as a corner-stone of their efforts to improve the quality of life in human settlements.

These desiderata depend on policy and action in a number of areas dealing with land in the recommendations for action to be taken by nation states.

The recommendations themselves, though not directly operational, or universally applicable given the differences in countries, do provide a comprehensive set of positive statements which could be adopted by any territory as a basis for evolving its own land policy.

On the other hand, even if viewed only as the essence of land policy and action, the issues raised by the recommendations point very sharply to the difficulties facing smaller territories in equipping themselves to translate even the simplest of the measures proposed into action.

A more detailed look at the recommendations will illustrate the point. Grouped under seven headings they are substantially reproduced below with relevant comments on some of the difficulties that any smaller island would face in trying to implement them.

Recommendation D 1 - Land Resource Management

Considering land as one of the most valuable natural resources it must be used rationally. Public ownership or effective

control of land in the public interest is the single most important means of improving the capacity of human settlements to absorb changes and movements in population, modifying their internal structure, and achieving a more equitable distribution of the benefits of development whilst assuring that environmental impacts are considered.

Land is a scarce resource whose management should be subject to public surveillance or control in the interest of the nation.

This is seen as applying in particular to land required for:

- (i) The preservation and improvement of valuable components of the manmade environment, such as historic sites and monuments and other areas of unique and aesthetic social and cultural value.
- (ii) The protection and enhancement of the natural environment especially in sensitive areas of special geographic and ecological significance such as coastal regions and other areas subject to the impact of development, recreation, and tourism activities.

Anyone who has operated or is familiar with the operation of systems of land resource management by means of known methods of public surveillance and control is aware of the difficulties of achieving positive results. It is, of course, of critical importance that land as an input to development must be allocated properly so as to be available in the required quantities, at the right time and place, and at the right price. This is the essence of resource management and public surveillance and control do not automatically achieve it.

Recommendation D 2 - Control of Land Use Changes

Agricultural land, particularly on the periphery of urban areas, is an important national resource; without public control land is prey to speculation and urban encroachment.

Change in the use of land, especially from agricultural to urban should be subject to public control and regulation.

Such control may be exercised through zoning, direct intervention, legal controls, fiscal controls, planning, all very sophisticated and requiring expertise and

elaborate administrative machinery - all of which are not readily available to smaller islands.

Recommendation D 3 - Recapturing Plus Value

This is a sensitive and emotional recommendation urging that the unearned increment resulting from change in land use be the subject of "appropriate recapture" by the community.

Again for purposes of this discussion, it is only necessary to point to the obvious difficulties in resolving questions of rights of individual owners and rights of the state, of assessment, of betterment and so on; in fact, it is the problem of determining what is "appropriate recapture." This does not deny the desirability of achieving some of the objectives seen in such policies - a source of revenue for financing further development, a catalyst to encourage development where it is desired, a means of correcting or at least influencing distortions in the market.

Recommendations D 4 & 5 - Public Ownership and Patterns of Ownership

Public ownership either transitional or permanent, is not seen as an end in itself but rather a means to achieve other development objectives - land assembly for re-distribution, land reform, rationalization of use and more appropriate patterns of ownership.

At their core, these recommendations have as their overriding policy objective, reform of the inherited patterns of ownership, rights and other such institutional barriers to rational and efficient land use.

Recommendation D 6 - Increase in Usuable Land

The following statement is so applicable to the situation of smaller islands, that it justifies reproducing this recommendation in full.

In view of the limited availability of land for human settlement and the need to prevent the continuing loss of valuable natural areas due to erosion, urban encroachment and other causes, efforts to conserve and reclaim land for both agriculture and settlements without upsetting the ecological balance are imperative.

The supply of usable land should be maintained by all appropriate methods including soil conservation, control

of desertification and salination, prevention of pollution, and use of land capability analysis and increased by long-term programmes of land reclamation and preservation.

Special attention should be paid to:

- (i) Land-fill, especially by using solid wastes in close proximity to human settlements, but without detriment to environment and geological conditions.
- (ii) Control of soil erosion, e.g., through reforestation, flood control, flood plain management, changes in cultivation patterns and methods, and controls on indiscriminate grazing.
- (iii) Control and reversal of desertification and salinization, and recuperation of fertile land from contamination by endemic disease.
- (iv) Reclamation of water-logged areas in a manner that minimizes adverse environmental effects.
- (v) Application of new technologies such as those related to flood control, soil conservation and stabilization and irrigation.
- (vi) Prevention of pollution as well as restoration of derelict or damaged land, control of fire and preservation of the environment from natural and man-made hazards.
- (vii) Economizing land by fixing appropriate densities in areas where land is scarce or rich in agricultural value.
- (viii) Proper land capability assessment programmes should be introduced at the local, regional, and national levels, so that land use allocation will most benefit the community; and areas suited to long-term reclamation and preservation will be identified and appropriate action taken.
- (ix) Incorporation of new land into settlements by provision of infrastructure.

(x) Control of the location of human settlements in hazardous zones and important natural areas.

(xi) Expansion of agricultural lands with proper drainage.

The above set of recommendations cover in excellent detail the entire spectrum of technical operations needed in any island territory to deal with the problems of land. But more than being a summary of available techniques in land management processes, the recommendations highlight most of the physical problems which beset land through natural or manmade causes.

These range from deforestation, erosion, flooding, pollution, to over-grazing, inappropriate cultivation practices, slash and burn agriculture over-stressing of land by settlement and so on.

Recommendation D 7 - Information Needs

Effective land use planning and control measures cannot be implemented unless the public and all levels of government have access to adequate information. This truism supports the major recommendation under this heading, which is:

Comprehensive information on land capability; characteristics, tenure, use and legislation should be collected and constantly up-dated so that all citizens and levels of Government can be guided as to the most beneficial land use allocation and control measures.

Even if all the resources needed for this comprehensive approach to research were available, it would still be necessary to warn against the temptation to seek out and go on collecting every kind of information because it could be relevant and useful and is valuable for its own sake.

When the human and technical resources are scarce, it is even more imperative to ensure that research is tailored to collect operationally useful data and to assemble it in a form which can be used in applying these recommendations which are considered relevant.

LAND FOR AGRICULTURE

On the other side of the land picture, agricultural land, similar conclusions have been drawn about the limiting effect of history, ownership, and tenure of growth in this sector.

Summarizing a situation which is repeated on an island-by-island basis, the World Bank in its economic report on the Commonwealth Caribbean concluded that "The distribution of land holdings and the ways in which land is held represent a basic obstacle to development." It was estimated that 95 percent of the 350,000 farm holdings in the region are less than 25 acres in size and account for less than 30 percent of total farm acreage, while the 2 percent of all holdings which are 100 acres or more in size account for more than 50 percent of the total acreage.

Furthermore, the World Bank Report found that for different technical and institutional reasons both small and large holdings were plagued with inefficiencies, and also that the "system of land tenure - large privately owned estates on the one hand and small holdings on the other - makes for inefficiency in land use." In the case of the small holdings the reasons lie in fragmentation of holdings, insecurity of tenure, sporadic provision of complementary services and poor agronomic practices. Estate agriculture suffers from inefficiencies in land use because a high proportion of the land, in particular the marginal land, remains uncultivated, labor is chronically short and production decisions are made in the interest of an expatriate parent company rather than of the territory.

Both ownership and land tenure systems have been inherited from a colonial past and limitations on change due to inertia in the patterns being reinforced where the right to enjoy private property becomes entrenched. This limits the extent to which and the effectiveness with which land can be managed in the public interest, since management of land, meaning more particularly management of the use of land, collides with private landowners' interests and can be carried out only within carefully prescribed limits by strong legislation. Legislation by itself without active endorsement of political will and public opinion, and sound understanding of the need for land use management, cannot achieve the objective of rational use and efficient allocation of land resources without serious conflicts.

So far the conflicts and constraints which arise in the use of land in development of settlements and agriculture have been considered.

LAND FOR TOURISM

The third major use to which land is put in smaller islands is for tourism. Development in this sector is important for

these islands because of the contribution it makes to their national economies. One can expect, therefore, that efforts will continue to expand this sector and increase its contribution.

Apart from sun and favorable climate conditions, the resource requirements for tourism are sand, seawater for swimming and water sports, and to a lesser extent natural vegetation and landscape. Land in coastal areas is, therefore, the foundation for tourism development in the smaller islands.

Given the strong, but delicately balanced, interaction between land-based activity and the marine environment within coastal areas, the development of tourism can be seriously constrained by environmental considerations whether these are built-in to land use policies or merely arise out of individual development decisions.

This suggests that the carrying capacity of particular tourism regions or individual tourist development sites may turn out to be much lower than expected or considered attainable.

Three conflict situations can be outlined to illustrate the limiting effect of the resources on which tourism depends. Near-shore or artisanal fishing is an essential feature of the life of coastal area communities on the islands.

If accepted as a positive policy measure, then respect for the rights of the fisherman would inevitably limit the potential for tourism development within these coastal areas.

Land development activities which result in increased run-off erosion and silting and marine development which may involve dredging, erection of structures and extensive coastline changes can combine to upset ecological balances and limit the extent of and benefit from tourism development on island coastlines. The work of Compton Deane, of the University of the West Indies on West Indian Shorelines, provides instructive insights into the effects of and limitations to tourism and general recreational development within island coastal regions.

Pollution of beaches and waters from sanitary sewage and solid wastes is a third area of conflict which can have serious effects on tourism. Tourism areas are, of course, not the only areas affected by this kind of pollution. In the absence of adequate

treatment facilities, quite often supplies of ground water and the waters of bays adjacent to larger settlements more particularly on enclosed or semi-enclosed bays, become polluted in this way. However, it is the impact on tourism that is perhaps more noticeable and certainly more limiting in economic terms, because pollution drives people away from facilities and adversely affects earnings in the sector.

Technically the problem is difficult to solve, since natural systems and disposal facilities that are quite adequate in periods of normal demand become overloaded during the few occasions of peak demand to which they are periodically subjected.

WATER

In the continuing search for understanding and rationality in the management and use of resources, water, like the environment and human settlement, has attracted the attention of the world in the United Nations Water Conference held in Argentina in 1977.

A common thread that runs through the recommendations from all of those conferences is the necessity for sound management of the natural resources which are so vital to economic growth, national development and improvement in the quality of life of people everywhere.

A study of the recommendations reveals a remarkable consistency of thinking on principles and a steadily evolving commitment to approaches based on comprehensive policy formulation and planning, to the necessity for increasing dependence on science and technology and to the concomitant need for better trained and better equipped human resources.

Here again, in the case of water, all of the measures recommended for action by nations, apply, in essence, if not in specific detail, with even greater urgency to the smaller island states under consideration in this paper.

The recommendations which are most relevant are found under the headings "Community Water Supply" and "Water for Agriculture." In addition there are some useful thoughts on management of water which is necessitated by natural disasters.

COMMUNITY WATER SUPPLY

In essence, countries are urged to "develop national plans and programmes for community water supply and sanitation" in

order to meet certain targets. In doing so the countries must "initiate engineering and feasibility studies" on priority projects based on "cost-effective technology."

To support this sophisticated technical exercise, there must be assessment of manpower, training, establishment of appropriate institutions and national campaigns to mobilize public opinion.

Funding is to be provided through a "national revolving fund" initially financed from "loans and grants from national and foreign sources."

This all sounds very elegant, logical, and feasible; however, is it really feasible for small island territories to tackle their water problems in this fashion? And, one may ask, is it necessary? To follow this approach would be a denial of the concept inherent in the heading community water supply, particularly in smaller islands which have the opportunity to provide adequate water to their communities on an individual basis and on a smaller scale. They should seek to implement the concept in their own way rather than adopt or be persuaded to adopt the more comprehensive "national approach," which is so dependent on technological skills and human resources which are not available.

WATER FOR AGRICULTURE

Perhaps of more relevance to smaller islands are the recommendations on Water for Agriculture. It is easy to understand this since agriculture plays an important role in the economy of most of these islands.

But more than that the tone and content of the recommendations suggest a better understanding of the frame of reference within which smaller islands must operate.

The activities recommended for the intensification and improvement of water development for agriculture include:

- (a) The improvement of existing irrigation with the objectives of raising productivity with minimum cost and delay, improving the efficiency of water use and preventing waste and degradation of water resources.
- (b) Developing efficient new irrigation for further expansion of production.
- (c) Improving and extending rain-fed agriculture and livestock production, through both better soil

moisture management and the opening up of new land through the provision of water supplies to human settlements and livestock.

- (d) The protection of agricultural land against the harmful effects of flooding and waterlogging and, where necessary, its reclamation.
- (e) The introduction or expansion of fish rearing in conjunction with over-all rural development activities.

Finally, water management must also deal with the potentially destructive effect of water, namely in cases of flooding, wave action during storms and salt water intrusion. The occurrences are immediately and dramatically destructive when they happen, but their effect can be longlasting, and in the long run, they impose more severe limitation on economic growth by impairing and in some instances totally destroying land and other resources.

Of significance when considering this aspect of management is not merely the measures which must be taken to deal with the occurrence, but moreso the need to prevent it as far as possible and for man to ensure that his actions do not encourage it.

Deforestation for agriculture or building alteration and paving of water-courses, construction in flood plains and catchment areas are the kinds of actions that can have adverse effects.

CONCLUDING REMARKS

We were asked to consider from a technical viewpoint the limits to carrying capacity and constraints on economic growth

of four resources of the smaller islands of the Caribbean.

We chose to look closely at the most strategic resource, land and one of its main components, water, and to consider what opportunities for economic growth and development were open to a small island state with limited endowment of these resources.

We conclude that opportunities exist but can only be realized if the resources are managed properly and used wisely and rationally. The pre-supposition here is that this is not now the case and that the situation was inherited.

Further, there is the proposition that change towards better management and wiser and more rational use of these resources demands a tremendous application of scientific expertise and technical know-how by trained people, and that these human resources are the most critical constraint on smaller islands.

LITERATURE CITED

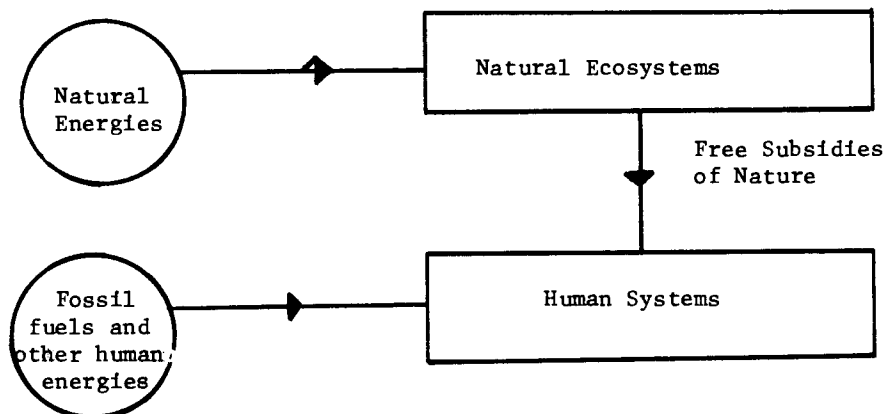
- Chernick, S.E. The Commonwealth Caribbean. A World Bank country economic report. Johns Hopkins University Press for the World Bank. 1978.
- Deane, C.A.W. Development Along West Indian Shorelines. Unpublished paper.
- United Nations. Report of Habitat: United Nations Conference on Human Settlements. United Nations, N.Y. 1976.
- United Nations. Report of the United Nations Water Conference. United Nations, N.Y. 1978.

(Contributed Paper)

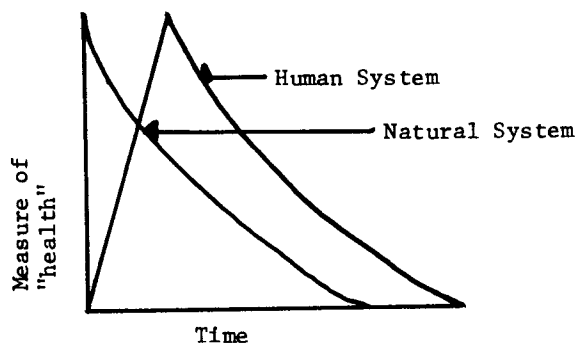
CONSTRAINTS ON HUMAN ECOSYSTEMS

Ariel Lugo

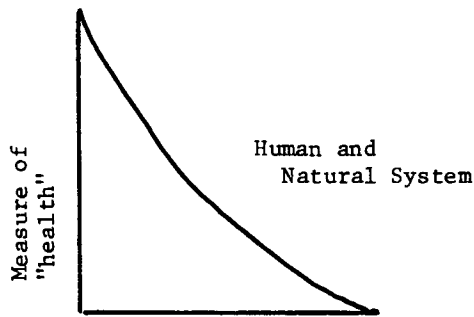
- Humans are subjected to the same environmental laws and constraints that affect other species of plants and animals.
- Humans, however, can supplement their environments and increase carrying capacity by bringing new resources to an area. Yet, this increase is not unlimited but is constrained eventually by:
 - the size of the island;
 - raw materials like water, soil, wood, etc.;
 - environmental quality;
 - price or availability of fuels; and
 - the culture itself.
- Environmental systems constrain human systems in those instances for which there are no technological substitutes for the services that they provide.
- The following model depicts the obligatory dependence of humans on natural ecosystems:



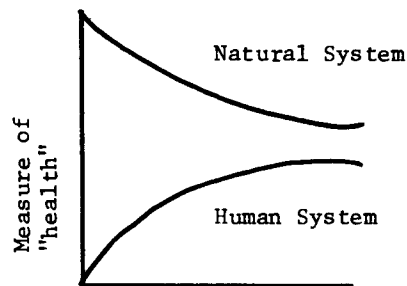
- The model shows:
 - natural ecosystems operating on natural energies such as sunlight, tides, winds, etc.; and
 - the human systems (towns, cities, etc.) operating on human energies (fossil fuels, manpower, etc.) and free subsidies from natural ecosystems (water, soil, buffering from stress, etc.).
- Three growth strategies emerge from this model:
 - Boom-bust growth: based on rapid exploitation of the environment:



- **Steady decline:** based on incidious exploitation of the environment due to a "growth at all cost" philosophy:



- **Steady state growth:** based on a balance with nature at a level determined by people:



- Since only the steady state provides a long-term solution to the problem of balancing humans with nature, the following concepts emerge:
 - Growth in the change in the intensity of human activity resulting from the use of human and natural energies after maintenance costs have been accounted for, i.e.,

$$\text{Growth} = (\text{human energies}) (\text{natural energies}) - \text{maintenance costs}$$

According to this equation, growth may:

 - be negative if maintenance costs are higher than the product of human and natural energies; or
 - be stopped if either human or natural energies are missing.
 - Development is the judicious use of human and natural resources with the idea of balancing their influences so that long term survival of both are assured. While growth must necessarily stop at some point, development may continue forever because the opportunities for human development and interaction with nature are boundless.
 - Carrying capacity is the intensity of human activity that does not exceed the ability of natural ecosystems to buffer or absorb the demands, impacts, and wastes of human systems. Human systems also have a carrying capacity that is dictated by the capacity of the culture to adapt to change and by the limitations of human institutions.

SUMMARY OF SESSION II - AFTERNOON

Ariel Lugo

RESOURCE PAPERS

- A. Dr. Jones-Hendrickson -- In his oral presentation, Dr. Jones-Hendrickson made the following points:
- He characterized small islands as Microstate Economies based on the amount of land and natural resources, number of people, political status, and human desires.
 - If we manage resources properly they would not be limiting to growth. For example, the Malthusian curse has been shown to be surmountable.
 - We need to define the kinds and amounts of energy, and technological, land, and water resources that are needed to support growth, and if we do so they may not be limiting provided we define them within the means of islands.
 - We must focus on people within a new framework of thought processes. This involves determining what environment you want and what kind of people you want to be.
 - Islands must communicate; they must form pools of talent to solve problems; they must take a holistic or integrated approach.
 - Humans should be creators of and not creatures of circumstance.
- B. Mr. Ken Snaggs -- In his presentation, Mr. Snaggs emphasized personal thoughts on the opportunities to overcome constraints of growth. He pointed out that:
- Land use decisions today, are affected by:
 - existing land use;
 - difficulty in changing land use; and
 - dichotomy between technicians and politicians.
 - Existing land use is not fit to cope with modern reality because it was designed for other purposes. To change this situation we need:
 - political will;
 - understanding of issues by the community; and
 - altruism by individuals of the community.
 - Studies must be relevant and appropriate to decisionmaking at hand. They are usually hampered by lack of data, irrelevance to islands, and difficulty of transferring information to practice.

QUESTION-ANSWER PERIOD

The following points were made by participants during the discussion:

- Physical planning does not venture into the coastal sector in some islands. Physical, economic, and social planning must be integrated.

- If we define our desires with due regard to environmental reality, we would find that limiting factors would not be limiting.
- Technicians need to organize their skills to the realities of society and not remain in an academic vacuum.
- In small islands, technicians, politicians, and the public are close together and may even be involved personally. This affects decision-making.
- How can we talk about developed, developing, and overdeveloped islands? What do these terms mean? Based on what? A small country with a high literacy rate, plenty of sand and sun may be better off than a large one with bauxite but no literacy.
- Irreversible constraints are more significant in islands than in continents. For example, once the water supply is salinized, it is virtually impossible to obtain fresh water again. Once resources are spent or mismanaged, long time periods are needed to correct mistakes, and humans cannot accelerate the process of repair. This sad reality should weigh heavily even on decisionmakers.
- Goals of insular people could be set in the context of physical land capabilities to assure a measure of relevance to them.
- Physical planners and other professionals are trained in the wrong countries under the wrong assumptions. Relevant training is needed in the region.
- In view of their size, coastal zone planning in small islands should be synonymous with national planning.
- Lack of base line information may be a significant constraint to small island development.
- Scientists must get involved, talk to the people, and transmit their technical knowledge.
- Education is the best way to mold the aspirations of people. The need for education is critical.
- A regional approach to education may be the best way to change people's attitudes.

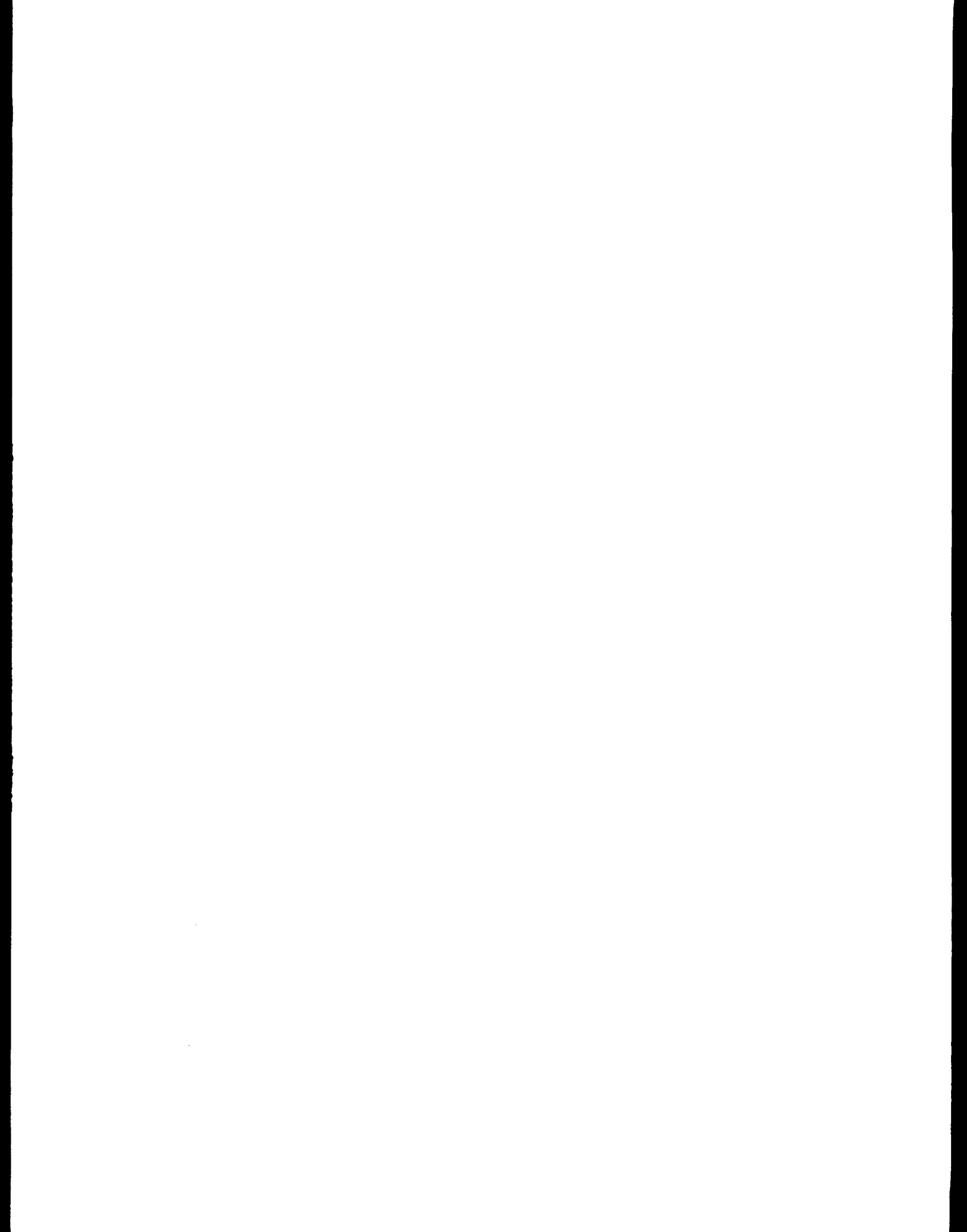
SUMMARY

- There is little doubt that the growth of human systems is subject to physical, biological, and social constraints.
- Islands in general and smaller islands in particular are subject more severely to these constraints simply because of their size.
- Once the natural systems of islands are destroyed, irreversibility sets in. Time becomes the enemy because it will take time for recovery. Humans cannot accelerate the rate of repair of natural ecosystems.
- Any growth and development scheme, no matter how ambitious or how humble, must depart from a recognition of these principles of constraint.
- Human nature, human initiative, human ingenuity, and human desires are the paramount ingredients for the success and future accomplishments that will take place in small islands. But these must be tempered by the realities of insular environmental constraints.

TABLE OF CONTENTS

Session III

	Page
LAND AND COASTAL RESOURCE USES IN THE SMALLER CARIBBEAN ISLANDS, AND THE ENVIRONMENTAL PROBLEMS OF POLLUTION AND SOIL AND COASTAL EROSION, Ivor L. Jackson	57
SOCIAL CHANGE AND MAGIC IN THE CARIBBEAN, Allan Harris	67
ACCOUNTABILITY: HOW DO DIFFERENT DEVELOPMENT STRATEGIES AFFECT OR HOW ARE THEY AFFECTED BY SOCIAL AND CULTURAL MATTERS?, Dawn Marshall .	69
PARTIAL TRANSCRIPT OF DISCUSSIONS ON THE RESOURCE PAPERS	72
SUMMARY OF SESSION III - MORNING, Eapen Chacko	84
INTRODUCTION OF THE HONORABLE WILLIAM G. DEMAS, Dr. Lewis Campbell . . .	87
HONORED ADDRESS, William G. Demas	88
ENVIRONMENT EFFECTS OF UNCONTROLLED DEVELOPMENT POLICIES IN CARIBBEAN ISLANDS, Pedro A. Gelabert	94
TOWARDS A STRATEGY FOR THE MANAGEMENT OF LIVING NATURAL RESOURCES CRITICAL TO DEVELOPMENT IN THE LESSER ANTILLES, Allen D. Putney . .	98



LAND AND COASTAL RESOURCE USES IN THE SMALLER CARIBBEAN ISLANDS, AND THE ENVIRONMENTAL PROBLEMS OF POLLUTION AND SOIL AND COASTAL EROSION

Ivor L. Jackson ¹

Abstract.--This paper assesses the effects of land and coastal uses on resources in smaller Caribbean islands, and shows a relationship between these uses and the development strategies of the islands. It gives an account of erosion and pollution problems that occur when uses are incompatible with environmental values and offers suggestions for environmental management.

INTRODUCTION

Natural resource use can be defined in the context of terrestrial and marine uses. Islands, with small areas and limited resource endowments, are extremely vulnerable in that these uses frequently pervade their physical and biological boundaries, leaving few options for exploiting new areas and resources in the future. This calls for environmental management that will provide the means to conserve critical resources and support systems for future use and to assure that currently used resources are sustainable over the long run.

The small Caribbean islands, unfortunately, at this moment, lack capabilities for sound environmental management, having neither the tools to ensure desirable land use, coastal marine use, the control of economic activities within continental shelves, nor proposed exclusive economic zones. ^{2/} Meanwhile, population pressures, spurred by high densities and natural increase rates up to 1.7% annually (Netherlands Antilles), induce uncontrolled urban and suburban growth, erosive agricultural practices on steep slopes, extensive sand removal from beaches, and a reduction in species populations serving important economic functions.

^{1/} Town and Country Planner, British Virgin Islands Government, P.O. Box 142, Road Town, Tortola.

^{2/} Barbados has already defined a 200-mile economic zone to include portions of the Atlantic Ocean and Caribbean Sea.

A significant dilemma of development in smaller islands, is that one of the usually selected development options, tourism, frequently exacerbates pollution pressures on resource use. The dwindling lobster stocks of the region are a good example. Tourism developments have also encouraged urban/suburban extension in linear fashion along coastal areas, north of Castries, St. Lucia, and St. John's, Antigua, southeast of Kingstown, St. Vincent, and south of St. George's, Grenada, creating new demands on fragile coastal habitats and sand beaches.

Preliminary maps prepared by the Eastern Caribbean Natural Area Management Program (ECNAMP) and to be displayed during the course of this Conference, show existing patterns of terrestrial and marine uses and a graphic interpretation of the effects on critical areas serving important economic functions such as watersheds, mangroves, and seagrass beds. ^{3/}

Figure 1 attempts to show the relationship between land and immediate coastal resources and the land and coastal, economic or social, uses normally found in these areas in the islands. Coastal resources refer only to those found within the immediate areas of the land and sea interface, such as mangroves, wetland habitats, sand and fringing reefs. Resource uses out to, and beyond the continental shelf, are considered outside the scope of this paper.

^{3/} From preliminary results of ECNAMP's "Survey of Conservation Priorities in the Lesser Antilles.

FIGURE 1. THE RELATIONSHIP OF LAND AND COASTAL USES, NATURAL RESOURCES AND ENVIRONMENTAL EFFECTS IN SMALL CARIBBEAN ISLANDS

LAND & COASTAL USES	RESOURCES AFFECTED							ENVIRONMENTAL EFFECTS
	Forests & Wild Lands	Attractive Slopes & High Coast Lands	Arable Lands	Low Coast Lands	Man-groves, Ponds & Wet-lands	Sand Beaches	Sea-bed & Reefs	
URBAN/SUBURBAN		*	*	*				S.E, W.P, F.
RESIDENTIAL		*	*	*				S.E, W.P
TOURISM - Hotels, Marinas, Jetties, Other		*	*	*	*	*	*	C.E, S.E, W.P
INDUSTRIAL - Factories, Oil Tanks, Pipelines, Power Houses Treatment Plants			*	*	*		*	O.S, W.P
RECREATION	*	*	*	*	*	*	*	C.E, W.P
AGRICULTURE	*	*	*	*				S.E, W.P, F.
FORESTRY & TREE FELLING	*				*			S.E, F.
MINING - Quarrying, Sand Extraction, Dredging		*				*	*	C.E, W.P, S.E
SOLID WASTE DISPOSAL			*	*	*		*	W.P

KEY

C.E = Coastal Erosion W.P = Water Pollution

S.E = Soil Erosion O.S = Oil Spill

F. = Flooding

DEVELOPMENT STRATEGIES

Resource uses vary very little among the smaller Caribbean islands. Where dissimilarities in development strategies exist, they occur mainly due to the relatively favorable scope and quality of resources in question. Islands with heavily dependent tourist economies, such as the Bahamas, the U.S. Virgin Islands and the British Virgin Islands, rely largely on attractive marine resources, which offer scope for a wide range of marine recreation, including pleasure boating, sport fishing, scuba diving and snorkeling. Incidentally, the St. Vincent Grenadines have the resources to support a successful marine tourism industry, similar to that being developed in other multiple-island territories.

In islands relying mainly on agriculture, for example, Dominica and Grenada, favorable land types and supporting climatic conditions are critical to the success of the various export crops. Barbados and St. Lucia appear to show signs of more balanced economies, with a relatively more diversified use of resources supporting tourism, agriculture, fisheries and industry.

Irrespective of the development orientation of the islands, the exploitation of limited resources is critical to economic functions that must realize socially acceptable living standards for human populations. Unfortunately, resulting uses are not always environmentally compatible, creating environmental problems that threaten to close the door on the options for future resource use.

Soil and coastal erosion, together with pollution from oil spills, sewerage and solid waste disposal, construction, and agriculture, are some of the critical environmental problems facing the islands. Some of it is due to traditional practices, ignorant of the consequences they induce, but more often the problems result from negligence, or the unwillingness to shoulder the responsibilities of better resource husbandry.

LAND USE

The more obvious problems are those associated with the utilization of land-based resources for urban and suburban developments, agriculture, mining industry, and more recently, tourism. Slums, foul storm drains, polluted rivers and harbors, and environmental diseases, are some of the problems affecting human populations from uncontrolled urban development, while tourism is more conspicuous in the destruction of mangroves, ponds, other wetland habitats, seagrass, and sometimes fringing coral reefs. Other uses are no less damaging to these and other resources.

Most islands have established land development control authorities to help create rational land development and building practices, while Grenada has a Soil and Land Use Division, that attempts to deal with the problem of soil management in agriculture. The lack of realistic national land use plans, or the failure of governments to adopt such plans, if they exist, presents serious problems for controlling land uses. Penalties for the contravention of existing land development laws are usually weak, and this often encourages public resistance to land control. Accompanying this, are the problems associated with patterns of land tenure, and land speculation, the latter resulting mainly from escalating prices generated by tourism.

While speculation and land tenure problems need to be addressed, the real challenge is trying to make land, as well as coastal uses, compatible with the environment and its resources. Where this is lacking, erosion and pollution problems are the likely results.

SOIL EROSION

A number of factors affect the rate of soil erosion in the smaller Caribbean islands. Some, such as steep slopes, high rainfall on mountainous peaks and natural weathering combine to produce vulnerable conditions under which landslides occur. This happens with some severity in the Windward Islands. Natural disasters, such as hurricanes, earthquakes, and volcanoes are known to further disrupt the geological, physical, and biological balance of these areas and so reinforce the conditions favoring erosion and landslides. Other factors are man-induced, resulting from land use practices in agriculture, building, and road construction. The damages caused by erosion on Caribbean island environments has been severe and not fully understood, affecting biophysical processes, living resources, water quality, and the aesthetic appeal of some areas.

In addressing these problems, the islands must first come to grips with their sources, then identify areas of erosion occurrence and be willing to bear the social and economic costs of restoring and maintaining the quality of their environments. A brief analysis of some of the sources of soil and coastal erosion, along with resultant pollution and water management problems, is given below.

Sources of Soil Erosion and Resulting Pollution

Land Clearance

Denudation of island landscapes began in the Colonial period and has continued

mainly in response to population increases and higher levels of consumption. Clearance for cultivation and building, tree felling for charcoal fuel and timber represent the main activities involved in the loss of forest cover.

Practically all of the watersheds are so affected, and the use of various chemicals for spraying cultivated crops against insects, pests, and fungi, poses threats to the quality of drinking water, particularly in the Windward Islands, where water is trapped by constructing weirs across rivers.

An example of a critical watershed is Dalaway River/Stream 24 in St. Vincent, which provides portable water to most of Kingstown. Here cultivation is approaching above the level of the water intake at the river, resulting in fear of water contamination. Cultivation has also crept way up into the Roseau and Cul de Sac Watersheds in St. Lucia and plans to dam the Roseau River, raises concern about the water that will be eventually harnessed.

Perhaps one of the most pressing environmental management needs is the proper maintenance of the physical and biological processes involved in water catchment, flow, and storage. This is so that adequate supplies of water will be available for present needs and future demands resulting from population increase and economic growth. Unfortunately, the problems facing good watershed management lie not only with agricultural practices, but also with building construction, which is discussed later, and the patterns of land tenure that exist on the islands.

Agriculture

In addition to the problems of water management, removal of vegetative cover and cultivation up steep slopes, induce soil loss that eventually lowers the returns on crops and affects later attempts to effectively rehabilitate the land surface with new cover.

This problem is very obvious on the west coast of St. Vincent between Layou and Chateaubelair, where cultivation was observed on slopes appearing to be over 30° so steep in some places that to balance oneself against the slope for clearing and hoeing appears to be a challenge.

In one area on the same coast of St. Vincent, cultivation occurs on slopes at a level close to 1,500 feet, and apparently without recourse to contour farming methods. There are, however, areas around Barrouallie, where terracing has been done, but soil loss is obvious in most areas under cultivation.

In the Chemin Watershed on the south coast of Grenada, a soil and water conservation pilot project is being run to demonstrate to farmers the correct methods of farming on steep slopes. As if to underscore the importance of the project, severe erosion, leaving shallow gullies in the land surface, is occurring on an agricultural plot next to the site.

However, correct bench terracing, and contour drainage sometimes require designs, that even if mastered by farmers, could prove uneconomical to individuals, unless constitutional or administrative arrangements are made for sharing equipment costs, use and later marketing facilities. Once governments are willing to install the institutional and perhaps legal infrastructure for cooperation between farmers, then the results of the Grenada project could prove valuable in solving similar problems in other islands.

Ideally, farming should be avoided on some slopes presently cultivated in the Windward Islands, to avoid costly investment in terracing and other corrective methods. Unfortunately, the subsistence farmers, who cultivate these marginal lands, lack the privilege of choice, and will ignore attempts to limit farming to less problematic areas, since finding suitable land would be difficult. Where possible, suitable land reform, involving public-owned lands, could be exercised so that farmers can have access to arable land through advantageous lease arrangements.

Building Construction

Building and road construction are acceptable procedures in providing shelter and circulation for human beings in most parts of the world. In some countries, however, cutting a foundation or grading the land surface for road construction are viewed as acts that are extremely damaging to the environment, if proper control measures are not exercised.

In the U.S. Virgin Islands, for example, construction of buildings must be preceded by the submission of earth change applications and plans to the Soil and Water Conservation District. Earth change permits are issued on satisfactory evidence that the environmental effects resulting from digging, grading, or stockpiling of soil are held to a desirable minimum.

In most of the other smaller Caribbean islands, the planning or building authorities are not equipped to control site development for buildings and roads, so that environmental damages can be minimized. It is not unusual

to see soil being washed from new construction sites and newly cut slopes of road embankments toward channels that eventually empty into the sea.

Hilly, coastal, urban areas such as Castries, St. Georges and Road Town are more readily affected because erosion and sediment transport are assisted in the movement toward coastal waters by gravity. One of the serious effects of poor site preparation practices, is the pollution of water by organic and inorganic sediments transported in this fashion. Another, is the suspension of fine silt particles in water, that result in curbing sunlight penetration to needy bottom organisms and the actual silting of live coral reefs, whose eventual death is the usual outcome. A third is that sedimentation on normally pervious soil acts to decrease water penetration through the soil, resulting in increased flooding.

To avoid these problems, some countries develop and apply a number of standards affecting digging, trenching, grading, and various other activities resulting in changes in the landscape and the earth. The U.S. Virgin Islands Conservation District's Environment Protection Handbook serves this purpose and its contents might be of interest to administrators, planners, and developers in the other Caribbean islands.

Accompanying problems of site preparation, are those resulting from poor design and location of roads, which frequently divert normal channel and stream flows and are responsible for some of the serious flood problems in times of heavy rains. Several cases of this exist in Road Town, Tortola, and the expenses incurred yearly for repairing flood-damaged roads have most likely risen above the initial additional cost that would have been required by proper road design and location.

Perhaps more potentially damaging to environmental health, is the location of buildings in areas where the disposal of sanitary waste is likely to contaminate domestic water supplies. On occasion urban or suburban development occurs over aquifers at the foot of watersheds, which support wells from which water is pumped for domestic consumption.

This is true of Road Town, Tortola, where sewage disposal from most residences is done through septic tank/soakaway or cesspool systems. One suspects that under existing conditions, chlorination would sufficiently purify the water, but the ever-present threat of an epidemic is a factor worth considering.

Ironically, a number of towns with installed sewerage mains, St. Georges and Road Town are two examples, are now pumping raw sewage into their respective harbors, without assessing the damages caused to water and other coastal resources. Similar but perhaps less damaging effects on coastal resources result from the discharge of contaminated storm water in the bays around which urban developments occur. The contamination stems from household kitchen wastes discharged directly into storm water drains from the small dwellings in deteriorated sections of the main towns.

COASTAL EROSION

Coastal erosion occurs as a natural process from the action of waves against the shoreline and sometimes on account of strong littoral or longshore currents. Erosion resulting from wave energy is occurring along the northwest coast of Grenada, and south of Roseau in Dominica. Modification of original cliffs and bluffs, such as blasting for road construction, helps to accelerate this form of erosion, even when sea defenses are constructed to protect the roads. This is true of a section of the coastal road, south of Gouyave, Grenada and at points on the highway next to Drakes Channel in Tortola.

The greater part or the most critical aspect of coastal erosion in the Caribbean islands is man-induced and results frequently in the deterioration and sometimes loss of beaches.

Some of it is brought about by sand extraction from beaches, as with Vigie Beach in Castries, or from nearshore dredging. The latter has the effect of sand slippage if the dredged slope is not finished at a proper angle, and is usually severe in areas affected by ground swells resulting from North Atlantic storms during the winter.

Coastal erosion also occurs when solid piers, jetties, and other structures interfere with normal littoral sand movements, causing a buildup of sand on one side of the structure and erosion on the other. Ironically, groins constructed to help rebuild beaches lost from natural or man-induced processes, frequently produce the same results.

Problems in Coastal Engineering

A lot of erosion problems occur because of the lack of environmentally conscious coastal engineering practices. In fact, structural designs for seawalls, coastal roads, and other coastline structures, either because of lack of funds or sufficient base-

line data, often do not make adequate allowance for increased wave energy and higher water levels during periods of storms and hurricanes. Since the islands are mostly within the path of hurricane movements and knowing that most islands expect further increases in coastal uses, the application of reputable and environmentally mindful coastal engineering practices should become an integral part of coastal zone management for the future.

COASTAL ZONE MANAGEMENT

The immediate coastal areas of the island present the biggest challenge for environmental management. On the one hand, the resources of these areas are fragile, while on the other hand, coastal land and water provide a wide range of options for recreational and economic uses.

The visible result is developments of all kinds, intensified by a surge in the construction of tourist facilities on some islands in the past 10 to 15 years. Unfortunately, the damages incurred by coastal environments are not always as noticeable.

A number of countries now realize that the proliferation of coastal uses on usually sensitive resources requires the delineation of a coastal zone which would be accorded special environmental management considerations beyond those normally applied elsewhere. The U.S. Virgin Islands recently passed a coastal zone management law in support of a program for managing the coastal areas of the territory. In Trinidad and Tobago, the Institute of Marine Affairs, established in 1976, is currently doing preliminary work toward the full development and implementation of a coastal zone management program.

It might be beneficial to other Caribbean islands to at least understand the principles inherent in managing coastal zones with a view toward designing programs of their own. One problem of course, is to define a zone of the size and characteristics that can be effectively managed within the institutional framework of the country. Another, is to identify the right program ingredients to suit the special coastal resource management problems of the islands.

A critical requirement of coastal zone management for the islands should be the identification of permissible land and water uses for various areas that will match the biophysical capacities of site specific resources. Oil storage and refining, marina construction, sand extraction, and solid waste disposal are critical uses that come to mind. A followup to this would be the drafting of standards af-

fecting water pollution, through oil spills and leaks, dredging activity, sediment transport from land to sea, sanitary and industrial waste discharge and coastal erosion mainly from sand extraction, dredging, and the construction of solid structures in littoral and sublittoral zones.

Standards must also be set for building designs to protect human life against floods and strong winds. The recent passages of Hurricanes David and Frederick, show too clearly the damages that can be done to building and sea defenses by wind and wave energy.

POLLUTION

The Caribbean islands are vulnerable to numerous sources of pollution. Those originating from construction activity, dredging, and sanitary wastes, have already been mentioned. However, by far, the most critical pollution source is that derived from oil leaks, spills, and oil-water discharges from tankers, the latter occurring en route to refill tanks.

Solid waste disposal is another critical pollution source for many Caribbean islands, as increased consumption patterns result in a simultaneous demand for disposing increased waste. Looking around the islands today, the problem is conspicuous in site selection, the methods chosen for waste disposal, and the rate of waste collection at source points.

There are other pollution sources, not as obvious as oil and solid waste, but with similar threats for the damage of marine and terrestrial life, including human beings and habitats. Mercury deposits, toxic residues from marine paint, vehicle emissions, various other chemicals used in agriculture and industrial plants and hot water discharges from industrial plants as well are some examples. However, only oil and solid waste pollution will be addressed in detail.

Oil Spills

Some of the oil pollution in the region is localized and affect only specific site or area resources, such as the case of pipeline leaks that destroyed McKinnon's Pond in Antigua. Small quantities of oil from local spills in harbors can be carried by long-shore current movements to affect resources in areas away from the point of accident.

Unfortunately, few islands have coherent systems for reporting such accidents, and still fewer possess capabilities for cleaning up even the smallest of spills. It appears

also that islands are slow in taking corrective action against negligent practices by oil storage facilities, and motor vehicle repair operations which are located next to critical wetland habitats and on the banks of rivers and guts.

The key requirements of the islands in the future are to identify proper location sites for potentially polluting facilities, impose operational standards, and develop systems for monitoring safety features and levels of maintenance for these facilities.

Small leaks and spills, however, do not hold as serious a threat to the resources of the islands as the possibility of major spills, resulting from accidents to tankers. The catastrophic effects on English and French coasts from 120,000 tons of oil spilled by the Torrey Canyon, recent damages to the U.S. southern coast from major leaks at drilling sites in Mexico and the collision of two tankers off Trinidad and Tobago, should all serve as a warning against the imminent possibilities of disaster.

A regional approach to deal with the mounting problems from increased tanker traffic, the location of oil storage, refining and transshipment facilities, such as the major project planned for St. Lucia, and contingency planning for oil spills, is urgently needed. Efforts toward this end have been initiated by OAS for the preparation of an Emergency Action Plan for Coastal Pollution and Oil Spill Control in the Caribbean. Unfortunately, only Barbados and Grenada, of the smaller Caribbean islands, have been involved so far in the preliminary planning sessions.

The Clean Caribbean Cooperative has been formed by a number of companies operating in the Caribbean to respond to oil spills. While this effort is commendable, more far-reaching planning by regional governments is required.

The statistics on oil production, refining, and transport in the Caribbean is alarming. In 1973, one-sixth of the world's oil was either produced, refined, or transshipped through the wider Caribbean (Towle, 1979). Twenty-three percent of U.S. oil imports passed through the Caribbean export oil refineries in 1978 (Thompson, from Caribbean Contact, 1979).

St. Croix has one of the world's largest refining plants, producing some 800,000 barrels of refined oil daily and another large transshipment and refining plant is now being constructed in St. Lucia.

American oil experts are reported to have stated that the Caribbean basin holds

great potential in oil reserves, greater than reserves of the Persian Gulf. Large deposits of oil have been discovered north of Puerto Rico; there are possibilities of finding oil and gas south of Barbados, and companies are exploring around the Dominican Republic, Haiti, Jamaica, the Netherlands Antilles, and Belize (Thompson, 1979). The Government of the British Virgin Islands recently signed a contract with Mobil Oil to explore off Tortola's north coast.

In both the larger and smaller Caribbean islands, the potential for damage from major spills is reinforced by the movement of oceanic and regional currents and prevailing winds. Alan R. Emery, while studying coastal currents around Barbados, let loose drift bottles, which moved through the Caribbean and toward the United States and South American coasts (Archer, 1976). Currently, all the islands experience balls of tar, drifting onto beaches from tanker discharges in the Atlantic.

The effects of oil pollution on marine life have been documented elsewhere, although one suspects that the extent is not fully understood. Of further critical concern to vulnerable Caribbean economies, is the possible destruction of beaches and the decline in water quality, which are so critical to their tourism industries.

The Need for a Regional Action Plan for Oil Spill

The details of a regional action plan for oil spill and marine pollution control is beyond the scope of this paper. It must, however, have the full support and involvement of regional governments and oil companies and appropriate regional and international agencies.

Realistically, the logistics and funding of the plan will call for large resource and funding allocations. It is important that some of its vital components include location criteria for refineries and transshipment facilities, navigational routes, safety features involving construction and maintenance of tankers, and qualifications of tanker and pilot boat crews.

Further, a contingency cleanup component should involve (1) a reliable communications' system for detecting, locating, and reporting spills, (2) the identification of relatively safe chemical oil dispersants and effective oil containment and removal equipment, and (3) a sound institutional and operational system for implementing the plan.

Geographically, it will be necessary to

have subregional operational plans, within the larger comprehensive action plan, to cover specific island or country groups. This will be a result of constraints imposed by communications and transporting cleanup equipment. Public education, institutional training, and demonstration seminars will also be vital.

Solid Waste

Solid waste is used to mean all discarded material from households, refuse from street sweepings, leaves, tree branches, dead animals, construction materials, vehicles, industrial wastes, and all other forms of waste material resulting from human consumption patterns.

One method used for disposing of solid wastes in many Caribbean islands is tipping or open dumping. Another, used frequently at major disposal sites, is a crude form of landfill, where a combined system of burning waste material and unscheduled covering with earth is done.

Both methods are environmentally unacceptable. Uncovered waste attracts rodents, insects, gulls, and other wildlife, providing the conditions for the spread of disease. Odors are always present at such sites and can be, at the same time, a nuisance and public health hazard. Even under such conditions, dump sites are known to invite scavengers or persons hoping to salvage discarded material and in some cases, food.

Such operations also result in a number of pollution problems. Burning, for example, causes air pollution and under certain geological conditions, unburned material can result in chemical and bacteriological contamination of ground and surface water. The possibilities of water pollution increase with the location of dump sites close to streams, guts, rivers, wells, and other water sources.

In Caribbean islands, common areas used for locating dump sites or for uncontrolled dumping of solid waste material, are swamps, ponds, and other coastal wetland areas. Unfortunately, the pollution hazards go unnoticed, and for some people the only problems are the unsightly appearance of the waste disposal sites and the nuisance of odors generated.

It is important that the islands adopt proper methods for disposing of solid wastes to avoid the problems caused by existing practices. While a few methods are environmentally acceptable, such as incineration and high rate composting, the use of sanitary

landfills offers the best choice for the islands. Sanitary landfill is considered an effective method and is comparatively less expensive, both in initial and operating costs, than incineration and composting.

The basic outline of a sanitary landfill operation is (1) solid wastes are deposited with control on a selected and prepared site, (2) the solid wastes are then spread and compacted in thin layers, (3) the solid wastes are covered daily with a thin layer of earth, and (4) the cover material is compacted every day (Sorg and Hickman, Jr., 1970).

Normally the daily cover should be between 6 and 12 inches and a final cover of 2 to 3 feet is recommended on completion. Sites prepared this way can be used afterwards for various types of recreation, or building under proper engineering guidelines.

Sanitary landfill sites should be carefully selected to avoid problems of water pollution as noted earlier and away from built-up areas, where even with proper control, an operation can be displeasing to the eye. Sites should also be adequately prepared to ensure effective layering of waste material and afford proper drainage.

Another condition for site selection is a size large enough to meet the demands of the locality. This requires data on per capita solid waste production, which is unavailable for most islands. Based on data elsewhere, there is reason to believe that the figures could range between 2 to 4 pounds per person daily in the smaller Caribbean islands.

A good sanitary landfill operation is of little value without a reliable system for collecting solid wastes at source points and transporting them to the site on a decided schedule. Most islands need to improve their solid waste collection systems either through the assignment of proper schedules or by increasing and effectively maintaining vehicles.

SUGGESTIONS IN SUPPORT OF FUTURE ENVIRONMENTAL MANAGEMENT

These suggestions are based on what is perceived as general problems and needs of the smaller Caribbean islands with respect to land and immediate coastal resource uses. It is felt that whatever development strategies are selected for the respective islands, they must have inherent conservation and resource management components, and must consider options for resource use

in view of likely future shifts in development. Cognizance must also be given to the need for regional cooperation in a number of resource management matters, as in the case of controlling oil spills, for which recommendations have been given. Suggestions on proper solid waste disposal methods have also been made:

1. The islands must develop national land use plans, not based primarily on the preservation of land for agriculture, as was done by the UNDP national physical development plans, but on the need to protect habitats, watersheds and to conserve species and other resources critical to economic, recreation, and cultural functions.
2. Updating of soil analysis, aerial photography, and rainfall records should be done to help assign land use values. Initial soil surveys would be necessary for countries such as the British Virgin Islands. Along with this, an inventory should be done of critical habitats, including forests, mangroves, ponds, and other wetland systems and this would be helped by the updating of existing aerial photography. Habitat inventory work by the Eastern Caribbean Natural Area Management Program will be of great assistance to governments.
3. A National Planning Unit should be established for each island, with economic and physical land use components, supported by the disciplines of biology, civil engineering, and sociology. The Planning Unit will be responsible for the drafting and implementation of the National Land Use Plan, along with drafting other appropriate national development and regional plans. A land development control authority or building authority, should be assigned the task of supervising day-to-day development control.
4. Soil management capabilities are important to each island and could be housed in a Soil and Agricultural Land Use Management Division, within the Ministry or Department of Agriculture. The Division would work closely with bodies responsible for water and forestry and should be given permit issuing authority on major development applications, affecting the landscape, land sur-

face, and subsurface of the earth.

5. Sound watershed management will require laws to regulate agriculture and building practices in such areas and governments should consider acquiring lands in the most critical sections of the watersheds to ensure the highest level of control. Watershed plans should be developed where necessary, with provisions for replanting in essential areas.
6. A Coastal Zone Management Plan for each island should be prepared by the Central Planning Unit, but a program of implementation must have an institutional framework to include inputs from other departments and bodies, such as the Water Authority or Division, Fisheries Division, Soil and Agricultural Land Use Division, Health Department, Land Development Control or Building Authority and an appropriate Executive Body, e.g., a Coastal Zone Management Board. An understanding of territorial jurisdictions is vital to coastal zone management plans, where territories are located close to each other.

The Coastal Zone Management Plan will set environmental standards for land, and coastal and water uses in the delineated area, site clearance and preparation, including grading and excavation, engineering of coastal structures and other coastal design work, pollution abatement from dredging, construction, sanitary and solid waste disposal, and oil spills.

CONCLUSION

The ultimate responsibility of environmental management is to assure human survival. As small Caribbean islands try to satisfy today's social aspirations, they must note that some economic activities can be short-lived or can deteriorate in value over time. Oil refineries are deserted. In Antigua, factories close as products are no longer useful and tourists shift vacation points of interest.

Major changes in economic activities will normally require modifications in development strategies and new demands on resources. It is vitally important that current resource uses do not foreclose on

future options for securing human survival and the socially acceptable standard of living that helps to maintain a functional society.

LITERATURE CITED

Archer, Arthur B. 1975. Marine pollution off Barbados' coasts. Presented at a Technical Symposium on Prevention of Marine Pollution From Ships. Mexico, 1976. p. 6.

Sorg, Thomas J., & H. Lanier Hickman, Jr. 1970. Sanitary Landfill Facts. U.S. Department of Health, Education, and Welfare, Bureau of Solid Waste Management. p. 1.

Thompson, R.A. 1979. Oil and the Caribbean. Caribbean Contact.

Towle, Edward L. 1979. Caribbean Marine Resources Management Characteristics, Problems and Prospects. Paper for ECNAMP. p. 9.

SOCIAL CHANGE AND MAGIC IN THE CARIBBEAN

Allan Harris*

THE MAGICAL PROPENSITIES OF CARIBBEAN CULTURE

I wish to propose, in all seriousness, that the outstanding characteristic of Caribbean culture is magic. Regardless of differences in social status, income level, educational attainment, race, or religion, the vast majority of Caribbean peoples implicitly accept the fact that the world functions according to the arcane principles of magic.

This startling fact of Caribbean life is hardly ever acknowledged and is likely to be vehemently denied. But even a cursory examination of our regional civilization will reveal, beyond any possibility of refutation, that magic is central to our life and thought.

Let us consider the following:

a) The magic of the maximum leader: Throughout the Caribbean, politics revolve around a central belief that there exists an individual possessed of unique gifts of governance who, by virtue of these almost god-like endowments, will singlehandedly deliver all of his people from bondage. There may be differences of opinion as to the identity of this individual, and great anguish if none of the current crop of politicians seems to fit the bill. In the latter case, there will ensue a kind of national vigil to await the coming of the Messiah.

b) The magic of creed: Caribbean peoples have long possessed and still retain an amazing capacity for believing that the world and all of its wonders can be contained and controlled by creed. Whereas historically, this predilection has been fostered and served by institutions of an avowedly religious nature, today the fastest growing creeds are clearly political. With a touching, if naive, faith Caribbean peoples have taken to the ceaseless incantation of a ritual rhetoric in the firm expectation that therein lies a potent magic for effecting social change.

c) The magic of modernization: Long frustrated by the negligible results of the

old magics, Caribbean peoples have increasingly turned to new methods. A form of sympathetic magic, called modernization, is one method. According to this type of magic, social transformation will be achieved by means of a close familiarity with as many as possible of the artifacts which symbolize the good life in metropolitan countries. The more we cherish our own color TV sets and microwave ovens, the more confidence we have that the productive base for our consumer fantasies will almost automatically fall into place.

I think it is clear that we have to discard the prevailing notion that magic in the Caribbean is confined to voodoo or obeah or some other African survival. Magic is endemic. Our list might be almost endlessly extended.

By no means am I attempting to be flip-pant, or to be contemptuous of, or condescending toward Caribbean peoples. In fact, I believe that magic is much more widespread in the world than we have been taught to believe. In particular, there may be a lot more magic in the so-called developed countries than we suspect. Is there not a kind of Presidential magic in the United States, say? And whether under communism or capitalism, is there not a magic of technology, a sublime faith in the capacity of mankind to engineer away the ancient limitations which hitherto had been thought almost to define our humanity?

THE SOURCES OF MAGIC

Why should Caribbean people have resorted to magic on so widespread a scale? Does the answer lie in the colonial history of the region? The magical culture of the region is really a derivative of its culture. A colonial culture may be defined simply as a set of values, attitudes, and behavioral patterns which deprecates all that is native in favor of all that emanates from the metropolis. But behind that simple definition lies the source of all the manifestations of magic at which we have looked.

The original magic in a colony is the magic of the metropolis; a magic which believes that things will work in the domestic

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environment--the colony--simply because they have worked in the metropolis. This magic manifests itself in a slavish imitation of things metropolitan, in a mindless acceptance of ideas, ideologies, manners, mores, tools, and techniques of an entire culture which has evolved or been developed in an entirely different geographical, historical, and social setting.

The colonized personality not only has no sense of its own self-worth, of its own specific situation, of the legitimacy of its own interests, but moreover, it has no sense of process. Or we might say that what is lacking is an empirical cast of mind, or the scientific attitude, or what have you. The point of the matter is that, divorced from any sense of the reality of its own situation, the colonized personality readily succumbs to all manner of magical interpretations of the world.

We define the Caribbean culture therefore as a colonial culture with an abnormally high propensity for magic.

MAGIC VS. REALISM

What are the problems and possibilities of social change in such a cultural setting as we have outlined? What should be clear from the foregoing is that when we talk of social change in the Caribbean we are talking essentially of a culture revolution. Since economic policy prescriptions, technological innovations, social planning, or political and constitutional reforms all presuppose a rational basis of discourse, initiatives in any of these areas stand little chance of success until such time as there is a wide enough consensus in favor of rational values, and until the boundaries of magic have been pushed far enough into the background.

Such a cultural awakening of Caribbean people will not come easily or in one great leap. Above all it requires skillful, subtle, and resourceful leadership at all levels and spheres of society. It is in such a perspective, I believe, that agencies specifically concerned with economic development need to look at their activities.

It is not surprising that in a region so wrapped up in what I've called magic, programs of economic transformation should fall

into one of two categories--the cosmetic or the apocalyptic. Cosmetic programs are those which are incremental in nature; they seek to graft on new facets to the age-old colonial economy, be it tourism or assembly industries or whatever. But the basic relationships within the economy, and between the economy and the outside world, remain the same.

The apocalyptic approach, on the other hand, will have nothing to do with such half-measures. Imperial and neo-imperial domination, class differences, and exploitative relationships will be eliminated with a revolutionary thoroughness. Interestingly, there is never a strict time dimension to apocalyptic programs. The revolution is always hovering dimly somewhere on a distant horizon. Fundamentally, the revolutionary, apocalyptic approach is in no way morally superior to the reformist, incremental style. They both avoid coming to terms with the core structures of the inherited colonial economies.

What this means in practical terms is that a significant portion of our new programs must begin at the very lowest level--the local community--with enterprises of appropriate scale and levels of technological sophistication. Not only must the scale and scope of such enterprises be small enough that people are not lost once again, but there is need for bold institutional innovation. Methods of business organization need to be devised which take into account historic feelings of alienation and impotence, available levels of skill, broad social and economic goals as well as the facts of political power and constitutional organization. If the end result of social transformation is the activation of a people to exploit the potentials within themselves and their environment, only an approach which sees the primary importance of a cultural reorientation in the Caribbean, and which designs its measures with this in mind, has any chance of success.

No amount of sophisticated technology, no number of foreign experts, no quantum of foreign capital, no degree of access to metropolitan markets, will produce any measurable change unless Caribbean peoples are first induced to abandon magic and face up to their own reality.

ACCOUNTABILITY: HOW DO DIFFERENT DEVELOPMENT STRATEGIES AFFECT OR HOW ARE THEY AFFECTED BY SOCIAL AND CULTURAL MATTERS?

Dawn Marshall¹

Before I start just a few words of warning. First of all, this "paper" was prepared at very short notice and is more a presentation of my own personal ideas and views. It is mainly intuitive, and not really documented by evidence and, therefore, you're free to disagree and criticize as you wish. But they are things in which I believe. I am going to address the problem which is stated in the program: accountability and how do different development strategies affect, or how are they affected by social and cultural matters?

First, it is probably useful to give some indication, however vague, of what I understand by development. A useful general definition is one given by Beckford in 1975: "A process whereby the material welfare of a people is improved consistently and substantially over long periods of time."^{2/} It's something that you can develop and as you develop and define more vigorously you get more and more criticism so I would leave it very general. There is also an additional element which comes through in the works of most Caribbean economists. Because of our history as the locus of production for metropolitan countries, development in the Caribbean has also come to mean a movement or change away from dependency toward greater autonomy, self-reliance, and self-sufficiency.

Strategies for achieving this development are, however, severely limited by the size of the islands and their resources. Presumably this was discussed in some detail yesterday in the session on Growth Limiting Factors. Here, I want only to emphasize again this smallness. For instance, Demas in his celebrated book in 1965, The Economics of Development in Small Countries, almost dismisses the possibility of development for the eastern Caribbean islands which he saw as so small as to fall into a separate category, "and it appears to me that their future is more closely bound up with exports of trad-

tional primary products, the growth of productivity of the domestic food-producing sector and the development of the tourist industry." Today, participants from these islands would probably add light manufacturing, e.g., the garment industry, to this short list.

Furthermore, the situation is such that an individual island cannot spend time debating which of these to choose, but jumps at any opportunity to initiate any of these.

The crucial variable in determining development strategy is size and I want therefore, to spend a little time looking at the implications of small size.

Small size is almost synonymous with Caribbean economics, while the question of viability and survival of small states has been an ongoing concern of Caribbean political scientists since the 1960s. But sociologists in the Caribbean have not contributed to the discussion on small size.

Most of the sociological implications of small size stem from the fact that in a small country the social field is small and limited. This means, for example, not only that fewer roles exist in a small country, but more importantly, that many roles have to be played by relatively few individuals. Thus the same individuals are brought into contact over and over again in different activities; almost every social relationship serves many interests and these inevitably impinge on each other. I think this came out very clearly in Dr. Blackman's presentation when he referred to the intervention of politicians into managerial operations and to the confusion between the roles of academics and managers. Individuals therefore tend to be judged or evaluated according to who they are or whom they know, rather than on their efficiency in the performance of any one role. Further, because in a small society choice is limited and alternatives are few, the decisions of individuals, particularly those in leadership roles may have considerable effect throughout the social structure. For example, a Member of Parliament becomes Minister of Labour and

^{1/} ISER, Cave Hill Campus, U.W.I., Bridgetown, Barbados.

^{2/} Beckford, G., ed., "Caribbean Rural Economy." Caribbean Economy, ISER.

Housing because he owns a construction company. In addition, he may be a Director of a number of companies, leader in the Rotary Club or Lions Club, member of a church reconstruction committee, etc.--a lot of power and patronage are available to him. Thus, the small size of the social field affects the roles which people perform and their social relationships. The main impact, because people are judged by who they know and who they are, is on efficiency. Because this does not encourage efficiency, it imposes constraints on development.

The other important effect of small size would be on alternatives available which are extremely limited. But the openness of the small Caribbean societies has, to a large extent, overcome the constraints of small size in this respect, in that choices are made in a field extending beyond the boundaries of any one individual territory, to alternatives which are available in other countries; and in particular, metropolitan countries are taken into account when choices are being made. Thus migration to greater opportunities available in the UK, the US, or Canada has been one of the alternatives utilized by Caribbean peoples.

Now this is a direct result of our history, this is what colonialism means, but I think we have to understand that when a Caribbean person is making a decision, he does not feel that he is limited to the opportunities available in his own country. If he finds that these are not what he wants, he feels it's very legitimate to look abroad and find these other opportunities and to take them. Now this implies, or could be understood, as a lack of commitment to our countries and to our islands. And I think that this is one of the crucial values or attitudes that somehow or other we have to try to engender in our people. Yes, these opportunities are available because of the high educational levels in the Caribbean. Our peoples are well suited to grasp these opportunities in the metropolitan countries. So we have, therefore, somehow to engender in them this commitment to the development of their own individual territories, or I would extend it myself, to the Caribbean islands.

We can take then migration as a very good example of this view, that opportunities are available in the other countries. And I think it's important for us to realize that the migration of Caribbean peoples has been going on ever since emancipation. In other words as soon as our people were free to move, they did. Therefore, this sense of commitment that I'm talking about has never really existed in the Caribbean. Any commitment was to the plantation and this was

an enforced, mandatory commitment, not one that was voluntary; this was something from which you wanted to escape as soon as possible.

But this openness has incurred a great cost, it seems to me, and not only in the sense of loss of valuable human resources. The openness of the societies has meant that the aspirations and expectations of the people are formed by metropolitan tastes, metropolitan advertising, etc. But there are no metropolitan resources to satisfy these expectations. In other words, because of the influences of the developed countries on the small islands of the Caribbean, the expectations of the people are raised beyond the capacity of the islands to satisfy them. Yet if development is to be autonomous, self-reliant, and self-sufficient, then the peoples' aspirations are counter-development.

Let us return again to the strategies for development of the eastern Caribbean islands envisaged by Demas. Two of these possibilities are based on agriculture: the exports of primary products and growth of the domestic food-producing sector. This may not be true in the other islands, but in Barbados, agriculture has had great difficulties in recruiting labor, for example, for the cane harvest. Together with the aging of the Barbadian agricultural labor force, this would seem to indicate a dislike for agricultural work. Clearly, such an attitude would impose severe constraints on development.

Tourism also carries dangers as the Hon. Billie Miller indicated yesterday. The leisure-oriented nature of tourist activities does not encourage hard work and productivity but I think one of the main dangers of tourism is the openness again of the society. We're getting not only media advertising--TV, movies, that sort of thing--what we now have is an importation of the very people with their values and their attitudes which are based again on metropolitan resources and therefore, must "corrupt" the tastes, the aspirations, and expectations of our people.

I also feel that the conventional wisdom about the work ethic needs to be examined more closely. To me, it "smacks" just a little too much of the assessment of the planters during slavery. Yet with emancipation viable, hard-working peasantries came into being throughout the Caribbean. It seems to me that Caribbean men and women have very definite ideas about under what conditions hard work is called for. It is true that these conditions do not always coincide with those normally conceived by employers, be they private or government. Could this be because of a perception of employers,

public or private, as "them" apart and separate from "us" or "me"? West Indians vote for Members of Parliament (MPs) but there is no sense in which they expect these MPs to serve "us" or "me"--so there is little participation or involvement in what "they" define as important for the development process.

In summation, many of the attitudes and values are counter-development. I understand that in the session yesterday afternoon, you

were talking about constraints. Somehow or other we have to turn these things to our advantage. Now, at the moment, I cannot see any means of turning these counter-development attitudes toward development but I think that it is an area within which some creative thought has to be made. And somehow or another, we have to either change these attitudes, which is almost impossible given the open nature of the society, or to get these things working for us toward development.

PARTIAL TRANSCRIPT OF DISCUSSIONS ON THE RESOURCE PAPERS

JOHN CONNELL: This morning we sat as a captive audience, listening to the experts. Reference was made to the fact that I am an opposition Senator. I do not know what is expected of one. It seems as though the impression has gotten around that there's a certain aggressiveness in opposition Senators, that they are expected to be aggressive with speakers who go beyond their time. If that is the impression, I wish to disappoint all those who have it.

What I propose to do, unless there is violent opposition from a significant number of persons present, is to go right down on my right hand, and up on my left hand among the delegates from the Caribbean. My understanding is that there are certain persons who wish to be angels when they pass out of this existence; and they are here to do something good for the Caribbean. They, therefore, wish to hear what Caribbean people conceive is necessary to be done. I understand that this cannot be done unless the Caribbean people say what they want. So I am going to invite you, one after the other--the distinguished delegates from the various territories of the Caribbean--to react to the three addresses you have heard. You can react either way: a brief statement, or a question, or a brief statement and a question; but kindly bear in mind, at all times, that there are other persons who would also like to make a brief statement and ask questions. Without more, I propose to invite the delegate from the Bahamas to make any brief statement or to ask any question he may wish.

BAHAMAS

I would like to commend Mr. Ivor Jackson for his very fine paper this morning. It's quite detailed and most informative. He indicated in that paper that the method of solid-waste disposal, the sanitary landfill method, is the path most appropriate for the small countries. I would like to know what advice he would give where there's limited land space. This is one of the problems that we have in the Bahamas, and in some of our smaller islands.

IVOR JACKSON: The suggestion to use the sanitary landfill method took into account the costs of using any other environmentally acceptable method. And my experience in the islands would indicate that most governments would not be able to afford, at least they say they would not be able to afford, methods through incineration--such as incineration composting. If you have limitations of space, but you have the money or the wherewithal to use other methods, I say: "Fine, go ahead and do it!" But I know the problem is basic. It is a critical one, especially in small territories such as the Bahamas where you have very small islands, and small land space for wastes.

BARBADOS

Mr. Chairman, I am not the official delegate of the Government of Barbados; I came here to listen and to observe. However, as the point was raised on refuse disposal, and sanitary landfill being the most appropriate type of disposal for small islands such as ours, I can agree in principle generally with Mr. Jackson. However, there are other constraints besides the size of an island for determining the most appropriate type of refuse disposal. One has also to think of the pollution constraints. In small islands, such as the Bahamas and Barbados, we depend largely, or almost entirely, on ground water for our water supply. So one must weigh the benefits of an unpolluted or a water supply that is not very badly polluted, and the costs of treating that water to the level of purity where it can be accepted for potable purposes, against the costs of using other methods of solid-waste disposal.

We, in Barbados, will soon be going to mixed methods of refuse disposal, and we are going to pulverize refuse, hopefully to derive some benefit from it, as a soil conditioner, possibly with some derivation of energy, maybe from methane gas, which can be generated in a reasonably large area of disposal. And we will continue with refuse disposal by landfill methods. But our biggest constraint here is the maintenance of the high quality of ground water which Barbados possesses, and this is the main reason we have opted to embark on pulverization as a treatment of the refuse before disposal into the land. So I think that the size of the island does have some, rather should have some, bearing on your decision whether you would use landfill or otherwise. But there are these other constraints, which must be taken into consideration such as pollution--a very important one.

BRITISH VIRGIN ISLANDS

I do have different questions for different people, and I have been thinking about how I can get my priorities straight. But something strikes me particularly regarding Harris' paper. The paternalistic approach of Caribbean societies, the dependency on governments to provide for goods and services, and the attitude of the people toward that--their dependence on that--has a long history, as you probably know. I'm not so sure I agree, or totally understand, the use of your word "magic." To my mind, there obviously is a fallacy in the system, because if the political directorate derives its legitimacy from the people, it, in my view, would tend to perpetuate itself. As long as you have invested legitimacy in another person or persons, the dependency syndrome and your notion of magic would also tend to perpetuate itself. Wouldn't you agree, or do you see any way out of it?

ALLAN HARRIS: In my written paper, I did say that we require leadership on all levels, and in all spheres of society, so that I agree with you that it is difficult for governments or established institutions to make the kinds of changes necessary. I think we have to look to new agencies for it; and I did point to new kinds of politics. Politics is an informal activity, and yesterday when I was saying that technicians must become politicians, this is part of it, too. Wherever we are in the system, we can and should do something about bringing about changes in values. I'm not suggesting this is at all easy, as we know; but if there's any hope of change, people, wherever they are, have to bring that change.

BRITISH VIRGIN ISLANDS: In other words, the legitimacy will not be vested in the politician, as we know it today, alone, solely, but also in the technocrat--or any other.

GRENADA

I would like to refer to Mr. Harris' paper on magic and social change. As the delegate from BVI said, I do not understand what he means by "magic"--terms like "rational" and "magic," I do not understand. But I wonder if you'll agree with me if I say that some of the territories in the Caribbean area right now that are using what I will call in your terms, "the highest form of magic," are the same territories that are more economically advanced; and that these are the same territories that are now actively opposed to any meaningful social change in the smaller Caribbean territories? And if these are the same territories that are aping or monkeying the metropolitan countries? And if this is true, why are we accusing the smaller territories of social stagnation, when territories in the Caribbean that are in a position to set an example are the ones who are not setting these examples?

ALLAN HARRIS: If you mean by the larger, more economically developed territories that are more magical than others, if you are referring to Trinidad and Tobago, I probably agree.

GRENADA: I didn't call names, right?

ALLAN HARRIS: Well, I will come out and say that Trinidad and Tobago

is a very magical place. I have no problem with that. And my paper is not directed at the smaller territories. I'm speaking about the Caribbean culture as a whole.

GRENADA: Well, what I wanted to say was this: What are you really accusing the smaller territories of?

ALLAN HARRIS: Nothing that I'm not accusing the larger territories of.

JOHN CONNELL: I do not think we should allow the choice of language in the title of this Conference to mislead us and to dominate our thinking. I do not think that Barbados is any larger territory than Grenada or any other place--neither geographically or otherwise. And we must be careful not to get into this dichotomy of small or larger territories. I don't think it is justified on the facts or on the history of the Caribbean islands.

GRENADA: Mrs. Marshall said that Caribbean peoples do not feel committed to working in their own individual countries or the Caribbean. I would like to ask Mrs. Marshall: What are the alternatives? If you're working in a very small island and you just can't get anywhere? You have to deal with your superiors, who have come up through the ranks in a colonial society, and who are more colonial than the colonialist. And they're young, and they won't move. And you can't get any change.

DAWN MARSHALL: I don't know if I'm supposed to give a solution to that because I can't. This is one of the realities of the Caribbean. I would say, though, that certainly the opportunities available for these young people are much greater than they were, for example, when my parents were growing up: the constraints, particularly in the Bahamas, of victimization because of color, all this type of thing. I mean, this is a complete new world in comparison to that one. So I can only say that things have improved.

Now obviously, not all people are going to be committed to the island territories. What I'm suggesting is that too few of the people are, and I feel that we should be taking positive actions, somehow or other, to engender this commitment. Whether we're going to be successful or not, I don't know. I feel that I'm failing in my task with my children, for example. And I'm trying really hard, and that's only two people; but it is a difficult task. I'm just saying this is something that is lacking, and it's something to which we have to address ourselves. I recognize that from the individual point of view, there's a conflict between the individual and the nation.

HAITI

We suffer a lot from magic in Haiti. We try to fight against that, but we can't find an easy solution. We would appreciate reading what you will publish in the Conference Transactions or receiving information about this important subject because our case is very special. We speak French in an environment where everyone speaks Spanish or English. Even in Haiti, we have what we call the elite who speak French; but 99% speak Creole. That's quite complicated for us.

JOHN CONNELL: Let me hasten to assure you that there are many persons in the Caribbean who do not regard Haiti as alien. There are many persons in the Caribbean who look to Haiti with its history of people like Toussaint L' Overture and Dessalines as making an immortal contribution to the development of the Caribbean. We do not regard people from Haiti as being strangers to the Caribbean in any connotation of the term strangers.

VENEZUELA

I would like to know how do you see the way other countries can participate or help in the solution of your problems?

ALLAN HARRIS: I think, perhaps, this is the crux of the matter for a Conference like this. Not very much quite frankly.

VENEZUELA: Why?

ALLAN HARRIS: Because if you define the problem as one of culture, external inputs may reflect the kind of cleavage that I suggest between elite culture and popular culture at home. And it is my experience that external agencies bring their own cultural references and biases, which may create or reinforce the difficulties we have. If external agencies are to function at all in Caribbean development, I think they will have to make themselves indigenous first.

ST. VINCENT

I, too, would like to congratulate Mr. Jackson on an excellent paper. What impressed me was the fact that he not only dealt with problems and analysis, but his approach was prescriptive.

Some of the most serious environmental problems that we face stem from the fact that in small Caribbean islands people seem to feel, and feel very deeply, that they have a right to live anywhere they choose. I think that it's now appropriate, the time is right, that we make a serious attempt to control settlement so as to discourage dispersed urban settlement, and encourage the development of nucleated population centers; I think it's most important.

Another point I want to make has to do with setting up planning units. One of the serious problems that we face in the small islands is recruiting people with technical expertise. We can set up a planning unit and yet find that the staff we are able to attract doesn't have the technical competence to deal with problems. I suggest that one of the things we can do is to demand from applicants for planning permission, environmental impact studies. In other words, I feel that the onus should be on the developer to prove that what he is attempting is environmentally acceptable. I think that's one way of getting around our problem.

The other points are minor. On the question of watershed management, Mr. Jackson was suggesting that governments perhaps should seek to acquire land in watershed areas. Now the problem in the small islands, in most small islands, is that money for that acquisition is just not there. We can argue about what sort of priorities we have, but the fact is that things like that are usually funded by grants; and donor countries and international agencies have traditionally refused to give money for the acquisition of land. But I'm suggesting that the objective could be realized through legislation, through the passage and enforcement of appropriate legislation, and through public education, fostering public awareness of the problems.

ST. LUCIA

I think this Conference is basically geared largely to generate some thinking on improving the welfare, eventually, of the people in the smaller islands of the Caribbean. The question of improving the welfare was addressed yesterday; and many different definitions emerged. I think many of us have tried to become hypothetical about the whole thing but, in fact, we all know what our people regard as improving their welfare. I wouldn't want to go into an explanation of what I think people consider to be improvements. I think we all individually know from our experience in our societies how each individual or each group of individuals would define this improvement.

I must commend Mr. Jackson for his paper, and his talking about the preparation of a land-use plan as an essential factor for ensuring that the welfare of the people is protected even though you are going to proceed with certain developments, make certain sacrifices, and so on; there should be a land-use plan. In doing so, that plan will be drawn up using specific data. I've yet to hear some suggestions about improving the quality and possibly the methods

of collecting the data needed for arriving at these land-use plans in any meaningful way. Also, the preparation of the land-use plans, skilled personnel involved in the necessary disciplines would be needed. We've addressed ourselves, we've mentioned the shortage of skills in the region for undertaking the task. I've also noted some statements about technical assistance to the region and the differing goals of people or differing ideologies of the peoples who would provide the technical assistance and the effect of that on the aims and aspirations of our own people.

Mr. Jackson also made some comments on the land tenure system, and suggested that, where possible there should be suitable land reform involving public-owned lands. In countries like St. Lucia--I don't know too much about the others--there's not much public-owned land, as such, to really tackle that problem seriously. So I think we have to look at the islands in a comprehensive manner. Privately owned lands that people are using for speculative purposes, etc., should be pulled into the fray, so to speak.

IVOR JACKSON: The reason for not involving privately owned lands in the suggestion for land-use reform is because I do not know the peculiar circumstances that exist from island to island. I do know that in the British Virgin Islands, for example, there is much resistance to any form of control of privately owned lands beyond the normal development control processes that are being currently used. But I can understand the problem of St. Lucia where the only publicly owned lands are way up in the mountain regions or central areas, or most of it, anyway.

But on your other comments, on the need for data, I have suggested the need for soil analyses on the various islands, or to improve the existing work that has been done--the updating of rainfall data, updating aerial photography, and an inventory of critical habitats. And I think this afternoon, when Mr. Allen Putney presents his paper, you'll realize that some of that work has been undertaken by the Caribbean Conservation Association. There will also be need for additional social data, of course, in trying to determine land values and that sort of thing.

ST. LUCIA: I would like to address at this point, a statement of fact to Mrs. Marshall. Insofar as the constraints of small islands present themselves, you said that one of the social developments arising from living in a small island has to do with patronage: the fact that one person knows each other, and the multiplicity of roles invested in one person. You suggested that rather than attempt to do something about it, we have to live with it. Well, just one statement. The revolt, which we know is taking place in eastern Caribbean countries, now has to do with reversing that process.

The second point is addressed to Mr. Jackson. I commend him on his brilliant paper, and his identification of the problems of environmental abuse or the problems arising from environmental abuse--soil erosion, sand erosion, and whatever the case is. There are methods developed in Western countries that can handle these problems. The funding agencies have made their priorities clear. Western technology--sophisticated or intermediate or appropriate or whatever the term may be to describe it--has all the answers as far as I'm concerned, to these erosion problems.

If we believe that the best way of dealing with environmental problems is to further entangle ourselves in dependency relations by submitting to funding agencies requests for landfill machines, and the technology that goes with supposedly reversing the process of environmental abuse--if we believe that, then we can offer that method. But to my mind, what the Conference has to seriously address itself to is to the social origins of environmental problems. I am putting forward a theory that most of the problems that exist in Caribbean small countries have a direct relationship to the socio-economic existence of the majority of Caribbean peoples. For example, slash-and-burn agriculture has to do with the fact that a small farmer cannot, does not have access to land. Land may exist, arable agricultural land may exist, and does exist, in St. Lucia, for example. But in many cases, these lands are held for spec-

ulative purposes, as Mr. Michel pointed out. Sand erosion has to do with the fact that no new method, no local research has been done; funds have not been flowing into local research institutions within these small Caribbean countries to deal with, or to examine, or exploit local indigenous material that exists that could be an alternative to sand for use in constructing houses.

And to my mind, the fact that I believe seriously is that these environmental problems have their base in socio-economic developments or in the deprived material existence of the majority of Caribbean peoples because they're the ones who have very little access to opportunities, finance, whatever, management skills, etc. A useful exercise that could come out of this Conference would be the establishment of a research committee to examine the origins of problems relating to the physical environment, or an attempt to really assess the social factors that give rise to these problems. That has to be done before we even approach funding agencies for solutions--capital solutions to solve what we believe to be reversible problems.

DAWN MARSHALL: Can I just respond to the point about patronage. As I said, I don't know very much about the smaller islands, but work that I've been doing in Barbados suggests that this idea of patronage both from the person giving patronage and from the person receiving it, is very well entrenched. I would hope that what you say about the present revolt is true. There is, however, a fear in my mind that this might just be changing the person who is going to give the patronage. I hope that this is not true. On your point about the social origins of most of the environmental problems, I agree strongly.

ST. KITTS/NEVIS/ANGUILLA

The distinguished delegates from St. Vincent and St. Lucia have included in their presentation, or their comments, much of what I had in mind to say. And I wanted to touch on environmental protection. As has been pointed out, many of the smaller Caribbean islands are not really, have not been exposed to much environmental protection. So to us, this is something relatively new.

First, we have to consider what we want to protect, and that gets us into a long discussion. Second, which is the best organization to protect or to identify areas for protection? Third, who is going to pay for this protection? Fourth, what powers are needed to protect those areas which we identify? This is what we must address ourselves to.

For the start, and even after we have identified these areas, then what we really need is followup action. In most of these islands, as the distinguished delegate from St. Vincent pointed out, we don't have the personnel to really carry out detailed investigations and make detailed recommendations for the politicians to act on. However, the need for protection of the environment, as related to our own situation in St. Kitts, has been realized, as I said before.

In our draft development-guidelines application, which developers must fill out, there is quite a lengthy section on the effects on the environment that their projects will have. I think this is a start. I'm hoping that we can set up some sort of communications among the smaller islands so that we can share our experiences with each other. I think if this is established, then maybe we will be able to learn more about the environments.

JOHN CONNELL: I think that the points that you raised, the comments, the suggestion that you made are pretty fine ones. I think that it was Mr. Jones-Hendrickson yesterday who suggested the need for talent pools and I think Mr. John was implying the same thing. I think if this is done then that would be the basis for the sharing of experiences which we badly need in the smaller islands.

ST. KITTS: Ivor's paper is very close to our situation, particularly the very severe problems of soil erosion and our deepening gulleys, and widening cuts; our water courses pose tremendous problems to us. And I would be happy

to discuss these matters with him formally. It's also a question of dwindling stocks of lobster to which we have to address ourselves. It is no longer a fallacy that to eat St. Kitts/Nevis lobster you sometimes have to go to Puerto Rico or St. Thomas.

The escalating costs of building are threatening to make us use up some of our prime arable lands. We are very much concerned about this, and we are attempting to address this problem. The paper by Mr. Jackson is a very useful one and I shall certainly commend it to my authorities.

NETHERLANDS ANTILLES

I would raise a question to Mrs. Marshall. In her paper she said, regarding tourism, that it kind of corrupted the thinking of the people of the islands. I want to ask her--what implications would this have for any tourism promotion programs?

DAWN MARSHALL: Perhaps I could just rephrase that. It carries the potential for corruption. I think that one of the corollaries of our small resources and the need to go out and grab any development agency has led to the problem that we don't monitor and control as closely as we should these development agencies that come into our country. For tourism--I'm not saying, "No, don't have any tourism!" not by any means. But I think we should have some clear idea of the carrying capacity of our island for tourism; not only the physical carrying capacity, but perhaps, even more important, the social carrying capacity. How many of these foreigners can we allow into our country at one time? This type of thing. We have to monitor the growth of hotel rooms.

Most important, I think, and I'm not sure whether this is being done in the Caribbean or not, I think we have to look at what sort of tourism product we want. In other words, we have to decide what we want to get out of tourism; what type of tourist is most likely to give us these things; and to gear tourist promotion to this type of tourist. What tends to happen is that the whole flow of tourism promotion throughout the world tends to take us up with it, and carry us along, so that charter companies say, "Look, do this, and not that; or we're going to do this, and not that." This type of thing. And I think that one of the things that is needed is a Caribbean-wide promotion agency, which will look toward the tourist product and short-circuit, if possible, the stranglehold that these external companies can have on the Caribbean.

MONTSEERRAT

Mr. Chairman, I, too, would like to congratulate Mr. Jackson on a very useful paper. I find his suggestions in support of future environmental management very helpful and, in fact, I would like to obtain a copy of the handbook that he referred to earlier in the paper--environmental protection. I just want to ask one question on the National Planning Unit in St. Croix: How is it composed, and how are the decisions monitored? For instance, at home we have a building inspector who tries to see that his decisions are imposed, but we find that this has not been very effective. So I would like to know, how is this done in St. Croix?

IVOR JACKSON: In St. Croix, the Act that I referred to makes possible a permit-review system, or a permit-issuing system for development within a critical zone area, the coastal zone. There are various bodies or groups that are involved in reviewing development applications. I think that Dr. Edward Towle who lives in St. Thomas might be able to explain how it works in St. Thomas and, of course, I think you should also talk to him about securing a copy of the handbook because he might be able to mail on to you.

MONTSEERRAT: As a local student of sociology, I was particularly interested in Mrs. Marshall's talk. It seems to me that in our anguish over the lack of commitment of the Caribbean man to his island, his country, or the region, that there seems to be some need for re-education of some type. Do you see, Mrs.

Marshall, a subculture like the Rastrafarian movement, for instance, contributing substantially toward the loyalty in the society.

DAWN MARSHALL: That's a difficult question. I would say, "Yes." One of the things that Rastrafarians have going for them, it seems, is a commitment to the country. This is from what I know about the ideological aspects of Rastrafarianism coming out of Jamaica. There seems, however, to have been a loss in translation from Jamaica to the eastern Caribbean, which I think has to be looked at very carefully. Now one of the problems is that most of the information about Rastrafarianism coming out of the smaller islands has been from those who are against it. So we don't know how biased the information is. I think we'll have to look at the other side to see exactly why people feel that they have to go toward this, and what are the goals and objectives that they see. Certainly income distribution or wealth distribution seems to be one of the things. Unfortunately, the means they tend to use to do this is perhaps not acceptable by society. But certainly, they seem committed to the land, and a natural way of living, and to the Caribbean. But these subcultures cannot exist on their own; somehow or other, they have to be encompassed by the total society, and made to work for it. I think that the negative attitude, which is the main, official, middle-class type attitude, is not conducive to this.

JOHN CONNELL: Ladies and gentlemen, we have completed one round of observations and discussions. I would like to think that this is only the first round. I feel some duty to you to take a bird's eye view as to where we stand.

Basically, the discussion is polarizing around the technical aspects as represented by the paper of Ivor Jackson; and the more theoretical aspects as represented by the papers of Allan Harris and Mrs. Marshall.

I have the charge to make sure that the discussions come up with some concrete results. Now I am not suggesting we cannot have concrete results in the area of the theoretical part of the discussion; I think that both technical and theoretical aspects are vital to use.

I have heard repeated and well-deserved congratulations for the paper of Ivor Jackson. I suggest as a start that it may be a good idea to come up with some concrete suggestions as to what we should do about the contents of that paper in terms of environmental preservation and development of the Caribbean region.

On what we may call the theoretical side, I think that we cannot overestimate the importance of the contributions of Allan Harris and Mrs. Marshall. You know, there is a tendency among Caribbean people to speak very softly on these matters. My view is that the experience of slavery in the plantation has been destructive of the personality of the people of the Caribbean who have undergone that system. In other parts of the world, in Nazi Germany, and so forth, in the post-Nazi Germany period, sociological and psychological studies have been done as to the destruction of personalities by that experience. I think, therefore, that if we are to understand the problems of Caribbean people with a view to solving them, we must understand the process that led to the destruction and the erosion of the personalities of Caribbean peoples. I feel, therefore, very heartened by the contributions of Mrs. Marshall and Allan Harris. I do not find myself unduly mystified by the use of the word "magic" myself. In my simplicity, perhaps, I took it to mean the manifestation of phenomena that have no apparent rational explanation. I think that we should get behind the word, and to see what Allan has been trying to say to us.

Does any member of the sponsoring group wish to make a contribution at this stage? I observe the distinguished Mr. Trevor Boothe.

BOOTHE: Thank you, Mr. Chairman. I would like to make two sets of comments. The first will relate to the papers that were presented to us this morning. And the second also related to those papers, but specifically deals

with your suggestion that the paper presented by Mr. Jackson and its recommendations be translated into some concrete actions.

To deal first with the papers presented this morning, I'd like to, through you, really congratulate the three authors of those papers. I thought that the papers were substantively very good; they were to the point; and they have generated discussions that I think have been particularly useful.

I was particularly struck by Allan Harris' paper; I found myself in an exceptionally wide measure of agreement with the statements contained in that paper. I am especially struck by his suggestion, with which I agree, that there is a clear cleavage between elite and popular cultures in the Caribbean. Dr. Harris made the point that we here, in effect, represent the minority culture. I think that is also true. The question in my mind, therefore, is one that we cannot debate. How effectively can we represent the concerns of the majority culture--the popular culture, if you will--which, of course, is based on the values of the masses? I think that this is a crucial and critical question and one that unfortunately has not been addressed in the discussions that have taken place. I would dare to suggest that in considering this, the whole question of communications and education enters into force. We, this group here, representing the minority culture as we do, have got to find the means, the mechanism of conveying the concerns, preoccupations, that have been raised here, if they are, in fact, valid, to that other culture. We've got to find a means of communicating this to them. But at the same time, we have got to, I think it's a two-way street, we have got to receive an input from the majority culture--the popular culture--and feed that into, somehow, the process that we have embarked on here today. I think that this is extremely important. I hope that I have succeeded in making a point. But I think this is absolutely the crux of what we are about. That is the first set of observations.

The second relates to Ivor Jackson's exceptionally fine paper. I have here a note, in fact, prior to your statement to this effect, that virtually all delegations here have expressed satisfaction with this paper and its recommendations. I very much welcome, therefore, as a cosponsor, your suggestion that some mechanism should be sought, or the need for somewhat more concrete arrangements for followup to that paper.

Let me say here that we, the UNEP/ECLA/Caribbean Environmental Project, as most of you know, are now at the very advanced stage, in the preparation of an integrated multisectoral action plan for environmental management in the wider Caribbean area. I'll be making a presentation on that later, so this is not the moment nor the time to do so. What I do, however, want to say is something that has been said privately to most of the delegations: that we have been involved in this Conference because we believe this Conference should provide the medium and the opportunity for the island states to come together in advance of the consideration of the Caribbean-environmental-action-plan by all the countries in the region. This coming together should allow the island states, we hope, to arrive at an understanding of what your concerns, environmentally speaking, are. So that when you get to that large meeting with all the other participating countries, you will be well-prepared and well in a position to represent your interests, and also to lay claim to priority attention for your interests. So I think that what you have suggested, Mr. Chairman, is from our perspective, right on target and we would very much welcome some way that this can be done and we are ready to cooperate in everyway with that exercise.

BELLER: I would like to endorse what Mr. Trevor Boothe has said and what the Chairman has said in that the Conference is seemingly coming down to some conclusions. And I would like to point up three of the conclusions that seem to have come forward, and then raise a question with respect to them. The illustrious delegate from St. Lucia has suggested establishing a research committee to establish the origin of problems that affect the physical environment and, most importantly, the socio-economic causes of these problems.

Secondly, it has been suggested, and I believe this was from the delegate from St. Kitts/Nevis/Anguilla, to set up a committee that would exist among

the smaller islands so that the smaller islands would be able to share experiences, and from these experiences extract sound ways to develop themselves and in their light.

And thirdly, Mrs. Dawn Marshall suggested that there be a Caribbean-wide and -focused tourist agency so that the tourist policies could be carried out as the Caribbean people would wish them. These all seem like exceptionally fine ideas, and the question I believe that arises is: given the validity of these ideas, what is the mechanism, what is the agency or agencies to carry them out? I would suggest that this might be something for further discussion at a later time at this Conference.

MOODY: I would like to pursue this line of commentary a bit further, thinking ahead to Thursday when we will be talking about technical cooperation in the morning; and then in the afternoon, opportunities for international assistance and cooperation. And the fact that I'm one of the people on that panel in the afternoon, I'm wondering if between now and Thursday morning, people that have specific ideas that might not get discussed in the plenary sessions would give them to one of the designated people here. I can envision the usefulness for our Thursday afternoon discussion having on a blackboard, a list of all of the concrete suggestions, as concrete as people want to make them, because several of the panel members, representing some of the funding agencies, might be able to react at Thursday afternoon's session, say with respect to idea A and B and C. For example, with respect to Mr. Allan Harris' interesting paper, I see that he already talks about an approach and then he talks about what this means in practical terms. It occurs to me that he might have some specific ideas that he would want to list that may relate to a particular territory, or a particular type of project; and I would find it helpful to know about that in advance. With respect to Ivor's interesting suggestions on his last page, he might even want to give some priorities to those suggestions, just for us on Thursday afternoon for our panel reactions.

JONES-HENDRICKSON: I think all three papers were very, very interesting; as were the presentations; we should commend the fashion in which they were developed. I think although the topics were variegated, they really had a synchronization that I found highly useful. Since this particular Conference is aimed at developing some kind of workable document, which could be used by decisionmakers, I want to address some brief comments to all three papers.

I think that Jackson's paper we need not discuss anymore. I think it's a very, very good paper. But as an economist, I kept looking for something about costs, and I think in the development of this particular paper, when it moves beyond the particular point where it is now, this particular factor should be considered: what are the costs involved in terms of monitoring, managing these things; how critical are these things within the cost-benefit analysis, basically, in terms of managing the environment? I believe we must, if we're talking about managing the environment, take a holistic approach rather than one in narrow disciplinary confines.

In terms of Harris' paper, I found the paper useful and thought-provoking. However, I started making a lot of notes on the paper inside and outside. And the first thought that came to my mind was the fact that in terms of "magic," and I take the Chairman's definition, we really have two kinds of magic. We have black magic, with which we have been associated with for all these years, and we now have white magic, which is technology. And I think they have spill-out benefits; but it seems to me within the confines of his paper that he's suggesting that magic is used and has been used in the region to mesmerize people and to mysticize people.

I think we can use this magic to our ends, and you suggest this and give the impression that you don't really like the concept of magic, but I think we can use it.

The question is, you see, by sleight of hand we've used black magic over the years; and as my colleague Norman Gerbin says, we now believe that technol-

ogy is the white magic for development in the region. But what I'm suggesting is perhaps we need to use that magic that is such a part of our culture and use it to our ends. As you go through, and you develop the plantation thesis here, which you did not say explicitly, I say I totally agree with you; but many of the leaders would contend that they have been using this magic over the years for the benefit of the people. Now we have to establish this explicitly and say how, for example, on your last page, how we can get some of these approaches you suggested. But to my mind, we could use that magic to our benefit.

Finally on Dawn's paper, on the issue of accountability and the sociological implications of size, I disagree with her that economists have done a lot of work. In fact, we're blaming ourselves for not having done the work on the economics of size and the implications in the region, and turned it over to the political scientists who have done a lot of work. In 1960, Robinson wrote a piece on the economic consequences of the size of a nation; and nothing happened until Demas wrote something in 1965; and within a few years, political scientists at the University of the West Indies, Paul Lewis, and Patrick Emmanuel here in Barbados--they're the ones who have taken the ball forward. But what she was getting at--the sociological implications--have not been touched, and I think they comprise a critical aspect. When for instance, as I was telling my Montserrat friends the other day, Mr. Bramble, the past premier of Montserrat, said he wants to see development in Montserrat; he wants to see smoke over Montserrat--that's the sociological aspect we need to consider within the context of a small nation. So I think that Mrs. Marshall's paper has a lot to offer, but I feel that in terms of development, she would perhaps need to consider, what I consider, the dynamics of a small country.

CHACKO: I will try to summarize briefly where I, listening to two days of discussion, where I think we've arrived. One thing I noticed: despite the fact that speakers have disagreed with each other, and there's been quite a lot of discussion across the table, really, I think a lot of those disagreements were just a matter of what the person's particular experience has been, or perhaps his professional training.

Really, a number of the same points are coming through. I think in today's session, Allan Harris' metaphor of "magic" in a way relates to the type of things that Courtney Blackman was talking about although his language might have been the language of a banker. But I think his paper began with an attempt to sort of dismiss some other theories of magic, or to make problems vanish with the wave of a hand, and to say, essentially, "Let's get on with business!" This is also what I thought Dr. Marshall was saying, in a way, that you can go around and around on the causes of environmental problems, of economic growth, of the effects of colonialism on a colonial country.

Now, my country is India, a country subjected to the same colonial conditions as a number of Caribbean countries and certainly a long and extensive period of colonialism. But I think that what we discovered very rapidly, or a vision coming out of that period for me was, for example: seeing a picture of the late Lord Montbatten of Burma meeting with Ghandi on the eve of independence; and this picture of a very distinguished man in a custom-fitted suit standing next to the man who had single-handedly destroyed an empire, a man in a piece of very simple homespun cloth wrapped around his body and wearing no shoes and no hat. That was a very vivid picture for that time, and for now.

The colonial experience was there and it certainly did have its costs. There were people who recognized even at that time that colonialism would go away; and that we had to make our own way. And I think one of the things in Allan Harris' paper that perhaps he does not give enough emphasis to is the vitality of people everywhere, their creativity, their ability to rise above, what, for us seems to be terrible intellectual problems of colonialism, and feeling of lack of self-worth.

If somehow this Conference can help in the process of the islands beginning activities in the spirit that Allan Harris suggests, a lot of problems will become intellectual ones: you'll see, I think you'll be surprised to see what hap-

pens if you give individuals in the private sector in the Caribbean some help. Why don't the funding agencies here, the local banks, find ways of encouraging local entrepreneurship, local savings, local investments? Why depend on funding agencies from abroad? You can depend on them for specific technical functions. But why not turn loose the forces that are obviously already here? Perhaps we're looking outside instead of inside for causes and explanations.

Now specifically, in the light of what the Chairman said, we would like to come out at the end with some specific suggestions for action to make sure that the spirit of the Conference goes on. I was impressed by one of the points made by Ivor Jackson about problems that a planner would face in the country, say in the Virgin Islands, in Tortola, when presented with a proposal by a developer to, let's say, build condominium apartments, or an oil refinery. Now it's fine to say that the person has to submit an environmental impact statement; there's really quite an art to that now and, you know, you can churn those out pretty easily. In fact, my experience with them is that they're almost always prepackaged according to the industry, anyway--there is one for an oil industry; there is one for coconut palm plants. All you do is push them out and add a different introduction. You say this is what happened in place X, this is what happened in place Y, and this may happen here.

There's another side to the impact question, and that's the economic impact side. Now in the light of everything that's been said here, I believe that it's up to the local planner to say what are the environmental and economic impacts of particular development projects. Now here's an area where in the light of the expertise that does exist, obviously in this room and throughout the rest of the region in institutions and universities and government planning departments, we should be able to take this pool of talent and use it to develop a group of people who would undertake these assessments in particular islands for large-scale development projects. Having carried out some of these financial or economic evaluations, I know that there's no magic to them, really. People who are trained in civil engineering, or any basic engineering scientific discipline, or in economics can take very short courses or even sit down by themselves and learn through handbooks how to carry out these evaluations. I think we have institutions such as the College of the Virgin Islands, or the University of the West Indies, which might be able to carry out this sort of educational function.

We have Professor Andic here who's had some field experience in economic environmental assessment; perhaps we could take advantage of his knowledge and experience to pursue this idea.

ANDIC: I think the idea is excellent, and was hoping that someone would make a proposal of this nature. Among your papers, you will find one prepared by a colleague of mine and me dealing with the environment and the guidelines for project evaluation. The idea was to work in the parameters and cost elements of environmental protection with cost-benefit analysis. Obviously, in the time available, I cannot go through the techniques and methodology proposed in this paper. All I can say is that the paper is basically for planners, and suggests some guidelines and emphasizes the cost aspects of environmental control and development. It emphasizes two aspects: one, that so far the economists have failed to come to grips with the cost aspect of environmental protection. And secondly, the paper tries to point out the peculiarities of the smaller islands, where the sea is both the insulator and conductor for environmental problems. If any one of you would care to discuss the paper, I'd be more than happy to do this.

TOWLE: The environmental impact statement process from my experience and the experience of many others is no better than the people who are reviewing the statements. It's critical that the government agencies involved have access to the skills and talents to review the documents adequately because they are often prepackaged, sometimes garbage, and to a degree they are self-serving: they are presented often by the developers trying to market projects in the Caribbean.

SUMMARY OF SESSION III - MORNING

Eapen Chacko

Ivor Jackson felt that the development strategies pursued by smaller islands were basically conditioned by the resources available; a country with wide, sandy beaches would therefore pursue a strategy based on tourism development, and an island with abundant coastal fisheries would emphasize fisheries. Resources, he felt, defined the development path.

Mr. Jackson also identified a number of areas in which small islands could cooperate by sharing information, expertise, and experiences:

- 1) Coastal engineering and protection. Many of the islands were experiencing shoreline erosion due to mining of beach sands and construction of groins, piers, and jetties.
- 2) Coastal zone management. Nowhere was the balance between economic growth and environmental management so critical as in the coastal zone, which encloses the most valuable resource areas in many islands. The experience of the U.S. Virgin Islands, British Virgin Islands, and Trinidad and Tobago would be of value to other islands.
- 3) Oil spill contingency planning. Recent pollution incidents in the Caribbean emphasized the potential damage and resultant costs associated with not being prepared to deal with large oil spills.
- 4) Economic and environmental appraisal of development projects. Planners in small islands needed to be able to evaluate environmental impact statements submitted by developers of proposed projects; in addition, there was also a need to evaluate the social and economic benefits of development projects.
- 5) Sound agricultural practice. Many small islands with rugged topography had to use terracing methods for planting steep slopes. However, correct bench terracing methods and contour drainage often proved uneconomical for individual farmers, so that ways should be found to subsidize the utilization of the sound agricultural practices in smaller islands.

Allan Harris, discussing the rise of elites in the Caribbean region, put forward the idea that the true nature of popular culture in the Caribbean was not the apparent one but, rather, its true nature was one based on "magic." He distinguished three types of "magical beliefs":

- 1) the magic of maximum leader;
- 2) the magic of creed; and
- 3) the magic of modernization.

Caribbean cultures suffered from the absence of a sense of process, which prevented people from taking a realistic view of the present economic and social situation. Massive "therapies," on the scale of a region-wide cultural revolution, were required to generate both the sense of process and of realism. Widespread educational programs, using the advantages of mass media, were a clear and immediate necessity.

Dawn Marshall noted that the individual Caribbean man and woman had not

restricted his or her career options to the Caribbean region. The metropolis had always provided a safety valve, by allowing substantial emigration. However, what was needed now was to engender a sense of loyalty to the Caribbean and a commitment to the solution of economic and social problems on the part of the individual. Openness, she noted, imposed other costs on the region in addition to the loss of human capital.

Mrs. Marshall noted that economic expectations of Caribbean peoples were probably beyond the ability of available indigenous resources to satisfy them. She cited the steady increase of the average age of sugar cane workers as an example; it was clear that younger workers, who expected more remuneration opportunities, were not joining the agricultural labor force. She felt, however, that the notion that Caribbean people were not imbued with a work ethic was a false one; it was a myth.

However, there was a clear divergency between the effort applied by individuals in their roles as public sector employees and their roles in private enterprise; in view of the fact that individuals in the Caribbean very often had multiple economic roles, this divergence was a serious drag on the growth of productivity of Caribbean labor. Attempting to explain this phenomenon, she felt that the lack of identification of community with government and its objectives was the basic cause.

Mrs. Marshall noted that small size was an important characteristic of the eastern Caribbean islands, but even though the economists had considered it, Caribbean sociologists had not. She briefly touched upon the sociological implications of small size and said that these stemmed mainly from the small size of the social field. This affects the roles and relationships of the society, e.g., leading to a multiplicity of roles for one individual and allowed for advancement based on their status and knowledge of important people rather than their efficiency in performing any one role. This effect on efficiency was counter-development

Another important characteristic of smallness--the limited choices and alternatives available--was affected by the openness of the societies. Mrs. Marshall stated--Individuals extended their field of choice beyond their particular island and even beyond the Caribbean, and had been exercising this choice by migration ever since emancipation. This could be understood as a lack of commitment to the islands, and somehow or other this feeling of commitment had to be generated among Caribbean people. Openness also meant that the aspirations and expectations of the people were raised beyond the capacity of the limited resources of the society to satisfy them.

Mrs. Marshall cited the dislike of agricultural work as another example of attitudes which were counter-development, since two of the three development strategies envisaged for these small islands by Demas were based on agriculture. Mrs. Marshall felt, however, that the work ethic, and the implied criticism of Caribbean workers had to be more closely examined. Caribbean peoples work hard for themselves but do not seem to identify themselves with their employers or the government. In conclusion, Mrs. Marshall stated that many of the attitudes of Caribbean people were opposed to the current concepts of development--and that some creative thought had to be channeled into using these attitudes for development.

GENERAL DISCUSSION AND COMMENTS

One representative felt that small islands should discourage dispersed urban settlements and encourage smaller, nucleated settlement patterns as a way of minimizing environmental problems, particularly those associated with waste disposal.

Another island representative felt very strongly that most environmental problems stem from basic poverty, and she cited the prevalence of slash-and-burn agricultural practice. The representative recommended the establishment of a research committee to investigate the relation between environmental deg-

radation and socio-economic variables. The understanding of this interrelationship was a prerequisite to seeking solutions based on increased capital expenditures.

Referring to environmental impact statements (EIS), one representative felt that the onus should be on prospective developers to pay for and produce an EIS for a proposed project. There was a shortage of trained personnel in the islands who were capable of analyzing and evaluating a complex EIS. The Conference, he felt, should address itself, in specific terms, to this need.

There was a query about the role of the Rastafarian movement in the region. It was felt that, in a sense, the Rastafarian movement served to foster a sense of pride and commitment to the region.

The Chairman, in wrapping up the session, stressed the need to translate the discussion into specific suggestions for action which would directly assist the efforts of smaller Caribbean islands to economic growth which was sustainable with a high level of environmental quality.

INTRODUCTION OF THE HONORABLE WILLIAM G. DEMAS

Dr. Lewis Campbell*

It is a pleasure and an honor to perform what I regard as a fairly easy and simple duty this afternoon. I regard it a simple duty because Mr. Demas' name is almost a household word in the Caribbean. He's particularly known for his leadership in economic development and integration, not only in the Caribbean but also in the developing world and in developed societies.

Mr. Demas came from Trinidad and Tobago; it might be fashionable to emphasize the Tobago end. He studied economics at Cambridge, did research work on the subject at Oxford, and came back to the Caribbean around 1958, after a spell with the then West Indies Trade Commission, advising on trade matters; and came in at a time in Trinidad when Dr. Williams had entered politics and taken over the government of Trinidad and Tobago. Mr. Demas played a vital role in the early planning of economic development in Trinidad. It is true that he was probably the main architect of the first few development plans that were put out by the Trinidad Government in those years. He moved from this area into the broader Caribbean sphere when he joined the CARICOM, or what was then the CARICARIFTA Secretariat. And I think it is true to say that it was at that time that the Secretariat matured. Mr. Demas put much effort and energy into making some meaningful development out of economic integration in the Caribbean. I think many of us regard him as still playing a vital role in this regard. It's part of his life style; you can't keep him away from this activity.

He joined the Bank about five years ago as President. In his usual style, he is putting much energy into development banking, in emphasizing the integration aspects of development. In the period he's been President of the Bank, we have increased our activities severalfold.

He's had some involvement in the academic world, being at one time Visiting Professor at McGill University in Development Economics; he has written quite widely on the subject, including several accepted texts. I'm sure Mr. Demas will certainly set you thinking this afternoon on the topic that has been assigned to him. And with these few words, I wish to present Mr. Demas.

BASIC HUMAN NEEDS IN THE SMALLER CARIBBEAN ISLANDS

W. G. Demas and M. St. Rose*

INTRODUCTION

I am very happy to have been offered the opportunity of addressing you this afternoon and possibly to make a small contribution to your important deliberations this week. I am to address myself to the theme of "Basic Human Needs in the Smaller Caribbean Islands and the Socio-Economic Goals of the Region's Peoples," but laying emphasis on the economic means and tools available to satisfy these needs and goals and, parenthetically, to inquire whether these can be satisfied.

I would like to lay the setting for what I have to say by making three observations: Firstly, while there is a distinction between needs and wants--with the former accommodating those ingredients necessary for sheer survival--I would like to recognize that wants can become needs if those in want perceive it in this way.

Secondly, social needs are relative to time, place, and culture. Thus it is unwise to compare the fulfillment of human needs on an absolute scale. Instead they should be considered on a relative scale and within the parameters of the similarities of time, place, and culture, the latter broadly defined. Given similarities of place and time, basic human needs would be different for persons oriented to a Western culture as compared with those oriented to traditional African or Asian ways of life.

Thirdly, I dislike the idea of the compartmentalization of the social sciences for purposes of studying a given problem. The social sciences studies social behavior and all aspects of this behavior interact, and therefore, it is partial and foolhardy to try to focus on economics, divorced from politics, sociology, history, etc. as all have bearings on each other. Consequently, I do not intend to restrict myself to economics although because of training and the

wishes of the sponsors I may tend to lean heavily on that discipline.

SOCIO-ECONOMIC GOALS OF OUR REGION'S PEOPLES

Man in a simple setting is a complex being. Our people, transplanted--some may even say uprooted--as they were from different origins, with diverse cultures, superimposed by peculiar historical experiences and fragmented in the Caribbean Sea with heavy influences from and exposures to Western ideas, values, and norms are even more complex. But from my limited vantage point and perspective I perceive the socio-economic goals of the region's peoples are principally twofold:

i) To enjoy a decent standard of living, but not necessarily comparable to that enjoyed by our northern neighbors; and

ii) To live within and contribute toward a just, fair, and integrated society.

I will elaborate on these.

The Overseas Development Council (ODC) concept of the Physical Quality of Life Index (PQLI), when taken in conjunction with per capita income indicators, can be used as indicators of the attainment of socio-economic goals. The PQLI looks at three indicators: Life Expectancy, Infant Mortality, and Adult Literacy. We compare these indices together with per capita incomes for the United States and Grenada, one of our smaller countries.

	<u>US</u>	<u>Grenada</u>
Life Expectancy (1970-75) (years)	72	69
Infant Mortality (1970-75) (per 000)	18	34
Adult Literacy (1970-75) (%)	98	76
Per Capita Incomes (1975) (US\$)	7,120	390

Sources: US & World Development - Agenda for Action 1975, ODC: World Atlas of the Child - World Bank

* President, Caribbean Development Bank; Assistant Director, Economics and Programming Department, Caribbean Development Bank.

A comparison of the PQLI and per capita incomes shows that for one of our typical smaller countries life expectancy is only 4% below that of the USA and this, no doubt, is due to the favorableness and hospitality of our climate and the advances and dissemination of modern medicine; 24% of the Grenada adult population is illiterate as compared with 2% for the USA; infant mortality is nearly double that of the USA and per capita income is less than 6% of that of the USA. These figures could suggest that people in our small countries are being kept alive but at levels that are still far too low, even if we do not aim explicitly at "catching up" with our northern neighbors. In this regard, recognizing the impossibility of even catching up in the foreseeable future with North American standards of living because of enormous differences in productivity between the two areas, the people of the region should try to set their own goals for the physical quality of life for the masses.

In fact, high incomes earned in the United States are necessary to meet certain unavoidable costs which hardly apply in our countries. Heating and warm winter clothing are not necessary in the tropics. Heavy transportation costs which arise from commuting in large bustling metropolises are not applicable in our small communities. Services such as babysitting and manicuring, which are normally provided by family and friends in our societies, have cost implications in the developed countries. Even the food and fat caloric intake for survival in a temperate country would be higher than for our tropical countries. The cost of shelter and hence rental or mortgage expenses are--or should be--much lower in the tropics than in temperate countries. Thus to attain a standard of life comparable to our northern neighbors is much less costly than it would be in northern countries. Our northern friends who settle in our countries can attest to that.

The integrated society characterized by fairness, justice, and opportunity in social, economic, and political arenas would incorporate such features as:

i) an equitable distribution of incomes which will minimize social tensions but provide incentives and rewards for real economic effort;

ii) the design of work being such so as to enhance its dignity and usefulness;

iii) the greater cohesiveness of the society with the development of mechanisms to facilitate the easy interaction of social groups;

iv) mechanisms to allow people to feel that their points of view are respected and that they are making contributions to the running of the society.

WHAT MORE NEEDS TO BE DONE TO MEET THE BASIC HUMAN NEED?

Despite the relatively high PQLI for the countries, a lot more needs to be done to the social infrastructure to improve the basic needs of the region's peoples. Data on social infrastructure facilities and performance are very limited and sketchy but those available speak for themselves. (Excluding Barbados and Bahamas, the other countries are more or less very similar.) Thus infant mortality in 1977 was 56 and 39 per thousand for St. Vincent and Montserrat, respectively, as compared with 18 and 10 for the United States and Sweden, respectively.

Only 38% of the Dominica population in 1977 had access to potable water, while for St. Lucia in 1974 the corresponding percentage was 60%. In 1977, 73% of the Grenada population had access to electricity and for the same country in 1975, the caloric intake as a percentage of requirements was estimated at 80%. Child malnutrition in 1972 for the ECCM countries as a whole was estimated at 14% while it was as high as 27% for St. Vincent in the same year.

In 1975, 24% of the Grenada adult population was deemed illiterate and, if functional literacy were to be taken as the criterion, the proportion would be higher. St. Lucian students pursuing a secondary education as a percentage of those of secondary school age was 22% in 1975 as compared with 91% for the United States in 1975. For primary education in the same countries, the comparative percentages are 91% and 100%, respectively for St. Lucia and the United States. The average number of persons per habitable room--not bedroom--in St. Lucia was 1.8 in 1970 and today, though the situation would have improved, still needs correction. In the same country only 18% of housing is considered standard or acceptable accommodation.

The work rate or the number employed as a percentage of the number of persons of working age was 49.4% for the ECCM countries and Belize in 1970 and had in fact fallen below the 1960 level as a result of reduced employment opportunities. The period 1970 to the present, when documented, may well show greater deterioration because of the greater rural-urban drift and the relative decline of agriculture.

HOW CAN THE GOALS BE ACHIEVED?

Achieving the goals of the region's peoples is certainly possible and may require less effort than our northern neighbors had to exert because of the relative hospitality of our environment. (On the other hand, some cynics say that the attractions of our environment prevent us from doing better as life can be all too easy!) We realize that our countries do not abound in natural resources but, at the same time, we note that countries such as Switzerland, Israel, and Japan, which are more or less similarly disadvantaged, have been able to achieve standards of living much greater than ours. I recognize that the problem of growth and development is a deep-seated multifaceted one that sometimes defies analysis. Nonetheless I can say categorically that the satisfaction of basic human needs and the attainment of much improved standards of living are possible and achievable if our major resource--our people--can be usefully and productively deployed and employed.

Today, an increasing body of opinion sees unemployment and underemployment as being part and parcel of the process of growth which has occurred without either development or equity and, indeed, may have called for a different pattern of growth. In other words, unemployment, underemployment, low levels of living for the masses and unsatisfactory progress of the structural transformation of the economy are today often seen as part and parcel of the problem of growth without either development or equity.

This point of view sometimes shades off into an advocacy of a "basic needs" approach to development. This approach aims at combining economic growth with a strengthening and diversification of the economic structure, while at the same time seeking directly to meet the basic needs of those persons within the bottom 50% of the population for greater productivity, productive employment and income; adequate food and nutrition; decent shelter; clothing and other essential consumer goods; and access to appropriate education and training, better water supplies in both urban and rural areas, public transport, etc.

I shall not on this occasion spend too much time on elaborating the "basic needs" approach to development. I shall simply say that it does not constitute a "freeness" approach to development--in other words, neglecting the growth of production in favor of economic and social welfare of the poorer groups in the society. It calls for competent planning and efficient management of the economy, including the taking of often tough

and unpopular decisions on economic policies including fiscal, monetary, incomes, commercial, savings and consumption policies and rate setting in public utilities so as to generate surpluses. It also aims at changing the sectoral allocation of new investments and so the future structure of production in order to bring about a better convergence between the pattern of production and the pattern of consumption. It also emphasizes the use of appropriate and often "intermediate" technologies and the development of self-employment and small-scale enterprises in both rural and urban areas.

But sometimes this approach is taken too far and the need for improvement of necessarily costly infrastructure such as electricity, ports, telecommunications, and highway facilities can be played down. And, even where the natural resource base and the size of the internal market of a country warrant, the production of capital and intermediate goods--where these are inherently capital-intensive--is often overlooked in favor of the production of simpler more labor-intensive consumer goods. Finally, the role of exports of manufactured goods in providing the foreign exchange to meet the demand for many kinds of goods and services is often not sufficiently appreciated.

For these three reasons, it is essential that the concept of a "basic needs" approach to development be properly interpreted. Rigorous analysis and hardheaded action rather than sloppy sentimentality should inform and orient our concern for human welfare if we are to plan and manage the economy efficiently.

We recognize that in the long run our people's consumption and hence their standard of living is dependent almost entirely on their level of production. The value of production per unit of employed labor is a little over US\$2 per day in our countries, as compared with over US\$44 per day for the United States. This is the direct result of low productivity, open unemployment, disguised unemployment and underemployment. Increasing employment and productivity is dependent upon a number of factors, four of which are critical. These are:

i) greater exploitation of the facilities, resources, and technologies immediately available to us in our small countries;

ii) meaningful economic integration through not only trade liberalization but also, and more importantly, the integration of production as between different countries, common external economic and other policies and the establishment of common services;

iii) increased trade opportunities for small states both in terms of easier access of our goods into foreign markets and at better prices; and

iv) increased flow of funds to our countries on as flexible loan and/or grant terms as possible for purposes of acquiring capital goods and for training, coupled with access to foreign direct investment on terms which maximize the benefits and minimize the costs of such foreign private investment.

While we recognize the small size of our countries, the structural openness of our economies and the need to supplement what is provided by our indigenous natural resources, we must first attempt to exploit as fully as possible what is around us. In other words, we must look inward and around us first before looking outside. This is one reason why we do not discuss tourism in this paper. It is far too easy to say that all our development problems can be solved by the creation by foreigners of "islands in the sun" in our countries. While it is generally recognized that tourism can make a contribution, there is still lively debate on the fundamental subject of "alternative forms and styles of tourism" which, it should be noted, requires active creativity by our people instead of passive acquiescence in what foreign investors, foreign airlines, and foreign wholesale tour operators do for our tourism.

Applied scientific researchers in attempting to develop new products take lessons and inspiration from nature. It is no accident that the airplane is shaped like a bird and a submarine like a fish. In the same way, we should take lessons from nature and history. Birds, fish, and beasts survive and thrive in their environment by adapting to what is available in that environment. They are only destroyed by man's predatory behavior or by cataclysmic disasters. That is one of the things that makes nature study interesting. We too can survive in ours.

History and events are proving that we can utilize our environment a great deal more with a lot less external effort than we are now doing. During the Second World War and a virtual shipping blockade for the transportation of consumer goods, the Caribbean was self-sufficient in food. Today, countries like Guyana and Jamaica which are experiencing foreign exchange shortages have been able, through economic management, to come a long way toward becoming self-sufficient in food production. At the same time, the smaller countries, today, with more labor, improved education, and with the same acreages of arable land have agricultural production falling and in some cases, e.g., cotton, bananas,

cocoa, citrus, current outputs are fractions of what they were. Salt was produced in the Turks and Caicos Islands but today planners are talking of a multimillion dollar investment to revive the industry and while the studies are being undertaken, this once exporter of salt now has to import salt. Before fossil fuels, sugar used to be produced in the Caribbean and in many of the countries, windmills still dot the landscape as an attestation to the technology used. Today, no such windmills are used and the dependence is on imported expensive technologies and raw materials.

It is clear that we must attempt to break away from that dependency syndrome. We can, and must, make greater strides in production and consumption, if we make greater use of the technology, labor, land, and investible resources available within our countries. We should be looking for our development funds from our own commercial banks and insurance companies which are either exporting funds or using the essentially long-term investment funds to facilitate the importation of imported luxury consumer goods before we go to external sources.

We should be looking for and exploiting the skills available in our people rather than looking toward the developed countries. Similarly, the ideas generated by our own people should be recognized, rather than the usual practice of employing foreign consultants who in fleeting visits interview our own people for ideas, document these, get paid, and then we accept the recommendations which were there in the first place. We should consciously avoid the practice of according value to our products and services, only because foreigners show appreciation for them. We should be careful in the selection of foreign technologies since these may be costly, remain largely underutilized because of their scale and complexity and difficulties in servicing, and may provide an undue external dependence. Instead, we should spend greater effort and money in improving on our own technologies and adapting where possible, foreign technologies to suit our needs. Of course, this would require regional coordination and cooperation.

We should be designing our shelter to take advantage of our natural assets of light and ventilation which are readily available, rather than putting in expensive lighting and air-conditioned facilities in building types that look as if they are designed for cities in temperate countries. Our production is geared toward satisfying foreign tastes, while at the same time, we are developing tastes for foreign goods such as wheat, apples, etc. which cannot be readily produced at home.

Similarly we depend on external sources for our supply of fish and fish products while at the same time these external sources exploit our own rich fishing banks to sell to us. When we need drugs we still depend on high priced imported drugs and discard our own folk medicine.

Fortunately, there is one area where we have asserted ourselves and this is music. Our calypsoes, steel-band music, cadence, and reggae are gaining international acceptance and admiration. This should be a source of inspiration to us since it demonstrates that the rest of the world will accept our goods and services if we have pride in them and market them.

I want to stress that I am not advocating complete self-sufficiency through the development of a siege economy. All I am saying is that we should look inwards first for ideas and resources and then look outwards from the large font of knowledge, but to use this font innovatively and adaptively to suit our peculiar environmental arrangements and circumstances. Our emphasis should be on production and productivity, at minimum overall--social, financial, and economic--costs. Our energies should be dissipated on surviving within and improving our environment rather than trying to effect a wholesale transplant of other environmental features and norms into our own. Posterity will not forgive us if we do otherwise.

In relation to the modern capital-intensive technologies widely in use today, our countries have small markets which are constrained by low per capita incomes and small absolute size of populations, which often make it difficult to achieve optimum levels of output in terms of economies of large-scale production. Hence, what is needed is access to regional and extraregional markets with reasonable prices. Thus, over and above the pursuit of integrationist strategies by the countries, it would be hoped that the region's external partners would assist by opening their markets for primary and manufacturing production. But, at the same time, it behooves national planners and public and private sector administrators to be aggressive and persistent in their search for external markets and to make full use of the limited access now available by providing consistently good quality goods in sufficient volume.

Large amounts of external financial resources will have to be mobilized to supplement our national and regional efforts to increase the existing capital stock and to improve the quality and quantity of skills in the countries. Such external resources

can only be obtained from two sources: by earning it from our visible and invisible exports and by not wasting what foreign exchange is earned on the conspicuous consumption of luxury goods by North American standards; and by making good use of external aid and by negotiating advantageous arrangements for foreign direct investment. Both have their costs. But in addition it will be necessary for the economy to mobilize savings to finance investments. To take an example, in 1977, for the ECCM countries and Belize, it was estimated that consumption was 97% of GDP and that while investment was 29% of GDP as much as 54% of this amount was financed from external sources.

In the countries of Antigua, Montserrat, St. Kitts-Nevis-Anguilla, and St. Vincent, consumption exceeded production and in the case of St. Vincent, the ratio was 128%. Only in St. Lucia, Montserrat, and Belize did investment exceed 30% of GDP. Further, only in Belize, Grenada, and St. Lucia did foreign investment represent less than 45% of total investment.

The scarcity of capital in a labor-surplus economy would suggest the need for the adoption of certain appropriate technologies reflecting those factor endowments. Unfortunately however, the pervasive influence of the "demonstration effect" of the power and efficiency of advanced technologies frustrate our planners in any effort to adapt to more appropriate technologies. Thus we know of poor countries refusing to build roads using labor-intensive methods while another refused the adoption of a more appropriate cheaper technology for sugar production. It is hoped that while every effort is made to mobilize investment resources in the meantime, the design of development projects should aim at making optimum use of available resources.

It has often been alleged that Caribbean labor is overpriced. What is meant is that wages are high as related to productivity. But labor productivity can only be increased by providing labor with complementary capital, efficient management, and increasing labor's competence. This latter can be achieved by increasing the level and orientation of training toward a technical/vocational bias and on training for self-employment. At this stage of development, and given our material aspirations, we can hardly afford the luxury of training for its own sake. One way of achieving this objective is to provide compensation on the basis of productivity and scarcity and to accord due pay, status, and recognition to essential skills, whether manual or intellectual.

Efficient management and technical expertise are two of the more critical areas of need in the Caribbean. At the same time education budgets, particularly for general secondary and university training, continue to dominate the overall expenditure budget of the countries. Moreover, any census will indicate that for any of the countries there would be greater proportion of its nationals with higher level training being productively employed overseas, than would be at home. This represents a significant capital transfer from developing countries to the developed world. Every effort should be made to attract back these skilled nationals, who would normally return with substantial savings, acquired technical and vocational skills and experience and also with a sufficient spirit of self-reliance as to embark on self-employment activities.

CONCLUSION

The people of the region must stop seeking to imitate the North American countries with the latter's very high physical quality

of life and set their own goals for meeting the basic needs of the masses in terms of basic human dignity. To achieve these more modest standards of life for the masses, the smaller countries of the region must seek to maximize the productivity of their human resources in terms of appropriate high-level and middle-level training--particularly the latter.

They must also raise standards of management, create a meaningful scheme of regional integration and seek and develop external markets for both primary and manufacturing production. They also need to attract relatively large amounts of external financial resources and make good use of them in ways which would strengthen and make more self-reliant the national and regional economies.

Finally, the search for more appropriate technologies which would absorb more labor relatively to capital and maximize the use of regional resources--including alternative sources of energy--must be intensified and pursued unrelentingly.

ENVIRONMENTAL EFFECTS OF UNCONTROLLED DEVELOPMENT POLICIES IN CARIBBEAN ISLANDS

Pedro A. Gelabert*

"Nature to be commanded, must be obeyed." With these wise words of Sir Francis Bacon, I intend to begin our discussion today related to the environmental effects of uncontrolled development policies.

The territorial lands of every nation have limited carrying capacities. The exact limits of these capacities are a matter for debate, but we must agree that there is definitely a limit in the resources of each country. Technology is just a mechanism for shifting from one resource to another, since it does not expand the actual resource base.

In the Caribbean islands, where we are pressed by limited territorial extensions, scarce natural resources, and dense population concentrations, our development policies are hindered by the delicate carrying capacities of our ecosystems. Therefore, we must pay greater attention to these limitations than our neighbors from North and South America who were blessed with a larger resource base. Otherwise, we are destined to suffer the consequences of irrational development policies.

An attempt is hereby made to illustrate, by means of a visual presentation, the environmental effects of uncontrolled policies. The great population density combined with the limitation of agricultural lands, poor distribution of fresh water supplies and scarce mineral resources, make the island of Puerto Rico an excellent locality to study the environmental impact caused by almost three decades of extraordinary economic growth. Based on the assumption that the results obtained in the large island of Puerto Rico can be transferred to the smaller Caribbean islands having similar ecological conditions, this brief account is presented to show the impact of unproperly controlled development upon the human environment of the smaller islands.

The coastal zone is an island's most critical natural resource. The smaller the island, the more critical the coastal zone becomes. This encircling strip of coastal lands and waters is very important because it is where most of the population concentrations are established, and where the demands for more land and resources are rapidly growing with the needs of the people. In the long run, the shore development will continue its gradual encirclement of the island. The types of developments will greatly influence the quality of the life in any Caribbean islands.

Progress in the Caribbean islands can be generally measured in terms of the amount of concrete poured for the construction of buildings, roads, bridges, schools, and recreational facilities. Concrete is a mixture of cement, crushed stone, and sand. The sand in a small island is easily obtained from its beaches, dunes, river channels, and back beach deposits. The extraction operations in the coastal areas usually create acute beach and soil erosions, and expensive real estate and agricultural lands are permanently lost to the advancing sea. Changes in the configuration of the coastline by the construction of shore development and protective structures worsen the erosion problems. Constantly impounding waves consume beautiful beaches, undermine seawalls, overturn houses, destroy roads, and erode cities.

As additional controls are applied by government to the extractive operation in the beach zone, they will tend to move inland to the river channels and back beach deposits. The extraction of sand from these deposits will generally create soil erosion and sedimentation problems. Ponds full of stagnant water are left on the coastal lands adjacent to the beach or the river channels, thus, eliminating more valuable agricultural lands or real estate properties.

The extraction of rocks to produce crushed stone leaves deep scars in the terrain and the crushing operations produce air pollution from the dust, and water

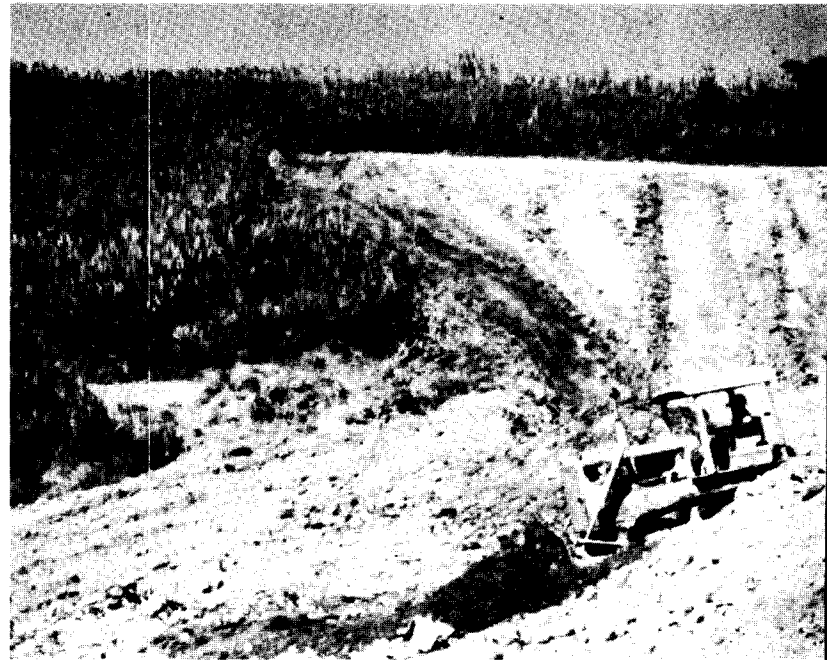
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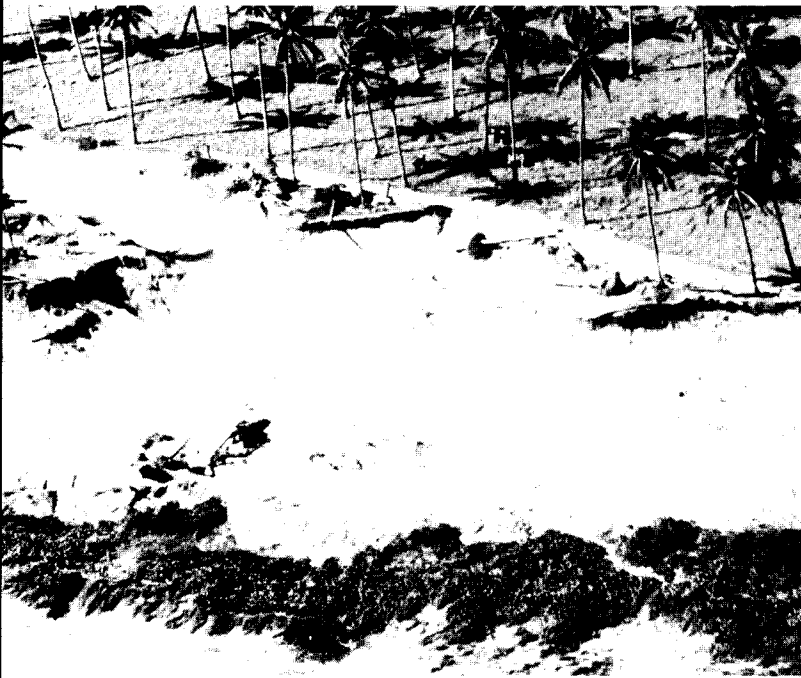
Highway networks are needed to connect the growing urban areas in the islands. Roadways are cut through the hills, embankments are built; where improperly designed, nature erodes them.



Steel sheet piling (above) has been used to protect real estate properties; but six months later (right), the waves have eliminated the beach and broken against the sheet pilings.



The city dump (above) causes pollution of the land and pollution of the water in San Juan, Puerto Rico; but sanitary landfills (right) can be developed such as this one in Cayey, Puerto Rico.



Sand is extracted from sand dunes (above) for construction purposes (north coast of Puerto Rico); one result: deep ponds (right) in a former beach area.

pollution from the waste waters. Of course, these problems can be solved by installing expensive pollution control equipment.

Earthwork to clear the land for development exposes the soil through the elimination of the vegetative covering and initiates severe cycles of soil erosion. Once the terrain has been prepared, a jungle of cement is usually planted with the construction of low cost residential projects. Massive single dwellings originate the urban sprawl which requires expensive infrastructure to provide the community's daily needs. The intensive use of the car becomes a necessity, along with traffic jams, noises, and air pollution. The car brings the development of the junkyard.

In order to stop the urban sprawl, high-rise buildings are constructed in the cities. The higher population densities bring forth a spectrum of social problems which push the middle- and high-income classes to the outskirts and enhances the city slums, simultaneously reducing the taxes paid to the city and generating budget deficiencies.

Garbage is concentrated in the cities and disposed of in the city dumps. If the garbage is not buried daily, rain falls over the wastes and the contaminated runoff pollutes nearby streams. It is also burned by scavengers who are looking for metals, paper, and other wastes. Open field burning causes air pollution of the downwind communities. The leaching of the garbage pollutes the ground waters. With the increase of toxic and hazardous substances, the pollution from improper landfill operations can cause critical health hazards in urban and rural areas.

Life away from the cities is still different with clusters of small houses with tin roofs. Thus, the people begin to flow back to the country life and commute to the nearby cities to work. Some return to the land and the old farm is reopened. Erosion problems are developed from the earthwork

necessary to construct unpaved roads and from poor agricultural practices. Soil erosion, sedimentation, and landsliding develop as the countryside is devoured by the expanding population.

The sugar cane harvest eliminates the vegetative covering and soil erosion develops even in the low flatlands. The cane is cut and taken to the sugar mills, where water is contaminated with high organic materials and discharged to the nearby streams, and where air pollution is generated from the dust emitted by the stack. Industrial development requires energy to run the machines. Energy is generally produced in the islands by burning fossil fuels to produce electric energy. The electric-generating facilities cause air pollution if the fuels have a high content of sulfur, and water pollution from the discharge of hot waters used for cooling purposes. The need for fossil fuels brings the petroleum refineries which also add to the air and water pollution, and the refinery brings the petrochemicals. Suddenly, a petrochemical complex has developed in a small island, and its economy becomes completely dependent on oil.

The risk of oil spills increases rapidly with the increment of crude petroleum imports and petroleum products exports. Oil spills can be caused by transfer operation in the port facilities, by ship accidents, or just by poor handling practices. Oil spills can adversely affect the beaches, mangroves, marine life and fishing, tourism, and recreational facilities along the shoreline. The harm to wildlife can be extensive, affecting all organisms from microscopic plankton to birds. With an increase in the commerce of toxic and hazardous substances, the risk of more devastating spills is growing at an accelerated rate in the Caribbean. Today any type of spill can occur along our coasts. A few years ago, a banana spill occurred on Mona Island which is located between Puerto Rico and the Dominican Republic.

TOWARDS A STRATEGY FOR THE MANAGEMENT OF LIVING NATURAL RESOURCES CRITICAL TO DEVELOPMENT IN THE LESSER ANTILLES

Allen D. Putney*

Abstract.--A preliminary regional strategy is being developed around the management requirements of selected area-, resource-, and species-specific priorities. These were determined by the analysis and synthesis of mapped environmental and socio-economic data of the region, and the field experience of the project consultants. The strategy provides the basis for the development of a systematic regional action program and specific project proposals.

INTRODUCTION

The title of this Conference, "Environmental Management and Economic Growth in the Smaller Caribbean Islands," is most appropriate. Besides providing a geographical reference, the title clearly identifies the two major variables which are at play in planning the development process. On the one hand, there is "environmental management" which must concern itself with the biophysical realities of natural ecosystems and their inherent capabilities and constraints. On the other hand, there is "economic growth" and social development which relate to human needs and aspirations, but which are conditioned by the possibilities afforded by socio-economic organizations and institutions. Sound development planning, or "ecodevelopment," must take full cognizance of, and effectively integrate, the variables of the natural and human systems. Planning which ignores major elements of either of these two very large systems is generally an exercise in futility.

The purpose of this paper is to present a project which is attempting to define a strategy for the management of living natural resources critical to development in the Lesser Antilles by integrating information on both natural ecosystems and human socio-economic systems. An exhibit has been prepared to graphically illustrate the

methods used and some of the information and conclusions being obtained.

BACKGROUND

Man's use of natural resources can be looked at in terms of three interdependent sectors; these are the urban sector, the rural sector, and the wildlands sector. Both the urban and rural sectors have received considerable attention in development planning, but the wildlands sector dominated by living natural resources, is usually ignored or credited with little importance. And yet, it is only in these areas that natural ecosystems can be maintained. Without them, the biophysical processes which are required for the survival of all living organisms, including man, will be severely altered, and the development process will be disrupted. This has already happened in many parts of the globe, most noticeably in areas overtaken by desertification, but it has also taken place in the Lesser Antilles. Many once productive areas are now essentially useless, species which supplied the livelihood for hunters and fishermen have been wiped out, and many areas which were once well-watered are now dry and barren. These are the most obvious cases, but what are the effects of multiple damages throughout an entire ecosystem? We can only guess at the answer.

On the positive side, well-managed living natural resources can contribute significantly to the development process. In Table 1, on the next page, an attempt has been made to enumerate the major components of sound development and to indicate the benefits that may be derived for each component by well-managed living resources.

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Table 1.--Major Contributions of Living Natural Resources to the Development Process

Requirements for a Sound Development Process	Major Contributions of Managed Natural Resources
● Provision of basic human needs.	-- Water, wild foods, forage, building materials, tourism attractions.
● Improvement of individual capacity.	-- Provision of sites for research, educational programs, environmental monitoring.
● Equitable distribution of benefits.	-- Protection of downstream investments, promotion of rural development.
● Sustainability over the long run.	-- Regulation of the environment, preservation of genetic resources, sites for definition of resource use alternatives, rational use of marginal lands.
● Lessening of dependence.	-- Maintenance of ecological diversity, conservation of resource potential, multiple use of local resources.
● Minimization of alienating influences.	-- Maintenance of representative ecosystems, protection of natural and cultural heritage, provision of recreational opportunities, maintenance of reference points and psychological supports, protection of scenic beauty.

Comparative studies of the Caribbean by Gajraj (1978), Putney (1978), and Ray (1979) have demonstrated that the living natural resources of the Lesser Antilles are under greater stress than anywhere else in the region. Population densities are high (from 72 persons per square mile in the British Virgin Islands to 568 persons per square mile in Barbados) compared to the continental countries of the region (Guatemala is the closest with 47 persons per square mile). Also, the resource endowments of the small islands are relatively poor compared to the continental areas. There are no hinterlands on the small islands and nowhere to go if mistakes are made in resource utilization. And yet, because of their small size, the islands usually do not have the human and financial resources to plan and implement sound resource management.

Given the above-mentioned problems, a joint program has been undertaken by the Caribbean Conservation Association and the School of Natural Resources of the University of Michigan. The program, entitled Eastern Caribbean Natural Area Management

Program (ECNAMP), is funded through grants from the Rockefeller Brothers Fund and the World Wildlife Fund. One of the first tasks has been to undertake the definition of a preliminary strategy for the management of living natural resources critical to development in the Lesser Antilles. It is hoped that a well-documented and systematic strategy will provide the basis for defining an action program that can be funded through bilateral or multilateral assistance sources.

DEFINITION OF A STRATEGY

The strategy discussed in this paper has as its central objective the management of man's use of the living natural resources of the Lesser Antilles, and their biophysical support systems, so that they yield the greatest sustainable benefit to local human populations while maintaining their potential to meet the requirements of future generations. It will provide the Caribbean Conservation Association with a basic element for placing the management of living natural resources on the offensive in the context of development within the Lesser Antilles.

Methods

The methods for deriving the strategy can be summarized in the following steps:

1. Gather, compile, and present basic data on both biophysical parameters of natural ecosystems and socio-economic parameters of human systems.
2. Verify and supplement the data in the field.
3. Analyze and synthesize the data.
4. Determine priorities by use of mapped data and field experience.
5. Prepare a preliminary regional strategy.

Once the preliminary strategy has been defined, it can be reviewed by CCA's membership and other interested bodies and revised as needed. Funding can then be sought for implementation. Through periodic monitoring of progress and evaluation, the strategy can be converted into a long-term action program.

Information Gathering and Mapping

Information was gathered and mapped for all of the Lesser Antilles except the U.S. Virgin Islands by three consultants who, in turn, contracted with local consultants on each island. The Principal Investigator covered the Netherlands Antilles, St. Kitts-Nevis, Montserrat, Dominica, and Barbados. Mr. Yves Renard of the Parc Naturel de Guadeloupe covered the islands of the French Antilles; Mr. Ivor Jackson, the Town and Country Planner for the British Virgin Islands, covered Barbuda, Antigua, St. Lucia, St. Vincent, the Grenadines, and Grenada; and Dr. Edward L. Towle, President of Island Resources Foundation on St. Thomas, covered Anguilla and the British Virgin Islands. Information on Aruba, Bonaire, and Curacao is being provided by the Caribbean Marine Research Institute (CARMABI) of Curacao.

The following data was sought for each island or island group:

● Environmental Data

1. Relief (topography, bathymetry, major roads, rivers, capital, location map inset).
2. Rainfall (average annual rainfall, rivers).
3. Land Use Capability (annual crops, pasture, forest crops,

wildlands, tourism, urban and suburban, industrial).

4. Coastal Currents (current direction).

● Habitat Data

5. Terrestrial Life Zones (mangrove, littoral woodland, cactus scrub, dry woodland, moist forest, rain forest, cloud forest).
6. Critical Marine Habitats (wetlands, salt ponds, sea grass beds, living reefs).

● Species Data

7. Endangered and Locally Important Species (game species, endangered species, seabird nesting sites, wading bird nesting and feeding areas, turtle nesting sites, migratory species, whales).

● Socio-Economic Data

8. Population Density (uninhabited, light, moderate, and dense).
9. Present Land Use (wildlands, forest crops, pasture, annual crops, urban and suburban, industrial, tourism, solid waste disposal).
10. Marine Resource Use (fisheries--conch, lobster, fin fish--sand mining, coral harvest, salt production, tourism--marinas anchorages, dive sites--cables and pipelines).
11. Transport (main roads, secondary roads, airports, harbors, ferry routes).
12. Natural Attractions (beaches, unique natural features--waterfalls, scenic areas, geothermal areas, mountain trails etc., reefs used for snorkeling and diving).
13. Cultural Attractions (archeological sites, historic sites, living cultures).
14. Pollution (domestic, industrial, petroleum infrastructure--tanker terminals, refineries, pipelines--seaborne pollution).

15. Key Watersheds (potable water, irrigation, hydroelectric).
- Legal Data
16. Land Ownership (public lands, private lands).
17. Parks and Protected Areas (present, proposed).

Some 90 percent of the information has now been collected and presented on draft maps. The greatest information gaps still remaining are for Saba, Barbuda, and the Grenadines. To date, final 8-1/2" x 11" acetate overlays have been prepared for Dominica and St. Vincent, but it is expected that the rest will follow in the next few months. Examples of these maps are presented in the exhibit.

Data Verification

All of the data which is being mapped has been or is being checked with knowledgeable people on each of the islands. It has been found that in most cases two and sometimes three map drafts must be made before the information is considered reliable.

Analysis and Synthesis of Data

Analysis of the data has taken place by the consultants through the use of the overlays. Using this together with their field knowledge, they have identified those areas, habitats, species, or resource combinations which seem to be of particular importance. Synthesis of data has taken place by comparing the information and analysis among the various islands. While the analysis is almost complete, synthesis of information is still being carried out through the preparation of maps at a regional scale and through meetings among the consultants.

Determine Priorities

The analysis and synthesis of information carried out under the previous step provides the background for determining priorities for the management of living natural resources critical to development. Selection of the priorities was guided by the following criteria:

1. Species, resources, or combinations of resources which are, or could be, of particular economic value if properly developed and managed.
2. Areas most important for maintain-

ing the biophysical processes critical to development. In general, for the Lesser Antilles these areas are considered to be the key watersheds, mangroves, living reefs, and sea grass beds.

3. Areas which provide relatively unaltered samples of the major terrestrial life zones and marine habitats which are representative of the Lesser Antilles.

4. Areas which provide habitat requirements for endangered or locally important species.

Guided by mapped data, these criteria, and their own field experience, the Project Consultants have identified the preliminary national and regional priorities indicated in Table 2, on pages 103 and 104. It should be emphasized, however, that the project is not yet completed and only preliminary results can be ventured based on still incomplete information. In addition, these priorities remain to be discussed with the country delegates attending the upcoming Annual General Meeting of the CCA.

After experimenting with a variety of alternatives, it has been found that the most satisfactory way of grouping priorities is under the headings of areas, resources, or resource compositions with apparently good economic potential and, endangered or locally important species. In line with criteria No. 3, Table 3 on page 105, shows a further selection of the best areas representative of the habitats of the Lesser Antilles. These areas could form the core of a regionally consistent system of parks and protected areas.

Prepare Preliminary Strategy

The adequate management of the areas, resources, and species noted as priority in Table 2 will require enormous effort and substantial human and financial resources. Some of the necessary inputs can be provided by each island, but many will have to be provided through regional and international assistance programs. It is necessary, therefore, to elaborate a strategy whereby the most efficient use is made of the limited inputs that are, or potentially could be available for the effort.

While priorities have been preliminarily established in terms of areas, resources, and species, lines of action cannot be determined until the process of managing living natural resources is broken down into its component parts. While management is a dynamic process with many feedback loops and simultaneous activities, for the purpose of this exercise,

Table 2.--Area-, Resource-, and Species-Specific Priorities

<u>Island</u>	<u>Areas</u>	<u>Economically Important Resources or Resource Compositions</u>	<u>Endangered or Important Species</u>
British Virgin Islands	HORSESHOE REEF BATHS-FALLEN JERUSALEM ANEGADA SALT PONDS Sandy Cay Virgin Gorda Peak Fat Hog Bay Pond North Sound	SALT PONDS SAILING REEFS Lobster Conch	Iguana
Anguilla	PRICKLY PEAR	SALT PONDS REEFS SAILBOAT RACES Cays Conch Lobster Fin Fish	Seabird Nesting
Sint Maarten	Molly Beday Pelican Cay Hen & Chicken Ile Tintamarre Baie Oriental	SEA GRASS BEDS Salt Ponds Fin Fish	
St. Barthelemy		Scenic Quality	Whale Mating Ground Iguana
Saba	Mt. Scenery	Scenic Quality	
Sint Eustatius	The Quill	Historic Sites	
St. Kitts	PANHANDLE AREA MT. MISERY BRIMSTONE HILL	Historic Sites	
Nevis	Nevis Peak	CONCH Lobster Historic Sites Fin Fish	
Montserrat	Gallaways Estate Fox Bay		
Barbuda	Codrington Lagoon Palaster Reef Dry Forest	Mangroves Lobster	FRIGATE BIRD NESTING SITE
Antigua	ENGLISH HARBOR Guana I. Long I., Parham Harbor Diamond Reef	Mangroves	
Martinique	S-E COAST N FROM MT. PELEE FORT DE FRANCE BAY Piton Carbet	REEFS MANGROVES SALT PONDS PETRIFIED FOREST Watersheds	

Table 2.--Area-, Resource-, and Species-Specific Priorities (Continued)

<u>Island</u>	<u>Area</u>	<u>Economically Important Resources or Resource Compositions</u>	<u>Endangered or Important Species</u>
Dominica	MORNE TROIS PITONS CABRITS LAYOU GORGE N-E COAST Morne Diablotin Scott's Head	NATURE TOURISM Watersheds	JACQUOT PARROT SISSEROU PARROT Agouti Manicou
Guadeloupe	CENTRAL MOUNTAIN AREA GRAND CUL-DE-SAC MARIN N-E Coast Grand Terre Desirade Western Marie Galante	Fin Fish Central Mountain Watershed Nature Tourims	Agouti
St. Lucia	PITONS Mt. Gimie Savanne Bay Complex Dennery Knob Roseau & Cul-de-Sac Watersheds		ST. LUCIA PARROT Sempler's Warbler Iguana Ground Lizard
St. Vincent (incl. Grenadines)	TOBAGO KEYS Dalaway Stream 24 Diamond Est. Sand Dunes Pigeon Island	NATURE TOURISM SAILING Conch Lobster	ST. VINCENT PARROT
Barbados	West Coast Marine Park N-E Seashore Turner Hall Wood Greame Hall Swamp	CAVES	
Grenada (incl. Grenadines)	Grand Etang Levera Pond Chemin Watershed/ Calavigny Bay	Conch Lobster Hawksbill Turtles	Scarlet Ibises

Table 3.--Best Areas for Representation of Major Habitats

	<u>Area</u>	<u>Island</u>
<u>Terrestrial Life Zones</u>		
Mangrove	Cul-de-Sac Marin Fort-de-France Bay Codrington Lagoon	Guadeloupe Martinique Barbuda
Littoral woodland	N-E Coast Panhandle Area	Dominica St. Kitts
Cactus scrub	Lowlands Panhandle Area Prickly Pear Cay	Barbuda St. Kitts Anguilla
Dry woodland	Highlands N Grand Terre Cabrits	Barbuda Guadeloupe Dominica
Moist forest	Central Mountains N of Mt. Pelee Mt. Misery	Guadeloupe Martinique St. Kitts
Rain forest	Central Mountains Morne Diablotin Morne Trois Pitons Morne Diablotin	Guadeloupe Dominica Guadeloupe Dominica
<u>Critical Marine Habitats</u>		
Wetlands	Grand Cul-de-Sac Marin Fort-de-France Bay Codrington Lagoon	Guadeloupe Martinique Barbuda
Salt ponds	Anegada Anguilla St. Martin S-E Coast Panhandle Area	British Virgin Islands Anguilla St. Martin Martinique St. Kitts
Seagrass beds	St. Martin Platform Barbuda Platform East Coast	St. Martin Barbuda Antigua
Living reefs	Prickly Pear-Shoal Bay Horseshoe Reef, Anegada Tobago Keys, Grenadines S-E Coast Grand Cul-de-Sac Marin	Anguilla British Virgin Islands St. Vincent Martinique Guadeloupe

the process can be broken down into the following components:

- Law and Policy
- Land Acquisition
- Institutional Infrastructure
- Personnel Training
- Management Planning
- Public Education and Participation
- Research and Monitoring
- Resource Protection
- Resource Utilization
- Field Operations and Maintenance

All of these components must work together if effective management is to take place. This is not to say that the management process must be complicated or difficult. On the contrary, management which is simple and logical is usually the most effective. It does mean, however, that attention must be focused on all components of the process and each must be properly addressed.

Based on the foregoing, it is suggested that the following list of options be pursued:

1. Highest priority should be accorded to pilot projects which would demonstrate the development and management of resources of particular economic potential and which would confer major benefits on local people. These would include integrated tourism, artisanal fisheries, conch mariculture and management, lobster management and cottage forest industries. Of course, the biophysical support systems for these activities must be included in management.

2. Highest priority in terms of areas should be accorded those which would contribute to a regionally coherent system of parks and protected areas as indicated in Table 3. High priority should also be placed on areas that are important for the maintenance of biophysical processes critical to development.

3. Priority in terms of species should be conferred first on those considered to be endangered, and secondly on those with significant economic value.

4. All aspects of the management process should be attended to and included in assistance programs. Where local human or financial resources are insufficient, regional and international resources should be tapped. However, in terms of human resources, highest priority should be placed on sharing resources in the region.

5. Because of its impact on other components of the management process, personnel

training should receive high priority and be considered a key element of the strategy. However, training should not be undertaken in isolation from the rest of management process.

6. Regional and international cooperation should, where possible, be arranged through nongovernmental organizations, such as the Caribbean Conservation Association, so that bureaucratic requirements can be kept to a minimum. However, governments should, at all times, be kept informed.

7. All activities should be coordinated with other nongovernmental or intergovernmental organizations such as the UNEP/ECLA/Caribbean Environmental Project, IOCARIBE, WECAF, MAB Program of UNESCO, universities and research laboratories of the region, Island Resources Foundation, Environmental Research Projects, Peace Corps, and others.

8. Monitoring and evaluation should be built into all activities so that learning and improvement can take place.

These general lines of strategy should form the guidelines for the definition of an action program.

REGIONAL PROGRAM CONCEPT

Although the action program or programs that are derived from the strategy must be tailored to suit the requirements of the organization(s) providing the assistance, it is suggested that assistance be structured around three basic projects.

The first project would center on information gathering and processing and would further the work initiated by this project. A data file on biophysical and socio-economic systems would be established, maintained, and updated. Appropriate data would be mapped for analysis and synthesis. Verification of data in the field would take place for important areas and resources.

The second project would center on the dissemination of information. This would be pursued through the training of personnel by counterpart activities, graduate research, scholarships, workshops, professional networks and newsletters. Environmental education activities for schools and the general public would be undertaken as would seminars for decisionmakers. Museums could also be developed for public education and the establishment and maintenance of national collections.

The third project would center on resource development and would certainly be

the largest in terms of the inputs required. Support for the various components of the management process would make it necessary to work simultaneously on several fronts. Legislation and policy appropriate to local conditions would have to be developed. Support would need to be provided for planning the management of key areas, resources, or species. The establishment, staffing, and equipping of a local institutional infrastructure would need to be undertaken. Most important, assistance would need to be supplied to develop the sustained utilization of key resources through artisanal fisheries, mariculture, integrated tourism, cottage forest industries, development of park facilities and historic sites, and management of precious corals, recreational boating, and the exclusive economic zones of maritime jurisdictions.

CONCLUSION

The characteristic that sets the management of living natural resources apart

from others is that when they are gone, they are usually gone forever, at least within the perspective of human timespans. It is this absoluteness that makes the management of these resources so urgent and so important to mankind over the long run.

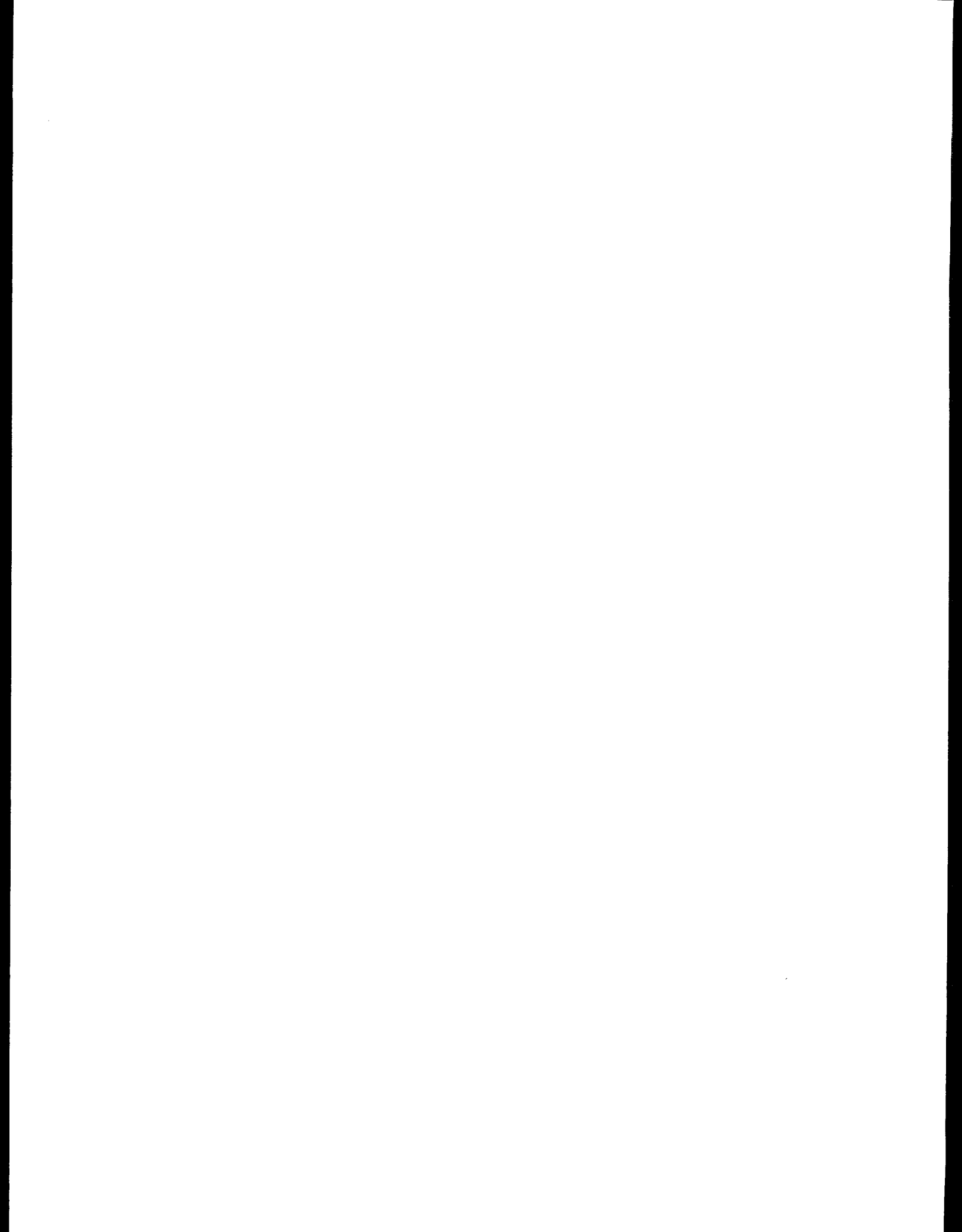
LITERATURE CITED

- Gajraj, A.M. Background Information on the Wider Caribbean Area. Draft of the Joint UNEP/ECLA/Caribbean Environmental Project. Mimeo, 80 pp. 1978.
- Putney, Allen D. A Strategy for Marine Conservation in the Wider Caribbean. Report for IUCN Project No. 1462. 184 pp. 1978.
- Ray, G. Carleton and M. Geraldine McCormick-Ray. Planning a Marine Conservation Strategy for the Caribbean Region. Report for IUCN Project No. 1037. 27 pp. 1979.

TABLE OF CONTENTS

Session IV

	Page
SUMMARY OF SESSION IV, Trevor Louis Boothe	109
LIST OF PROJECTS AND AREAS OF INTEREST AND CONCERN PUT FORWARD BY THE DELEGATES, Attachment	127



SUMMARY OF SESSION IV

Trevor Louis Boothe

A panel discussion was held involving the Chairmen of Sessions I, II, and III, in which the principal elements to emerge during the Sessions were reviewed and discussed. The following points were made during the discussion:

- Need for strategies of development which take account of the special situation of the island as a fragile ecosystem with a very limited absorptive capacity for environmental degradation.
- Physical planners in the region have not embraced environmental management; this was seen as a function of their training and orientation.
 - a. Lack of information on the environment, lack of baseline data, as well as programs to gather that information. Planners need baseline data information as a basis for preparing plans.
 - b. Physical planners must take the environment into consideration; environmental impact statements should be prepared.
 - c. Planning units traditionally have been institutionalized within financial departments, giving these units a financial or economic bias; question of translating the planner's submission with a management perspective; need of sophisticated technology, but lacking financial or technical resources; take Westernized sophisticated technology and localize them within the limits of our resource bases.
 - d. Need, in the short run, to improve the decisionmaking process; in the long run, aim for baseline data acquisition.
 - e. Should not underestimate the difficulties planners face when making decisions about projects.
 - f. Provision must be made for management system in planning; management expertise must be consulted.
- Question of constraints: size of island, water, exponential growth of population, etc.
 - a. In the long run, nothing was a constraint in an absolute sense; need for development options and strategies.
 - b. The distinction between a constraint or a load on that particular ecosystem; use the scientific and technological resources that you have; constraints should be linked with basic needs.
 - c. Need to set a frame of reference before dealing with constraints and limitations; realities of external expectations, question of whether Caribbean environmental problems require Western technology--does this perpetrate a dependent relationship.
 - d. An additional constraint is the problem of money and budget; need for coordination between planning unit and budget department.

- Do the Caribbean environmental problems require Western technology?
 - a. Recent attention has come from without rather than within; question of strategy.
 - b. Technology should be something you choose; hard to define Eastern, Western, or Caribbean technology.
 - c. Problem of adapting technology to Caribbean situation.

Following the panel discussion, the Chairman invited the Conference participants to make informative statements, highlighting the problems and needs within their respective countries, as well as to make prescriptive suggestions as to ways in which these problems might be tackled. The following suggestions emerged:

DELEGATES' STATEMENTS AND DISCUSSION

MONTSERRAT

Cynthia Ryan - Assistant Secretary in the Ministry of Agriculture, Trade and Housing

As Assistant Secretary, I work very closely with the Permanent Secretary who works in turn, very closely with the Minister of Agriculture. Our Minister of Agriculture is particularly interested in conservation. Although we have not yet, really, taken into account environmental management in our development plan, I think that with this interest, and as a member of the CCA, the Government of Montserrat will pursue areas of environmental control that the Government thinks will be of benefit, or that the people require. I cannot pinpoint any particular area right now; that, I need to think about. I mentioned that the Minister's particularly interested, and perhaps he would be the best person to bring forward the most important needs as he sees them, which would reflect those of his constituents, the people we represent.

Gerard Cassell - Permanent Secretary (Special Duties), Chief Minister's Office

As everyone knows, Montserrat is a very small island, and it has a lot of constraints including smallness of size, lack of sufficiently trained manpower, financial problems. We are planning our development strategy, taking into account all of our constraints. And I feel to a certain extent some of these constraints can be used to our advantage. Of course, we are willing to draw on the experience of the other Caribbean islands as well as the outside world. As my colleague said, we have not yet done too much in the area of environmental management. We have a Development Control Authority, which looks into physical planning. But, to date, our efforts have been confined to land-use as well as to building structures; and to the monitoring of decisions taken by the Developmental Control Authority. As I mentioned yesterday, we're having some problems in monitoring, that is, seeing that what the physical planners say is what is carried out. This situation is, to a large extent, due to a lack of information on the part of the public really. For instance, they may not understand why a house should not be put on good agricultural land. But hopefully, we should be able to overcome this problem in the near future.

NETHERLANDS ANTILLES

Ivan Calmes - Economist, Curacao Department for Industrialization and Development

Our Department is mainly reviewing economic problems. We are focusing on Curacao. It would have been good if we could have brought (to the present Conference) someone from the Environmental Management Department. The best thing I can do now is to take home the information I get on environmental manage-

ment. We can now get in contact with Mr. Allen Putney of the Eastern Caribbean Natural Area Management Program to use the information he has.

Now we are facing a lot of economic problems. The main problems at this moment we can say are two: unemployment, and balance of payments. Those are, of course, related to one another.

My Department, part of the work of my Department, is to look for the best way of using the aid we get from the Netherlands. Also our Department is doing prefeasibility studies for industries or enterprises, which intend to start some industry on our islands. Now the last five years, the tendency in the Netherlands Antilles has been to decentralize a lot of work done by government institutions, especially because the second largest island of Antilles, Aruba, feels it needs more recognition by the central government. So there's a tendency to decentralize a lot of work done in the government. This brings some of the government work closer to the public.

TREVOR BOOTHE: I wonder if you would care to say anything about the problems of soil erosion. Of course, this is quite a common problem in this region. I know from my own experience in Curacao it is quite a serious problem--soil erosion, pollution, solid waste disposal. I wonder if you care to comment on some of these problems, and if there are any sort of prescriptive suggestions that you might care to advance.

CALMES: Let us start with soil erosion. Some 200 to 300 years ago, when a lot of trees were removed for raw materials that the Dutch could use, this has resulted in a lot of erosion. Also, erosion is partly due to the oil refineries, which have extracted a lot of oil from the soil.

One other thing is that now in Curacao--let me explain it this way--the other islands of the Caribbean, the eastern islands, there is more rain; they are a lot greener, there is more vegetation. But our islands are drier, they have less rain. So a lot of farmers, the men who have goats and sheep, just let them walk around and they eat the vegetation. This makes more soil erosion. When it rains, sometimes it rains very hard, like here on Monday; a lot of the soil washes away to the sea. We suggest that dams be made to hold back the water. Also the problem of the goats: try to show the people how to restrain the animals inside a fence.

About pollution: the main pollution is caused by the oil refineries. The refinery of Shell in Curacao is built just in the middle of the island. And the trade winds blow the smoke of the oil refinery over that part of the island; there are many problems with this pollution. There's not too much going on to bring a solution. Shell's saying they've made tests to minimize the pollution, but I can say that that part of the island is not pleasant to live in. If you go there, you will see that the people who live there are the poorest of people, and they can hardly move to another part of the island.

About solid waste, I can't say much because I don't know much about the problem. But some of the waste is thrown to sea but you can find a lot of this waste again on the beach.

TREVOR BOOTHE: I just observe, that regarding your comments about the oil refinery being located where it is, in the center of the capital, virtually. It is my understanding that at the time that refinery was to be constructed, there were two alternative sites being examined: the one in which the refinery presently stands as well as a site somewhat out of the center of town. That time, of course, feasibility studies, environmental feasibility studies for development projects were not customary. In fact, had such a study been made, the site chosen would possibly have been located such that the air currents, would have carried the emissions from the refinery right out of the way, out to sea with very little effect on the population. So I think, I merely give this by way of illustration, of the importance of feasibility studies. Unfortunately, the refinery went in at a period, in an epoch, when environmental feasibility studies for development projects was not a norm.

ALLEN PUTNEY: I think it's interesting the work that you mentioned that's being done in Curacao to work on pollution contingency plans, and that sort of thing. It might be very helpful to some of the other islands that are dealing with these same problems to know that the Caribbean Marine Research Institute in Curacao has done probably some of this pioneering work on the present effect of oil on coral reefs. For instance, the delegates from St. Lucia might be interested to know that there is some good information that has been developed in Curacao on that, which would be very helpful.

BAHAMAS

Edwin Strachan - Acting Director of Environmental Health Services

The functions of my Department relate to management and control of the environment, and conservation of the environment. My Minister recognizes that environmental health is fundamental to the development of a nation and that it influences the function of adults on the job and at home; and particularly the child, whose relatively limited perception could result in a high risk of exposure to environmental health hazards. A safe environment has a profound physical and social effect on a people of a country, particularly the poor. My Minister also recognizes the necessity for a well-defined environmental health strategy, which cannot be over-emphasized in a country with a dynamic tourist industry such as the Bahamas.

• Some of the problems we encounter in the Bahamas are in the areas of environmental management--solid wastes, particularly solid waste collection and disposal. We have a unique situation in the Bahamas: we are scattered over about 700 islands and 2,000 keys. But only 29 of these islands are inhabited and this means the duplication of facilities on each of these islands to monitor environmental factors. My Minister is particularly concerned in these areas, and there are plans where we have embarked upon a reorganization of the Environmental Health Department with the hope that we can get qualified more people, personnel that we can position among the various islands. This is even more important now that large concerns, building industries are based on the islands.

We also have the potential problem of oil pollution, in that we have one of the largest refineries on the islands on Grand Bahamas. So we have very large tankers moving through our waters. So far, we haven't had any disasters. We do suffer a lot with the oil slicks from some of the tankers, from their ballast water that they dump into the ocean during their passage. These oil slicks end up on some of our beaches in the form of tar balls.

We have plans to diversify into light industry, and this is creating needs for qualified personnel to be able to monitor these industries.

Again in Freeport, we have a cement factory, which is a problem area, and a chemical factory; and these areas coupled with the need for personnel training and industrial health are some of the areas that we are looking into with most concern.

TREVOR BOOTHE: Mr. Strachan, thank you very much for that very useful statement on your responsibilities within the system, and the sort of problems that do confront the Bahamas at this time. I wonder if you had any thoughts that you felt you could share with us on the nature of prescriptive suggestions for arresting some of these problems. I was particularly interested in your reference to the danger of oil spills and the movement of oil tankers through your waters. We at CEP have become, over the last year or two, very conscious of the incredible movement of oil that, in fact, is taking place through the Caribbean waters. It does pose a very real and a very present danger. We have just recently, of course, had an oil spill off Tobago. I wonder if in that matter or another, you have any suggestions that you might wish to advance for consideration, and which could enter into the list that we are putting together.

STRACHAN: The only prescriptive thought I would like to point out or interject is that we in the Bahamas, at the moment, are considering a sort of well-defined oil spill contingency plan.

BRITISH VIRGIN ISLANDS

Ivor Jackson - Town and Country Planner, Government of the British Virgin Islands

The British Virgin Islands is mainly interested, at this point, in furthering the development of the tourism industry, which is mostly marine based, be it boat chartering, scuba diving, sport fishing, etc. Some of the problems that I think we face in the British Virgin Islands are directly related to the types of uses that are generated by the emphasis on development of tourism. As a result, we have coastal development problems in hotels, marinas in areas, etc., which generate problems of destruction of coastal habitats: mangroves, wetlands, and also on beaches from sand extraction.

We also have water-quality problems resulting from solid waste disposal, sanitary waste disposal, sediments, trenching, and land reformation. And we have problems in other marine uses, including coral harvesting, overfishing of important commercial stocks like lobsters, conch. We have navigation and safety problems, and perhaps soon we could face problems in oil exploration; and after that, perhaps, problems in digging for oil or oil extraction; and we also have erosion problems stemming from construction of roads and buildings, from steep slopes, and also from past practices and clearances for agriculture and wood fuel.

Of course, there are the institutional problems for dealing with the implementation of programs concerned with critical problems.

One of the things that I think is of interest is that some of the problems faced by the British Virgin Islands, and other islands as well, are problems that can be dealt with locally by better administration and better diligence, for example, sand extraction from beaches. And it's also important to know that in a number of islands, including the BVI, that there are a number of beaches which are by law off-limits to sand extraction; but there are still sand-extraction practices being carried on. And this is something the governments themselves could deal with on local levels. But on the other hand, there are problems that are major and that will need regional assistance or external assistance and cooperation. And of course, there is the problem of finances. How do you find the money to help deal with some of the problems that you face?

TREVOR BOOTHE: Thank you, Ivor. I wonder, given the emphasis which you placed at the outset of your statement on tourism, whether you feel that the need might exist, and I think in fact this point was stressed when it came up in our earlier discussion, for some means of assessing the environmental impact of tourism development projects that are taking place in the region. Let us bear in mind that the islands are basically, I think we all agree, fragile with limited absorptive capacities. The question therefore arises: What is the absorptive capacity of an island to bear, to support, the effects of both the construction and the physical plant of tourist facilities plus the use of the resources by the tourists who visit the islands without, in fact, their eventually destroying the very resource that in itself constitutes the attractions? If you take a small island, I won't name any, but I think that there's one that comes very quickly to mind that might have a very famous reef off it--what is the absorptive capacity of that island and its adjacent reef, which constitutes the major attraction, to bear, to support, to endure the effects of its use without destroying, degrading, the very resource? Is there not perhaps a need for very careful attention to be paid to this? Also, while moving, as the BVI is, toward the exploration for oil, hand-in-hand with the emphasis on tourism? From my own perspective, I see no reason why the two things should not go forward together; but very, very, very careful planning and environmental management seem to be called for to insure that the island's people can benefit to the maximum extent possible from both of these resources, these valuable resources. Could I have your views on this?

JACKSON: I think it's very important that we try to assess the carrying capacities of the islands. But I admit, I feel it's a very difficult thing to

do. I mentioned this yesterday, in the case of Barbados, with a population of about a half million and a land area similar to that of Antigua; and yet Barbados seems to be doing very well, from my estimation. I don't know about the particular problems of Barbados in trying to deal with population pressures and resources. I know Antigua has only a population of about 70,000, and I think we've been trying to deal with the problems of constraints in this Conference; we have been able to define constraints and identify specific problems.

On the other hand, I think that on islands where there's not a very serious unemployment problem like the British Virgin Islands, for example, you can get more public sentiment, and better public sentiment on environment issues because the politicians are not so much pressed into making decisions based on the need to supply jobs. In fact, the British Virgin Islands is now importing labor from the eastern Caribbean islands. But in countries like Antigua, St. Lucia, Grenada, and in other countries where you have unemployment problems--somebody said up to 50% or 40%--I think that trying to develop sentiments for environmental action is becoming a bit more difficult because the creation of 100 jobs is very significant to small islands. In the British Virgin Islands we have been dealing not, in a general sense, with the carrying capacity of the territory, but with the compatibility of a development proposal with the environment. We have been doing that because of a lack of resources, manpower, that sort of thing. And where, internally, we don't have the capacities or the talent to assess major foreseeable problems, we have asked for assistance in St. Thomas, from the Island Resources Foundation, and other people within the region. I think that the "carrying capacity" assessment suggested is a sound, sound suggestion and hopefully one that could be elaborated upon at this point. Perhaps you could set up the mechanism for getting that done.

ST. KITTS/NEVIS/ANGUILLA

Kenneth Martin - Acting Chief Agricultural Officer

Those of you who come into St. Kitts must observe that with our 150 square miles of area and some 45,000 people, we have to be very careful how we plan our strategies because of the constraints on our land use. And so, in fact, we have inherited a sound sugar industry from the planters. It had its ups and downs in the late sixties and the seventies, and the government has now acquired the sugar industry, both field and factory side of it. We are at the moment using somewhere between 9.5 to 10 thousand acres with a possible target of 12 thousand acres, hopefully producing between 40,000 and 50,000 tons of sugar.

We are also giving active attention to the diversification program. We have identified peanuts as the most profitable thing at the moment. We find a ready market in the CARICOM areas, particularly on Barbados. And last year we had an acreage of some 150 acres. We consider that to be very heartening, indeed.

We are also moving into the area of tree cropping because we suffer very badly from lack of certain types of fresh fruits, particularly citrus. We have an abundance of mangoes and other soft fruits, but we have to wait eternally on the boats from Dominica, which may not come in again; so we are moving very rapidly into the area of tree cropping. We have already put down some 40 acres, in some sheltered places, of citrus and of mangoes as well.

In the general food production area, we are not too badly off in root cropping, but we are woefully lacking in the so-called finer vegetables, and so we are devoting a lot of energies to this sector, particularly to offset this business of what they call import substitution. We have to buy too much from such places as Miami, Puerto Rico, and as far as California, which is not a good thing indeed.

In livestock development, we are planning on a new strategy, and thank heavens the energy crisis has forced us into this! We are giving attention to using the molasses-urea mix feed for beef and milk production. We have EDF

people actively associated in this, and also some regional agencies looking very actively in this direction.

In the area of fisheries, we are not too happy about that. Our fishermen are mainly in-shore people. The CFTC have sent us a man, and we are instructing our fishermen into coming into cooperative groups so that we can launch out into more meaningful deep-sea fishing.

In the area of poultry production, we are seasonally self-sufficient in egg production; around the Christmas season when the demand goes up, the Supply Office would issue permits for people to bring in eggs from abroad. But we are very much down in broiler production mainly because of the constraints of imported feed and so on. We have some of our local people attempting to look at the situation. We have the Planning Unit, of which my friend Victor (Williams) is a part, looking into propositions to solve that problem.

Our problems, like most of the small islands, are numerous. We have problems of manpower, problems of aliens, problems of pollution, a very great problem of soil erosion, which was heightened with the passage of Hurricanes David and Frederick. The old people over 75 years have said that they have never seen so much soil moving into the harbors of Basseterre and Charlestown. As a matter of fact, we have to address ourselves very urgently to that problem.

We are well served by a number of regional agencies such as CARDI: the Caribbean Agriculture Research Development Institute. As I said, EDF is with us, the University (of West Indies) is also with us, CFTC; the British Development Division has always been with us; and we are very happy for the inputs that these regional development institutions are, in fact, making to our agricultural system.

The question of manpower and training is one which is giving us some problems. Our young people keep coming and going. We are so very close to the U.S. Virgin Islands that the attractions there, that you find a better dollar there, give us this in-and-out problem, which will plague us for some time, we feel.

The farming population, we are not serving them too well. They said our extension services are very weak. We now have people in training; we hope to fill in that gap in about five to seven years' time.

In the animal health program, though, we are not too badly off because we had our minds on the Caribbean food plan, which is still in mothballs; and we have been training our animal health assistants and livestock development people, and we think we have a good nucleus on which we can revolve.

That I believe, Mr. Chairman, in a nutshell is what I can say on the agricultural sector. My colleague, Victor, can fill you in on planning and environmental matters.

Victor Williams - Assistant Physical Planning Officer

I'm Victor Williams, Physical Planning Officer in the Planning Unit, and I'm attached to the Caribbean Development Corporation Planning Committee and State Building Boards. Unfortunately, there's just the three of us in this field, and so a lot of responsibility is thrown on our young shoulders. So I do have to think quite a bit about planning. But before I deal with St. Kitts in particular, I feel I must first address this matter on a regional basis. As may come out of the suggestions from the various delegates, there may be some matters that should be dealt with regionally.

Now I was looking at the presentation from Mr. (Allen) Putney and I was very impressed with it. I feel that this is the kind of approach we should apply, especially seeing that we're starting from scratch--in terms of the data-collection emphasis and the possible uses of this kind of information.

Now still on the regional scene, as was mentioned before, and I'll men-

tion it again because I feel very strongly about this: "the pool of specialists." One could ask exactly what such a pool would include. Now I don't have all the answers for this matter, in terms of the environmental issues. I think it would be necessary to have available to us, the people from the small islands, the assistance of foreign economists or economic planners, and environmental specialists and engineer-planners, for example, general physical planners, and on and on.

Now I don't think it would be necessary for any one of these experts to be stationed in any one island because, frankly speaking, in a small island, there just isn't enough work for them. These people, I feel, should be available to us whenever, probably, land problems come about.

Now the important issue I should like to raise, which has been raised before, is the problem of training, which is unfortunately lacking in many of the islands. Seeing that there is this great need for trained local people, maybe we should set up a two-year training program for local people; and after that first period, probably another program for another two years. But in the interim, we still need some sort of expert assistance. This is where the pool of specialists could come in. Dealing with such a pool of specialists, I don't think these people should just come in and we throw everything in their laps. They should work with us, work out some recommendations and present them. I think it is necessary because of the background local people have, and the local people should work along with the specialists, and come up with joint recommendations, which I think would be more effective.

On the local level, dealing with the local permits, I think there must be some sort of communication among the smaller islands. I think I've mentioned this before.

Another thing, sometimes local people don't know what material is available on environmental issues. There must be some sort of a media that would know what is available, and we could draw from such a source.

These ideas could be improved upon, but it's the way I look at the problems on a regional level.

Now with regard to St. Kitts, we have identified certain areas which we consider priority areas; and as Ken Martin has mentioned, forestation is one area that is of great importance to us. He mentioned soil conservation, along the guts primarily, chiefly because this is where we get most of the problems.

We also identified some 400 acres, which constitute the southern peninsula of St. Kitts as having possibilities for a nature reserve with limited tourism activity. We also identified the need for investigating internal protection and wildlife protection. It may be necessary for us to look into mariculture not only for its environmental elements but also the economic values.

We could go on and on, but basically, I think, these are the priority areas. We could ask ourselves where does the local planner come in. Having identified these projects, and gathered basic information, I guess we could again call on the specialists, who would come in and work with us and present a report. Here, maybe, is where the funding agencies would be able to assist us. It would mean setting up some organization to carry out the implementation; we should also consider legislation for bringing about these projects.

TREVOR BOOTHE: Let me thank you for your thoughtful and useful statement. It might be useful to mention here that CARICOM and PAHO, the Pan American Health Organization, in cooperation with the UNEP/ECLA/Caribbean Environment Project, and others, have been working for some time on the development of a health strategy for the Caribbean. And that health strategy, in fact, was adopted at the last meeting of the Caribbean health ministers a month or two ago. One of the things that has come out of that strategy is the recommendation for the establishment of an environmental institute for the eastern Caribbean, which would not be limited just to matters of health but would look, in fact,

to environmental questions in very broad context. I mention that here because your thoughtful intervention has raised a number of issues that seem to me to run parallel in many ways to some of the thinking that I know exists at this time regarding the role and function of such an institution for serving the needs of the governments in the Caribbean area.

ST. LUCIA

Micheline Crichlow - Sociologist, Central Planning Unit

Before I really begin to make any kind of contribution by way of direct reference to St. Lucia's experience, one suggestion on the board (see page 127), I think, needs some kind of amendment. The research on the physical environment, if I remember correctly, also had attached to it research on social factors, which may impinge on the whole or which generate environmental problems.

Now I'm Micheline Crichlow and I work in the Central Planning Unit, which falls under the Ministry of Finance and Planning, which is in the Prime Minister's Office. I am called an Environmental Planning Officer, in brackets "sociology," because we have environmental officers who deal directly with physical problems, who sit on, what is called "a Development Control Authority," which handles plans--residential, commercial, or whatever the case may be.

It's quite important that, given the specific nature of the Conference, the specific subject area, that somebody with more detailed information or somebody who has been informed on environmental matters, should be present here.

The Central Planning Unit in St. Lucia, I'll just give you now a brief rundown on the whole role and function of the Central Planning Unit, in fact, the term Central Planning Unit may be, in fact, a misnomer because there's really no serious centralized planning in St. Lucia for obvious reasons. I say obvious reasons; I'm thinking of the discussion we had which was sparked off by Miss Miller's contribution and later exchange of information from the respective delegates.

The pattern of economic development, which I think one must take into consideration at all times when you talk about environment and our physical problems, is that the pattern of economic development has been more or less based on the whole loose concept of economic development, industrialization by invitation. One of the major constraints of small islands within the whole framework of economic development has been dealing with multinational corporations. I think, perhaps, if we divide the problems which are manifestations of environmental abuse into three sections--those which derive from natural disasters, or natural occurrences, winds, sun, etc.; those which are a result of social factors, inability to find land, inability to find alternative sources of construction materials and therefore constant use of sand, a scarce resource; and those which are a direct result of external, and I would not like to use the term intervention because it seems to suggest that there's no internal acceptance of this external intervention, but infusing, acceptance of multinational corporations. If we use those categories, perhaps we would be able to analyze the problems, environmental and physical problems.

Now the situation has been in St. Lucia that the Central Planning Unit never was an initiator of projects as such but would get the projects from, be approached by various ministerial departments, to examine projects and give their views on them. Sometimes the views are carried; sometimes they're not. It's important to know though that major projects, which come from the outside, like Hess Oil Refinery, the Rodney Bay Development and such projects, hotel buildings--fall directly within the sphere of quality assurance. By that I mean, any representative of these organizations that come into the country have to approach the Prime Minister. Now one of the major problems faced by small countries is the question of unemployment. Therefore, one of the major conditions for acceptance of these institutions has to do with how many people they're going to employ in the immediate run, not even on a long term basis, but votes are important. They should be for any political directorate, one can't really blame them for that.

But again, acceptance of any industry from outside creates social problems and environmental problems as well, which the Central Planning Unit and the politicians themselves cannot deal with for specific reasons. And those reasons have to do with the insufficiency of people trained in project appraisals. I think in our discussion yesterday, it was mentioned by one participant that those people who come in with package deals are very well trained in promotional techniques, and therefore the small islands are at a disadvantage in really assessing and examining and scrutinizing the projects that are for the mutual benefit, as we are told anyway by the investor, for the investor, and for the country itself. Now in the case of Hess, for example, one of the conditions for Hess' entry into St. Lucia was that all the parliamentarians had to vote en bloc in opposition to or in favor of the proposition.

Now without any serious analysis of the effects, perhaps of the constant transportation of oil tankers across the waters of St. Lucia, a country which is 238 square miles and has not yet fully developed its fishing industry, but, fishing is important to St. Lucia--no serious analysis was made of the effects of Hess. In fact, the major consideration, as I mentioned before, had to do with how many people was Hess going to employ, how much money was Hess going to pay, and, in fact, this was going to be good for the government prior to the election which just took place. And you know what happened.

So these are the problems, the major problems which the Central Planning Unit faces. Now the Central Planning Unit has what you may term feeder agencies, like we have the National Development Corporation, which itself is responsible for "appraising" and dealing with foreign investors who have something to "offer." You have within the Ministry of Trade also a think tank, which comprises a number of skilled and highly trained, university trained, technicians who also appraise projects. The Town Planner is also a member of the National Development Corporation and of the think tank, which makes for some kind of an informal link with the Central Planning Unit. This has been a recent development; it has not yet been tested really. Considerations of environment, of factors which affect the environment, do come in for serious consideration, however, within the Central Planning Unit, among the environmental officers who deal with plans and buildings and structures and alternative sites for industries, etc.

But so far, the main thrust or the main agencies that have been concerned with environmental problems--soil erosion, beach erosion--have come from outside of government. We have the Geography Society, we have the Naturalist Society, and we have had quite recently, a lecture series on the environment sponsored by the Extramural Department, where people within specific ministries with direct tasks in this area of environmental management and control have had their say on what they believe to be the origins and have identified problems, environmental problems, the causes, what they believe to be the causes of those problems.

So in St. Lucia, I can say quite generally, that there has not really been an absence of concern for these things we have been talking about so far. To my mind, however, the compilation of data on environment, for example, when you talk about fauna and flora, and whatever it is, I'm very limited in this area; I'm into social planning. But I just wanted to raise some general problems. To my mind, I have been most general and the environmental problems do not seek to address themselves to the particular political, socio-economic problems which exist in these territories. And therefore action by politicians who matter, and who control and who have influence in these countries have really fallen short in this area. And it is really up to the theoreticians and the technicians, those people who feel that the environment, that there is threat, that people's lives are threatened, that coastal lines are threatened, it is really up to them to break away from the whole academic jargon, and come to terms with the socio-economic problems in these countries.

Tourism is one of our main industries, and it rivaled the agricultural industry until very recently in prominence. Until one can really approach the politicians who have the final say on such matters, bearing in mind the whole thrust, the whole content of development of these Caribbean countries, partic-

ularly the socio-economic development, data from CCA or what have you, will continue to remain on shelves and precious little action will be taken on them.

I believe that the Conference, the objective of the Conference really is not merely to be a talk shop or an expression or an identification of ideas relating to this specific topic, but it possibly cannot guarantee action but it certainly can attempt to put things within the framework that I have just spoken about.

Allan Harris yesterday spoke of the dichotomy between the elite culture and the popular culture, and putting that within the whole context of the kind of planning which has been taking place within the Caribbean, within the small islands particularly. I think the Conference should also, because it has come up so frequently, address its mind to the possible mechanisms and the apparati which could be effected so that plans do not fall solely into the sphere of the so-called elite within the Caribbean society but take into consideration the contributions that can come from the grassroots of these societies. This is basically what I have to say on the whole question of planning, environment, and problems, which are specific to St. Lucia and the eastern Caribbean islands.

ALLEN PUTNEY: I would like to ask a question of the delegate from St. Lucia. From the presentations that have been made so far, it would appear that St. Lucia is somewhat unique in having in their planning office people capable of and interested in, determining as well as the natural environmental impacts, the cultural environmental impacts of proposed developments, and so forth. Do you have any specific procedures or techniques that have been worked out to do this on a practical basis for the projects?

CRICHLAW: We are in a transitional state, if you want to call it that. We have just had a change of government and to my mind also a change in the whole direction of economic development, which means the role of the Central Planning Unit has--we don't know yet, in fact, whether it has changed because we have just set out several proposals for the restructuring of the Department which would--the main proposal really is to formalize the links within the Department itself.

Take, for example, the Economic Section, which has always had a heavy export input; the Environmental Section, which has been local! The fact is that the Economic Section is directly connected or members within the Economic Section have been sponsored by funding agencies. It means that within the Department, although I am in an office next door to the Economic Section, I have no clue as to what they are doing, or those within the Physical Section, too. But I am dealing with sociology, I am dealing with social planning; they're dealing with something else. I could come to work, say, for a year and not know what is going on. Now we have proposed structures which would--taking all these factors into consideration--make for more integrated planning within the Department so that we have, perhaps at the beginning of the week, a committee meeting, where we'd meet to discuss the possible effects of too many discos in one area, or environmental and social considerations of too many discos, or too many churches, or whatever the case may be.

So at the moment, really there's, I don't know maybe a blind faith, but we believe the whole role of the Central Planning Unit, that the name will no longer be a misnomer, that we'll play a very key role--both internally and externally--insofar as reaching agencies outside of the department is concerned. I cannot really make a definitive statement on the whole process involved except to say that we have been meeting, we have been discussing it, we have set up proposals. The Prime Minister has said that he will give due consideration to these proposals. We will definitely be playing a more active role in the whole process of national development in St. Lucia.

BVI: I'm interested in what you had to say about Hess because it seems to me that your government, the politicians had, in fact, gone through the long rigamarole that you talked about because most of the territories are, in fact, in competition; Hess probably would have moved to another territory and St.

Lucia would have lost Hess. Now you said that there's about 50% unemployment . . .

CRICHLow: I didn't say there's 50% unemployment.

BVI: I'm sorry. But I think there'd be a lot of pressure on the politicians to provide work, and therefore, they would have to be crazy not to take Hess into St. Lucia.

CRICHLow: Or they would have to be crazy to take Hess into St. Lucia if you consider that the environmental problems are more crucial than providing jobs, in the short-term, for 200 to 300 people.

BVI: But the thing is, a politician's main consideration, Mr. Chairman, is to remain in power; this is his whole thing. And the idea is, if he does not provide work, he feels that he will lose his office; and a politician who's out of office is no politician. I mean he hasn't any power. And so the electorate, and this is what I call the fifth column, on technique, the electorate put a lot of pressure on the politicians, and all of the politicians are aware of all the environmental considerations. They are forced by expediency to forget a lot of that, and to do the thing that is expedient. Unfortunately, that's how politics goes, I think.

CRICHLow: I quite agree with you. The question of power, the depletion of power as soon as the politician goes out of office is questionable, given the particular history of the Caribbean. We know that politicians who were thrown out in the 1950s still have a lot of power now. It may be financial power, perhaps. Anyway, you see, the particular question, the issue raised by the representative from the BVI, is of particular importance and is of crucial importance because we have been talking about the dichotomy between politicians and technicians. We have to consider the importance of power to the politician. He has to remain in office if he's to exercise influence, and directly or indirectly, control power. So this is one of the problems that we face: the question of how do you try and let the politician see that you're not attempting to erode his power by the proposals that you may make for any project, and your serious concern for the deleterious effect of the project in question. This is one of the problems that I have been surfacing all along during this Conference, and which you really haven't come around to dealing with concretely.

ST. VINCENT

Carlton Williams - Chief Agricultural Officer

I am ex officio member of the Physical Planning Authority in St. Vincent, and as such, do have some influence in what happens in the environment so far as physical planning goes.

Possibly I ought to start with the situation of the LDCs, as we're known, prior to the Second World War. At the outset of the war, the Caribbean was a net exporter of food. Today we in the Caribbean as a whole, are importers of food and this is something which is of very great importance to us. I remember when Mr. (Allan) Harris made his presentation. The matter of whether or not the plantation system should be permitted to continue or not was raised. I am not sure if when talking about the plantation system we're all thinking in terms of the same thing. I may have a certain definition of a plantation system whereas another person may have a completely different definition. But my understanding of the plantation system is a system in which we grow a crop for export and it's a matter of monoculture. The situation that exists in several of the LDCs is that we still find ourselves very largely in this position and, as such, we have been trying as professionals to gear our farmers more into a monoculture agriculture, all to our loss. Within more recent times, we have come to appreciate that the small farmer is not as stupid as he appears to be, to us; and there is much wisdom in his approach to the problems which confront the countries. As a result, CARDI is now pursuing a program of multicropping research, which is

getting us back to the very important state where we raise far more of the food required within the region.

We are not for one moment saying we can be self-sufficient in matters of food; what we do maintain is that there should not be this overwhelmingly large percentage of food imported into the Caribbean. In other words, we have to do something about this matter of import substitution rather than just talking about it. I think we as technicians, and as public officers, have to make a positive contribution in this direction. This matter of malnutrition, and some of these very basic needs and very basic problems, which confront us, can certainly be solved if only we were to get some sort of reorientation in our approach to the real problems which confront the region.

Now this brings me to a salient point as far as St. Vincent goes--we are agricultural now, and as far as I'm concerned, we will have to continue to be agricultural, forever and forever, amen. Now the situation is that we do know that there has been this urge on the part of most of the territories of the region to go in the direction toward tourism and industrialization. But I think we must be very, very careful in this regard because we do not have many of these raw materials that we require for "industrialization." It does appear to me that any form of industrialization that is going to be promoted in the region, must essentially be in connection with our agro-industry. And here, I think we have very much to gain, especially so when we think in terms of the very huge import bill, which we in these territories pay for food that comes from metropolitan countries.

In St. Vincent, we have approximately 85,000 acres of land. Much of this land is extremely steep; we have extremely high rainfall; the erosion problem is indeed very severe in that our soils are highly erodible with very little colloidal material. I think that our people did appreciate this quite early on, and so in the 1940s, a lot of work was done in the area of soil conservation. Unfortunately, we took; we didn't use the correct strategies in implementing these soil conservation measures. And so even though St. Vincent was looked upon as the ideal country in the Caribbean in terms of soil conservation measures, today a lot of those soil conservation barriers have disappeared. Erosion is on the warpath once more. Our streams are dwindling. So that we have some very, very real problems facing us.

With the increased population, more and more people are going into the forest areas and removing vital forest stubble merely to be able to subsist and to grow export crops. Now we recognize that this is not doing us very much good at all. And so one of the matters that appears to us to be an approach, at least one approach method, which seems quite acceptable to us, is this matter of food forests. There's no point for us to say that we are going to put back the original forest cover that existed, and that we can get along without some sort of an economic production from these areas. We have to be realistic. It is a problem that people must be fed. They want the basic necessities of life; and I do feel very strongly that we can make a reasonable compromise in this direction, where these forests have already been removed, in that we can effectively put in a food forest to provide such crops as possibly coffee, cocoa, nutmegs, grapefruit, to meet the needs not merely of export markets but also for the home market and for the regional market.

Not only do we have these problems on land, but our problems in the marine sphere are also very grave. We have arrived at the situation where our black coral is being mined injudiciously, and removed, and sold in areas for jewelry. Now this poses a very, very serious threat to our situation. And it has got to be stopped.

I dare say we can have all the planning authorities, all the boards, or what have you, but this is not at all going to solve the problems. Indeed, we have had legislation on the lawbooks in St. Vincent since 1951, on the matter of soil conservation--that's as far as we have been able to get. Because under this legislation, if a particular farmer has not got the necessary funds for carrying out the necessary soil conservation works, then the Ministry of Agri-

culture must provide him with the money on loan over a long-term period. The fact is that money is not forthcoming. So then, what this really brings me to is the matter that whatever we, as a subculture of intellectuals, may like to implement--without the full cooperation of the people at the grassroots, as the distinguished delegate from St. Lucia pointed out--is going to be quite ineffective. As a matter of fact, we think we're on to a good thing now in that we, in the Ministry of Agriculture, have been pressing on with certain issues, matters like community development, because we do recognize that this whole matter of extension agriculture is not really extension agriculture, in truth and in fact. It's a matter of rural development, and rural development is not between you and me. Rural development has to do with people, real people on the ground. And so, whatever measures are to be taken in improving the environment for the benefit of the country, we must work along with the people at the village level. In other words, we as civil servants have got to become politicians in our own right.

I hope that you get me correctly; I'm not advocating that we throw out the chaps who have been elected to office. But we have to become politicians in our own right: civil-service politicians who must see the need for communicating with people at the village level; getting them to take part in discussions; getting them to understand what is involved; and getting them to help to make the decisions relevant to the situation. I'm afraid that this has been largely responsible for the failure of governments getting any of these helpful measures across in that we've been trying to use the big stick, trying to tell people what they have to do, what is best for them; rather, I think, we have to take the approach where we try to discuss issues with people, try to reason things with them so that they can better understand what is involved, and what is really in their interests, and the interests of their children.

So I'd like to suggest to this meeting that we bureaucrats come down from our high horses, and try to take a more rational approach at solving these problems. I'm not saying that we don't need these authorities; certainly you must have your planning boards, you must have your environmental control quality authorities. You must have them. But for heaven's sake, let us be rational about it! It doesn't matter what law you have saying that you should not cultivate slopes of over 20° or 25°; you cannot stop this because that farmer over there cannot understand what you're talking about, unless you can give him some reasonable alternative, because, after all, he does have to exist. So I'd like to suggest that we try to look at these alternative approaches, and possibly, my dear friend, the delegate from St. Lucia, who is very much interested in this area, can give this some certain amount of thought. Because I do think very, very strongly that there is much to come from this sort of approach.

On the matter of damage to our shorelines--this is something that is rampant, this is something that is giving us a lot of problems at home. We've been mining sand, extracting sand from the beaches for the building of houses, for road maintenance and this sort of thing; and though we have restrictions, nobody really bothers about them. There again, I think, this comes from the fact that people do not fully appreciate what we've been talking about. And this is quite relevant to our present situation. Even though Hurricane David passed several miles away from us, you'd be amazed to know that our northeastern coast was so badly bashed that a number of houses will now have to be removed, where people thought they were relatively safe. And that is a result of indiscriminately removing sand from the seashore--sand, gravel, large boulders, and whatnot for road building, for housing construction, and this sort of thing.

So I'd like to sum up in saying that any approach that is to be taken in solving these problems cannot for one moment ignore the matter of the integrated approach, and making solid use of the grassroots people--the people who really matter in the long run.

Now Mr. Chairman, there is one other point that my colleague, Mr. Karl John, the Director of Physical Planning, who had to leave the meeting this morning, has asked me to stress: it's a matter of training at both the professional and the subprofessional levels in physical planning.

We think not only that we should train people at the professional level but also at the subprofessional level; we think of this as quite important because it is quite possible if we concentrate too heavily on the professional level, we may be overtraining and not have better middle management personnel who must be there for executing the programs that are vital to any form of environmental quality control.

I must also support the other delegates from the other territories who make the point of this matter of this cadre of top-notch technicians. Let us fully appreciate that in the small territories, we have not the necessary manpower, we have not got the finances, to have full-fledged, top-notch personnel in all the various disciplines that go along with environmental control. As a matter of fact, I think we've all seen quite clearly, or most of us have seen quite clearly, that this system that we are recommending, that is nothing new. It already operates in CARDI, where you have a central core of professionals, and their services are shared amongst the other territories; I do commend this approach to this meeting.

During the coffee break, I had a brief moment to look at those plans across there, and I must certainly commend Mr. (Allen) Putney for the work that he has put into his paper; and for his presentation, and for the work that has been done by the CCA. Also, belatedly, I must commend Mr. Jackson for his presentation because so much of what he says is really relevant to the situation in all of the LDCs; I think that we must certainly take up his challenge and pay a great deal of attention to all that he had to say to us.

GRENADA

Anthony Boatswain - Economist in the Planning, Development and Training Unit of the Ministry of Finance, Trade, Industry and Planning

I am charged with the responsibility for the analysis of all industrial, agro-industrial, and tourism-related projects undertaken by the government.

Before I go on, a word or two about the Planning Division in Grenada: the Planning Division is the point of contact with the outside world for all forms of technical and economic assistance. It's also the body that handles private foreign investment in Grenada, as well as the coordinating and monitoring body for all public sector investment projects.

There are six units within the Division--there is the social and economic research unit, statistical documentation unit, external cooperation unit, project monitoring unit, manpower planning unit, and administrative unit. Prior to the revolution, the Planning Division was under the Prime Minister's Ministry. With the change, it was decided to move the planning unit over to the Ministry of Finance. One of the reasons given is that it would allow technicians to display their skills.

As the Chairman said, we underwent a revolution; I do not wish to comment on that aspect. What I would like to say at this point is that the Government of Grenada has established clear priorities, and among its priorities are concern for low-income housing and for structural development including feeder roads, electricity, research, health facilities, and agricultural development both for export and local consumption.

On the regional level, we believe in integration and cooperating with our sister islands for the mutual benefit of all. On the international scene, we are willing to cooperate with any government as long as they show basic consideration for human rights and as well, mutual respect for independence and sovereignty and noninterference in internal affairs.

At this point, Mr. Chairman, I would like to make two brief suggestions, which apply to the region as a whole; and I would ask my colleagues to present specific problems relating to Grenada. In previous sessions, a number of problems facing the smaller Caribbean territories were identified, and an equal

number of solutions were recommended. What is lacking, however, was a general framework within which these recommendations could be implemented, taking into consideration the cost element involved.

My first proposal, therefore, is for the establishment of such a framework. I suggest that the sponsors of this Conference get donors, donor countries, organizations, to assist the smaller Caribbean territories in the establishment of what I choose to call an Environmental Management Advisory Council--you can call it whatever name. The reason for establishing such a Council I believe, is that it will avoid the possibility of having each island scrambling separately with potential donor countries and organizations for assistance. This Council will serve as an umbrella organization within which will be housed pools of experts in the various areas of environmental management and the proper use of natural resources. These experts should be readily available to the various member territories and should be mainly nationals from the member territories. Among the various functions which I envisage for these experts, the following should be included: (1) provide training for nationals of member territories in areas of environmental management and the proper use of natural resources, (2) assist member governments in identification, formulation, and implementation of environment-related projects, and (3) secure funding from external agencies for these projects as a result of their recommendations to the Council.

The Council itself would have as its primary functions: (a) research and development in areas of natural resource use and environmental management in the region, that is, the smaller territories, (b) the establishment of a proper information network linking the various member territories, and (c) the coordination of the activities of pools of experts. It is suggested that in its inception stage, this Council will be under the direct supervision of the CEP.

In the smaller Caribbean territories, the majority of people are still denied basic human needs, that is proper nutrition, adequate housing facilities, etc. The denial of these basic human needs has resulted in outright abuse and overexploitation of natural resources with adverse consequences on the environment. My second suggestion, therefore, is one that calls for the urgent establishment of a Basic Human Needs Fund for the smaller territories. The establishment of such a Fund, I believe, will go a very long way in alleviating the socio-economic pressures now facing these territories. I will now ask my colleagues to present some of the problems on the national level.

Ron Smith - Engineering Adviser in the Ministry of Communications and Works,
Civil Engineer

There are a number of problems, some of which have already been identified. However, I would like to touch on one or two of these, for example, coastal erosion. We have already put down a need for assistance in coastal-zone management. However, I'd like to identify an aspect of this which I think we haven't really emphasized. A great deal of our problems of coastal erosion is occasioned by the need to win sand for building construction purposes. Some years ago, a study on coastal erosion in the smaller territories was done by Dr. Compter Dean. However, it seems to me that rather specifically, some identification of alternative sources of material, sources alternative to beach sand for use in construction, is necessary and desirable. And I think this should be identified as one of the specific goals of our studies on coastal erosion problems.

A second one, which has been touched a great deal, has been the question of solid waste disposal--and here I may be treading somewhat on the ground, the preserve of my friend Raymond Noel. However, in most of the small territories, flat land is at a premium. It's usually pretty fully utilized for agriculture, housing, and recreation. The solution, which we are forced most times to adopt with respect to finding sites for solid waste disposal, is to make use of wetlands, mangrove swamps, etc. I think we're all aware that there is a danger in this, and it seems to me that there would be some desirability in having a study of all the alternatives so that we could determine whether or not perhaps whether this is the least damaging of them all, or if there is an alternative that can be economically considered.

I would mention just in passing that with respect to some of the endangered fish species, there has been some research going on in Grenada, including work on lobster, conch, and certain species of turtles. There is a small group with which I have worked on a sort of a hobby basis, who are in fact establishing a small mariculture development on a community basis involving the fishermen and the people who will benefit from this. We hope that this will be an educational as well as a tourism exercise in that tourists and residents of the island could come in and see these species in their natural habitats, etc.

In our infrastructure activities in Grenada, we are about to embark on further studies relating to airport development. I think this is a problem that may be common throughout the territory as well, and there may be some desirability, when we are thinking of environmental management, in being able to incorporate some comments on the ecological effects of airport construction, which again is generally in the beach, or the coastal-zone area, mangrove swamp area, etc.

John Paul Fletcher - Engineer in the Ministry of Communications and Works

My main problem here is that for two days we have been speaking about the need for different projects, different controls, etc. And we haven't mentioned the cost of maintaining these projects. And this cost of maintenance is very important. For example, Ivor (Jackson) stated in his paper that Grenada dumps its sewage into the harbor. Now that is not correct. The outfall was built just prior to the Second World War; and it was properly designed engineering-wise, and the outfall was a mile-long out into currents that would take the raw sewage out in the sea. Well, due to nonmaintenance, or the inability of the local government to maintain the structure, it broke right after the Hospital Point. And I think in all projects being put up or being asked for, technical assistance from outside, the cost of maintaining these projects should be included. It's no use building roads if you can't maintain them.

The following is a transcript of the interventions made by Conference observers:

Isabel Bacalao - Observer from Venezuela

I am very sorry that my colleague from the Ministry of Environment and Natural Renewable Resources is not here. You will have to forgive an interloper because I really belong to the Ministry of Foreign Affairs. By training, I am a lawyer, and quite frankly I specialize in drainage basins and in the law of the sea and outer space. So it's really a pity I cannot speak very much about our environmental problems.

But there are some things that I can say, maybe from my past diplomatic experience: countries big or small have several problems in common; only the local aspects of them will vary. If you take into account that Venezuela is a Caribbean country with a lot of small islands that belong to our territory that have similar problems to your own countries; that we are a Third World country with problems of a lack of trained manpower. We are very much aware of the problems of importing technology. We are in great need to develop in spite of our great oil wealth. We are a mining country basically, but we are very aware of the fragile and important interrelation between man and natural resources. So we have placed a great emphasis on that for our development. If we can manage our resources in the proper way, we will be able to develop faster and better. If not, the bills for cleaning up and solving sometimes irreversible problems are just more than we want to think about, no matter how rich we are.

We are aware that we have problems to solve, basic needs, and we have little time. All those problems we share with you; and because of that, we know that sharing information, using the experience of other countries, and then adapting them to your own specific needs is very important. And we were sent here to learn your specific problems so that we can direct in a better way our already existing programs of cooperation, and future programs of cooperation that could be shared among all the Caribbean nations; to offer you our own experience, just

the same way that we are willing to take into account the experience of other countries. And we must take into account that we all want to develop, that we all have to keep our environment in a healthful shape, that environmental problems are very costly, and that it is easier to prevent than to repair. And that we all need to share money, knowledge, and experience.

Pedro A. Gelabert - Observer from Puerto Rico

Our main problem in Puerto Rico has been catching up with development and educating our people. I could probably talk for hours about that but the message I want to bring is that we cannot help you in financing a program; we have our own financial problems. But we can assist you with technical aids and training. I cannot commit the Puerto Rican Government but I certainly can commit my agency. And probably the University of Puerto Rico, which is represented here by Dr. Fuat Andic of the Economics Department, Dr. Máximo Cerame-Vivas of the Marine Sciences Department, and Dr. Modesto Iriate of the Energy and Environment Studies Center. We are at your service, government to government.

BOOTHE: Let me say that I do not believe that we have come up with alternative strategies but I do believe that we have come up with possibilities and elements around which it should be possible to seriously advance toward alternative strategies appropriate to the needs of the region, and which will facilitate economic growth compatible with environmental management. I believe that we have also come up, as was the intention in this session, with a platform for the discussions in Session V tomorrow. I believe the bridge has been established between the early sessions and the sessions to come.

Attachment

LIST OF PROJECTS AND AREAS OF INTEREST AND CONCERN

Projects

- Soil conservation
- Nature reserve
- Turtle protection
- Mariculture
- Wildlife protection
- Workshops: short-run, long-run
- Long-term training programs
- Development of environmental management plan
- Oil spill contingency plan
- Socio-economic impact of oil reserves on small states

Needs

- Research on physical environment
- Talent pool for sharing experience (regional)
- Follow-up on Ivor Jackson's paper
- Environmental control and management
- Need for environmental health managers
- Assistance in coastal-zone management
- Mangrove development
- Training of locals
- Information retrieval
- Mariculture development and management
- Research on social factors effecting environment
- Training in projects appraisal
- Compilation of socio-economic/environmental data
- "Closing" the gap between technicians and policy-makers
- Reforestation (reafforestation)
- Development of decisionmaking at the "grassroots" level
- Implementation of policies for all strata of society
- Development of environment awareness
- Involvement of TOTAL society in policy formulation and implementation
- Environmental Management Advisory Council
- Environmental management and control should include costs
- Need for sharing information and experience in the region

TABLE OF CONTENTS

Session V

	Page
STATEMENT BY TREVOR GORDON-SOMERS	129
OPPORTUNITIES FOR TECHNICAL COOPERATION FOR THE LESSER ANTILLES WITH RESPECT TO DEVELOPMENT OF ALTERNATE SOURCES OF ENERGY, Dr. Juan A. Bonnet, Jr. (Paper delivered by Dr. Modesto Iriate) . .	130
STATEMENT BY JAIME HURTUBIA	140
STATEMENT BY ARSENIO RODRIGUEZ	141
UNESCO/UNFPA/ISER MAN AND THE BIOSPHERE PROJECT: STUDIES ON POPULATION, DEVELOPMENT, AND THE ENVIRONMENT IN THE EASTERN CARIBBEAN, Christine Barrow	143
STATEMENT BY WILLIAM S. BELLER	145
STATEMENT BY MAXIMO CERAME-VIVAS	147
SUMMARY OF SESSION V - MORNING, Elinor Gittens	149
AID FROM THE BRITISH GOVERNMENT TO THE COMMONWEALTH CARIBBEAN	151
STATEMENT BY STEPHEN FREE, Representative of the Canadian International Development Agency	155
OPPORTUNITIES FOR INTERNATIONAL ASSISTANCE AND COOPERATION - CDB'S CONTRIBUTION	158
ENVIRONMENTAL MANAGEMENT AND ECONOMIC GROWTH IN THE SMALLER CARIBBEAN ISLANDS, Norman S. MacLean	164
CONFERENCE ON ENVIRONMENTAL MANAGEMENT AND ECONOMIC GROWTH IN THE SMALLER CARIBBEAN ISLANDS: THE PROGRAM OF THE ORGANIZATION OF AMERICAN STATES	166
CARIBBEAN PROGRAM OF THE ROCKEFELLER BROTHERS FUND, William S. Moody . .	169
STATEMENT BY TREVOR GORDON-SOMERS, Representative of the United Nations Development Programme	173
ENVIRONMENTAL AND NATURAL RESOURCES: A NEW FOCUS FOR U.S. DEVELOPMENT ASSISTANCE, Robert O. Otto	174
STATEMENT BY MURRAY ROSS, Representative of the World Bank	177
STATEMENT BY JOHN CONNELL, Representative of the Caribbean Conservation Association	178

STATEMENT BY TREVOR GORDON-SOMERS

I would like to mention briefly the World Conference, "Technical Cooperation Among Developing Countries," which took place in Buenos Aires in August-September, 1978. I believe some of you at this table attended that Conference, or are familiar with it. It was the first Conference of its type sponsored by the United Nations, and had high-level participation of governments and international organizations. Out of that Conference came a plan of action. It is detailed, has been widely circulated, and gives the governments the firm charge to take certain action before the next scheduled meeting. In reading some of the papers that have been delivered here--Dr. Demas' paper, Dr. Blackman's paper, others-- I was struck by the emphasis placed on the need for us in the Caribbean to look inward, to recognize that there are resources that we have within the Caribbean that must first of all be developed, identified, and then put to good use before we seek solutions externally.

One of the major recommendations in the plan of action formulated in Buenos Aires was to encourage and develop institutional growth, national institutions; to recognize that where these institutions exist that we should develop work programs among them so that there is a transfer of knowledge, of experience based on experimentation; that there be transfer of technology between institutions in developing countries, and between individuals who are involved in research on differing projects within the developing countries in order to encourage what we call the "south-south" dialogue. This activity, of course, requires that greater emphasis be given to our subregional and regional institutions, and to recognize that the expertise that exists in these regions must be put to good use. This approach assumes that in our negotiations and discussions with financial institutions, international organizations, there can be common understanding and a common front, which implies a certain strength, which we are sure to dissipate if we continue to work on an individual nation-unit basis.

OPPORTUNITIES FOR TECHNICAL COOPERATION FOR THE LESSER ANTILLES WITH RESPECT TO DEVELOPMENT OF ALTERNATE SOURCES OF ENERGY

Dr. Juan A. Bonnet, Jr.*

Abstract.--A brief background of the Lesser Antilles, including history, cultural, and linguistic diversity is given along with a discussion of their dependence upon imported petroleum and tremendous economic restraints. The hope for solving their energy problems rests on utilization of their common geographical and ecological situations. Extensive natural energy resources exist in the area in the form of solar radiation, ocean currents, and thermoclines, wind, geothermal formations, and even hurricanes. These energies must be redirected to meet human needs. A discussion of different energy efforts presently ongoing in the region precedes a detailed account of new opportunities for technical cooperation. It is recognized that cooperation has to be based on well-identified common interest areas, with the promise of recognizable results and a large active role for each island. Different approaches to meet these objectives are suggested.

INTRODUCTION

In order to understand the energy options available to the Caribbean Community, we must first understand some of its characteristics. During the recent conference on Caribbean Trade, Investment, and Economic Development held in Miami, USA, the President of Costa Rica, Hon. Daniel Oduber-Quiros, stated that the Caribbean Community includes all the West Indies, Central America, and Caribbean Coast of South America (Oduber-Quiros, 1978). In other words, all lands in contact with the 1,049,500 sq. mi. suboceanic basin known as the Caribbean Sea. Fortunately, this paper deals only with the Lesser Antilles or Caribbee Islands. The latter name was derived from the Indians, called Caribs, who originally territorialized the islands from AD 1000-1500. The Caribs were fierce fighters and consequently their territory was not conquered until the mid-17th century. From then on the islands became pawns in the struggles among the French, English, Dutch, Spanish, and Danes. It is significant that every major European war in the 18th century was reflected in heavy fighting in the Caribbean and every peace treaty included the transfer of West Indian

Islands. These historical events have created a diversity of cultures, traditions, languages and loyalties which have for many years prevented effective direct communication and cooperation among the islands, a situation which continues even now after many of the islands have obtained self-government. However, as reported in Puerto Rico and the Sea (Commonwealth of Puerto Rico, 1979): "The Caribbean Sea should be regarded as a possession common to all of the countries of the area."

There is a strong historical tendency to look toward the mother country for guidance, and of course, technology transfer. However, islands are not chips off a mainland block but unique entities with their own priorities. Stated in other terms: "Ocean islands are not mainlands in miniature any more than a cat is a miniature tiger." (Beller, 1973) For example, the electric utilities rely on foreign technology for their systems. The French islands have French equipment and former British colonies have equipment from Britain or other Commonwealth countries, etc. Consequently, one finds a mixture of 120 volts, 220 volts, 50-cycle and 60-cycle systems throughout the region. In short, the region utilizes not what it really needs, but what it inherited, and unfortunately all the islands, with the exception of Trinidad and Tobago, and partly Barbados (about 30 percent

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self-sufficient in petroleum) depend almost exclusively on foreign petroleum. This has had a tremendous effect on the balance of payments, employment, and development plans of the islands.

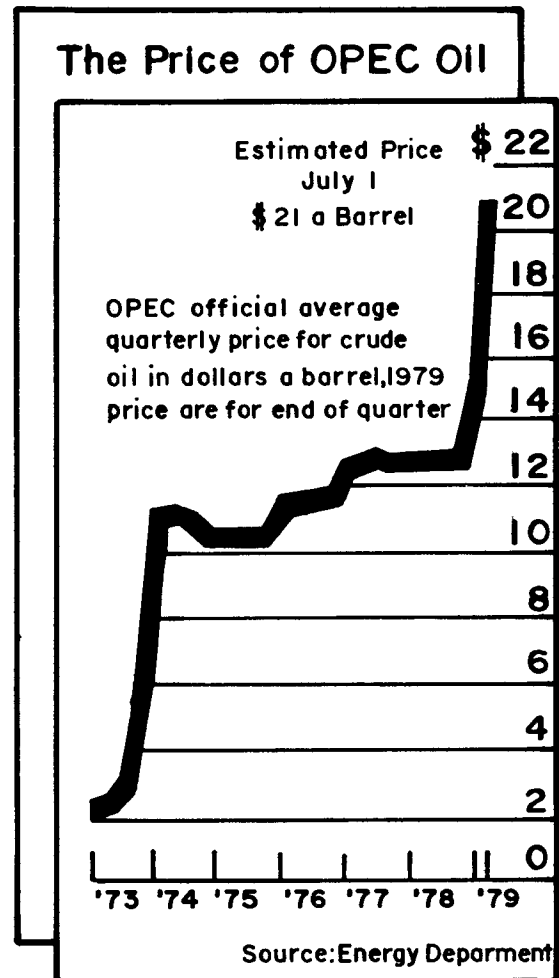
PRESENT ENERGY OVERVIEW

It was reported at the First Caribbean Conference on Energy for Development held in San Juan, Puerto Rico, that energy demand in the Caribbean from 1950 to 1965 grew at an annual rate of 8.6 percent, compared with 3 percent for the United States. The 1965 to 1980 rate of increase is expected to be 8.4 percent. With imported petroleum fuel bills equal to 15 to 20 percent of GNP in some countries, some analysts have privately predicted that a few islands may soon have critical energy-related international monetary problems. The 1973 oil price rise and subsequent increases affected the region badly (see fig. 1). As an example, the new prices (June 1979) will probably raise the fuel bills of most consumers an average of about 16 percent a year, which carries the aggregate price rise to more than 50 percent so far this year. (New York Times, 1979)

In the Caribbean, a large amount of imported petroleum is utilized by the utility companies (see Table 1 on page 132) which have peak capacities that range from less than 10 megawatts to several hundred megawatts. At present, as reported by Donovan, Hamester and Rattien, Inc. (Donovan, et al., 1979), no utility company in the Lesser Antilles has an alternative energy program which involves solar energy. At present, alternative energy programs are only at the academic or science council level.

The commercial sector's demand for electric energy in the smaller islands--which are frequently dominated by the hotel industry--accounts for as much as 60 percent of all electrical energy consumed. Residential electric energy consumption accounts for an additional 20 percent. Unless new energy alternatives are sought and developed, petroleum-based fuels will continue to be the main energy source for electricity and transportation. This situation could badly affect the tourist industry. The energy crisis is taking away people's flexibility and mobility. As the Energy User News mentions (Energy User News, 1978), there is "No Honeymoon in the Caribbean as Energy Costs Soar," and it shows as an example, that already last year the cost of generation of electricity on St. Lucia reached 9.5 cents per kwh.

In order to gain time, energy conservation measures must be taken immediately by the energy users and producers. However, the



The New York Time/June 29, 1979
Figure 1

ethics of emphasizing energy conservation versus energy alternatives for Third World countries was amply discussed during the Tenth World Energy Conference (1977). Many Third World representatives stated that if a country does not have energy to develop itself it cannot conserve. The general feeling was that Third World countries must emphasize the development of energy alternatives suitable to their needs.

ENERGY CHOICES

Geology and Seismology

To solve the energy problems in the Lesser Antilles we must recognize that there are large amounts of natural energy in the area. There seems to be only one factor which gives hope for establishing a constructive and common basis to solve the energy dilemma of the Lesser Antilles: their common geographical and ecological situation inherited from nature. The whole area is part of

Table 1.--Electricity Capacity and Production in the Lesser Antilles

ISLAND	AREA ¹ (sq. mi.)	POPULATION ² (Thousands)	INSTALLED ³		YEARLY ³		ELECTRICITY		ELECTRICITY PRODUCTION PER GNP (kwh/US\$)
			ELECTRICITY CAPACITY (Megawatts)	ELECTRICITY PRODUCTION (Millions kwh)	ELECTRICITY PRODUCTION PER CAPITA (kwh/person)	GNP ⁴ (Million US\$)			
Antigua	170	71	22	47	662	50	0.94		
Barbados	166	247	99	228	923	400	0.57		
Dominica	290	77	6	15	195	30	0.50		
Grenada	120	96	7	28	292	50	0.56		
Guadeloupe	680	360	50	190	528	770	0.25		
Martinique	425	369	55	194	526	1,070	0.18		
Montserrat	39	12	4	9	750	NA	NA		
Netherlands Antilles	384	241	290	1,600	6,639	430	3.72		
St. Kitts- Nevis	65	66	13	23	348	30	0.77		
St. Lucia	238	110	14	45	409	60	0.75		
St. Vincent	150	106	9	17	160	30	0.57		
U.K. Virgin Islands	59	12	4	12	1,000	NA	NA		
U.S. Virgin Islands	136	98	239	720	7,347	490	1.47		

NA - Not Available

1 - Caribbean Year Book 1978/79. Caribook Ltd., Toronto.

2 - Demographic Yearbook/annuaire Demographique 1976, U.N. Department of Economic and Social Affairs.

3 - World Energy Supplies 1972-1976, U.N. Department of Economic and Social Affairs. Statistical Papers Series 3, No. 21 (1976 Data).

4 - 1978 World Bank Atlas: Population, Per Capita Product and Growth Rates (1976 Data).

a Caribbean Plate (Western Geophysical, Inc., 1974), occupying most of the Venezuela and Colombia basins, moving east relative to both the North American Plate on its northern edge, and the South American Plate on the south (see fig. 2). Recent volcanism and the smooth arcuate pattern of the islands, as well as historic earthquake patterns, prove that the Lesser Antilles is a true modern island arc. Also the northern Lesser Antilles is separated into an inner and outer arc--the Leeward and Windward Islands--with the northernmost islands mostly underlain by a carbonate terrace.

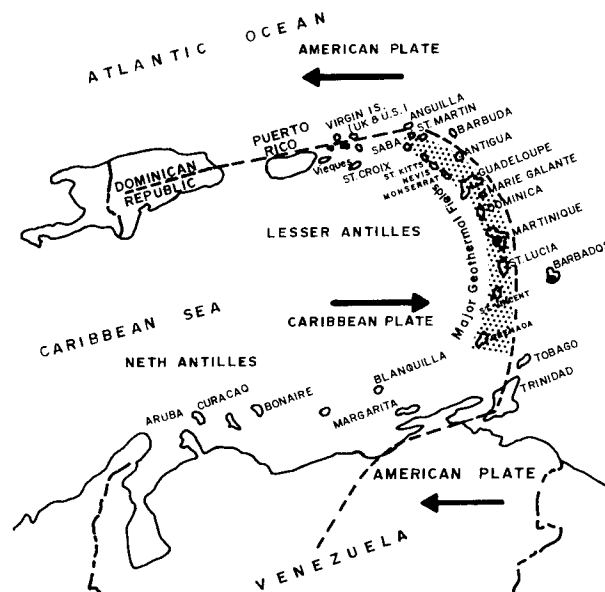
Actually the entire Caribbean area appears to have been extensively intruded by large bodies of basaltic magma which developed deep within the mantle of the Earth and moved upward. Active volcanism around the margins of the sea and constant seismic disturbance represent continuous re-adjustments of the crust. Regions of geothermal reservoirs are generally localized along the margins of major crustal plates and the Lesser Antilles is recognized as one of these zones (Muffler and White, 1972). (See fig. 2.) A tremendous waste of energy in these areas is from volcanic eruptions, with large amounts of hot (700°C to 1300°C) magma being extruded through the crust from the mantle.

Volcanos exist in the French Lesser Antilles. Martinique has the presently inactive volcano Mont Pelee, and in Guadeloupe a vein of steam connecting with La Souffriere volcano has been tapped by drilling at Bouillante off the west coast (West Indies and Caribbean Year Book, 1978). This has been capped, and as pressure is considered to be sufficient to operate a geothermal electricity generating station, the necessary plant and equipment have been ordered.

Ocean Thermal Energy Conversion

Tidal movements in the Caribbean Sea are small, partly because of the enclosed nature of the region. The tides range up to 2 feet but average only 1 foot.

Surface ocean currents pass strongly through the Caribbean Sea from the Atlantic and continue with increasing speed through the Yucatan channel. The main current flows at an average velocity of about 1 mile per hour. Also, temperature gradients between the ocean surface and 1,000-meter depths are more than 40°F (22°C). Great sources of untapped energy exist in these currents and temperature gradients. The maximum depth of the Caribbean Sea, south of Puerto Rico, is 6,150 meters, about 160 km. offshore in the Muertos Trough. However, at 2 km. southeast of Puerto Rico, depths of 1,000 meters are



LESSER ANTILLES OR CARIBBEAN ISLANDS
Figure 2

already encountered. Consequently, Puerto Rico is actively working on the development of Ocean Thermal Energy Conversion (OTEC).

Wind Energy

The northeast trade winds prevail over the Caribbean Sea. The winds blow consistently from the east or northeast more than 70 percent of the time at mean velocities of about 10 miles per hour. Because of this favorable condition, a 200-kilowatt wind power generator has been installed by the U.S. Department of Energy on Culebra Island and this energy resource is being evaluated.

Solar Radiation

The solar radiation in the Caribbean region is on the order of 2,000 kwh/meter² per year. Average air temperature varies from about 78°F in February to 83°F in September. Sunlight and mild temperatures are two valuable assets of the tourist industry and the first is also a great diffuse energy resource. As an example, Barbados received in solar energy, 426 times the amount of commercial energy consumed in 1977 (Cox, 1978). However, the Caribbean region is generally visited yearly by hurricanes from August to October which results in lower solar radiation during these periods.

Oil and Other Aspects

The Caribbean region faces some very difficult energy choices with solar, geother-

Table 2.--Petroleum Refining Capacity in the Caribbean (Oil and Gas Journal, 1976)

Country	Exported Refinery Operated by	Capacity (000 b/d)
Venezuela	Lagoven/Exxon (at Amuay)	600
	Maraven/Shell (at Cardon)	337
Netherlands Antilles	Exxon (at Aruba)	440
	Royal Dutch Shell (at Curacao)	409
Trinidad and Tobago	Texaco (at Point-a-Pierre)	361
	Trintoc/Shell (at Point Fortin)	100
U.S. Virgin Islands	Amerada Hess Corp. (at St. Croix)	728
Bahamas	New England Petroleum Co.	500
	Standard Oil of California	
Panama	Texaco (at Colon)	100
Puerto Rico	CORCO (at Guayanilla)	161
	Sun Oil Co. (at Yabucoa)	88
	Caribbean Gulf (at Catano)	40
TOTAL		3,864

mal, wind, ocean currents, and gradients. In some offshore areas, hydrocarbons are also present. A few decades from now we may also tap the energy of volcanoes and tropical storms.

A geopolitical circumstance now widely known is that, historically, close to two-thirds of all U.S. oil imports--crude as well as products--has been moved there by way of installations established in the Caribbean area (Governor, Netherlands Antilles, 1978). (See Table 2.) However, the recent U.S. policy of decreasing oil dependency could mean fundamental re-adjustment or an eclipse for the Caribbean refining industry. On the other hand, with little capital, few trained technicians, scanty infrastructure, inadequate reserves of conventional fuels (with the exception of Trinidad and Tobago), and small land masses with generally rapidly growing populations, there is little margin for error. Small is beautiful, but very expensive.

As mentioned by Eugene C. Crommett (Crommett, 1975) the resources of the ocean islands are not only vulnerable, but they are very limited. Due to their isolation and small size, islands can be classified as one of two types, those which depend upon agriculture and fishing, and those which depend

upon commerce and industry. The former is usually poorer economically, and, with the exception of Trinidad and Tobago, all the Lesser Antilles are of that category. How then, can we work together to help solve the energy dependence common to all?

ENERGY EFFORTS UNDERWAY

Efforts are already underway to analyze collectively the Caribbean energy situations. Unfortunately, in the Caribbean region, very little energy data is presently available. Various conferences have been held. At the Project Group Meeting on Alternative Energy Resources, September 18-22, 1977, Barbados was one of the few who indicated efforts made in this areas.

The objectives of the Barbados meeting were to review the present state of activities of alternative energy resources and to assess small-scale energy needs in the region; to identify specific projects for collaboration; and to draft joint project proposals for such collaboration. As a result of the meeting, specific projects were identified in areas such as: Biogas, Bagasse, Data Acquisition, Solar Systems, Wind Systems, Integrated Energy System, Biomass, Conservation, Wave Energy Resources, and Electric Vehicle Development.

Also, a Steering Committee was formed under the direction of the Caribbean Commonwealth Council (Commonwealth Science Council, 1977) to promote and pursue the implementation of these proposals. It is apparent that during this meeting, wide attention was given to the National Academy of Sciences publication, "Energy for Rural Development," (National Academy of Sciences, 1976) recommendations on energy alternatives. The NAS report concluded that:

1. A variety of energy resources and technologies are indeed available as alternatives to conventional power systems.
2. With the exception of a few devices, there are no cheap alternative technologies of significance for either industrialized or developing nations, and there probably will not be any in the near future.
3. It is not enough that an energy resource be available; the technology to put it to use must also be present.

The following activities were proposed by the National Science Foundation as steps toward a solution of the energy problem:

1. Organization of workshops to evaluate the potential role of decentralized power systems for rural areas in developing countries.
2. Organization of a pilot energy-oriented development program to assist rural areas in acquiring the needed energy technology and the means to exploit it usefully.
3. Establishment of regional institutes for research and development of technologies for exploitation of renewable energy resources.

The workshops continued with the First Caribbean Conference on Energy for Development held April 3-6, 1978 in San Juan, Puerto Rico. This conference was of a wider scope and included on its agenda energy supply and demand, conservation, energy in key economic sectors, and the economic and financial possibilities and constraints. The conference was attended by more than 300 persons from 26 countries, and 7 international organizations. The meeting succeeded beyond expectations by instilling a new awareness of common as well as unique energy problems facing the countries and territories in the region. The discussions at the conference pointed out that the Caribbean islands should not have great

hopes for oil exploration to provide an answer to their energy supply problems and should look toward other energy alternatives. Many conference participants expressed intense interest in the use of sugar cane for alcohol and biomass production.

Following this conference, other smaller conferences have been held such as the Caribbean Consultation on Energy and Agriculture, November 29 to December 1, 1978 in the Dominican Republic; Energy Self-Sufficiency and the Virgin Islands (Caribbean Res. Inst., 1978), December 8, 1978; Workshop on Energy Accounting for the Caribbean Subregion (Commonwealth Science Council, et al., 1979), May 14-18, 1979 in San Juan, Puerto Rico; Alternative Energy Workshop (U.S. Agency for International Development, 1979), May 24-25, 1979 in Barbados. Similar workshops have also been held in other areas of the world; for example, the National Academy of Sciences held a joint workshop with the Government of Tanzania in August 1977 (Brown and Howe, 1978).

Digressing momentarily from the topic, a short review of the history and present programs of the Center for Energy and Environment Research (CEER) may be pertinent at this time. CEER was initiated in July 1976 at the University of Puerto Rico under the auspices of the U.S. Department of Energy. With an annual budget of over \$3.5 million and some 200 employees, it is the largest R&D organization working in energy-related matters in the Caribbean area.

The Center has active programs (CEER Annual Report, 1978) in solar data collection and analysis, solar water heaters, solar parabolic compounded collectors for industrial process heat and solar air cooling. Other programs are involved with biomass, sugar cane and other grasses, forestry, bio-conversion, methane, alcohol, pyrolysis, desulfurization of heavy crude oils and terrestrial, marine and human ecology. CEER is also establishing an Energy Field Station to develop appropriate technology devices. One of the main goals of CEER is to develop indigenous energy resources for the Caribbean region which are compatible with the fragile tropical environment. These goals are shared with other Caribbean institutions.

The University of the West Indies, the only transnational university in the world, has been working for some years on solar research including insolation and wind energy mapping, solar agriculture, and waste conversion pyrolysis (Lalor, 1977). Another appropriate technology and development center is Las Gaviotas (Rensberger, 1979) in the Llanos region of Colombia. They have built

an inexpensive windmill, solar heaters, and a small steam-powered turbine. Also, Sun World (Gardner, 1979) recently discussed a solar-cooled building in Barbados which was sponsored by the Commonwealth Science Council.

As Mr. Rensberger (Rensberger, 1979) mentions, "There is an extraordinary new breed of inventors, scientists, and engineers beginning to emerge in the Third World." A wiser alternative to importing technology, many leaders now believe, is encouraging simpler, smaller scale technologies designed locally and applied broadly. This approach not only meets a country's grassroots needs but also builds pride in achievement and self-reliance which is too often disastrously sapped by imported technology and technicians.

In this movement, the Caribbean universities must adopt the leadership role in research and development for their own national needs.

OPPORTUNITIES FOR TECHNICAL COOPERATION

From what has already been said, it can be concluded that the willingness, and the atmosphere for developing energy alternatives following the Schumacher, "Small Is Beautiful" (Schumacher, 1973), and Lovins, "Soft Energy Path" (Lovins, 1978) approach in the Caribbean region, is ideal. It will be relatively easy to convert one of the Lesser Antilles Islands to energy self-sufficiency if appropriate programs and resources are developed. As an example, the State of California is planning to be self-sufficient in energy by the year 2025 and they produce, at the moment, about 3,500 times the electricity that is produced in the Virgin Islands.

The Virgin Islands last year produced about 460 million kwh of electricity. The Island of Culebra with a 200 kw_e wind turbine generator is already energy self-sufficient, but only on Sundays. On weekdays, the wind turbine only provides about 20 percent of Culebra's needs. Consequently, the Lesser Antilles are ideal areas to test the concepts of small is beautiful, energy soft paths, and self-sufficiency because of their limited geographical areas; ample solar, wind, and ocean energy resources; and higher cost of energy which makes almost any of these alternatives economically competitive.

As Denis Hayes (Hayes, 1977) also notes, the Third World can take the shortest path out of the fossil fuels cul-de-sac. While the industrial world has heavy investment in fossil technologies, which are hard to get rid of, they have no solar-powered societies to emulate. The approach to actually imple-

ment these energy self-sufficiency concepts for the Lesser Antilles will depend heavily on the priority and effort that each island is prepared to assign to this goal. It is indispensable to assure that whatever technology is selected meets the local needs. However, none of the islands can do it alone. Help is needed from the international community.

During the First Caribbean Conference on Energy and Development at San Juan, Dr. David L. Morrison mentioned that there are usually four factors involved in technology transfer: (1) a local industry, (2) a local technical institute, (3) an external technical institute, and (4) external technology sources.

He then recommended a six-part methodology for technology transfer which has been used successfully and might be applied to the Caribbean:

1. The local technical institute identifies the needs of the island.
2. The external technical institute searches for relevant technologies.
3. The local technical institute chooses the technologies.
4. The external institute arranges an indepth transfer between the external technology sources and the local industry.
5. The local institute demonstrates the technology.
6. The local industry manufactures and promotes use of the end product.

However, as Colin Norman (Norman, 1978) points out, if technological development is to be more compatible with human needs, and more in harmony with the Earth's resources, four principal points must be recognized. First, the unfettered working of the market system cannot be relied upon to promote the development and adoption of appropriate technologies, for the simple reason that the poor, by definition, are often outside the market system. Second, many new technologies are inappropriate to the needs of the developing countries. Third, the development of new technologies requires new arrangements for sharing with the Third World. Fourth, it must be accepted that technology, by itself, cannot solve political and social problems.

It is very difficult to generalize from one society to another. Only by paying careful attention to the impact of new technol-

ogies on people, social systems, and the natural environment will the picture of an appropriate technology for any particular situation begin to emerge.

During the recent AID Alternative Energy Workshop, goals were established to promote energy self-sufficiency of the Caribbean region by strengthening the capability within the region for:

1. country energy need assessments,
2. renewable energy resource assessments, and
3. technical analysis of alternative energy applications.

Toward this purpose, the program will provide:

1. Technical assistance to national and regional energy planning activities.
2. Technical and analytical training in energy management and energy technology development.
3. Regional communications networks to collect and disseminate energy information and to establish international contacts.
4. Research and field testing of renewable energy technologies.

In order to organize the program, DHR was contracted by AID. The DHR study objectives were to assess current regional activities and needs in renewable energy, to design and recommend an organizational structure for a regional alternative energy program, and to recommend activities to be performed by the program in policy analysis, training, communications and hardware identification, development, and field testing. DHR recommended at the workshop that the following organizations take the lead in the planning, management, and direction of the center:

1. The Caribbean Development Bank (CDB) will serve to provide program management, fiscal management, and regional coordination.
2. The CARICOM will serve as the policy research and development arm.
3. The Center for Energy and Environment Research (CEER) of the University of Puerto Rico will provide

technical assistance for applied R&D, proposal evaluation, and project monitoring.

DHR also concluded that there is a great deal of interest and a substantial amount of activity in the Caribbean and that several renewable energy technologies offer long term, large-scale petroleum displacement potential.

DHR also carried out a Caribbean Region Solar Cooperation Study (Donovan, et al., 1979) for the U.S. Department of Energy. The DHR study concluded that the DOE-USA could best organize its activities to support solar energy research and development, and cooperation in the Caribbean if it can first suggest, and then help develop, a common program approach for solar energy technology evaluation and transfer for all the countries in the Caribbean interested in investigating alternative energy paths. The operational scheme recommended attempts to retain a decentralized approach for individual countries or territories, yet creates a common procedural framework which would hopefully facilitate future cooperative efforts. The recommended approach is predicated on the following four steps to successfully introduce new technologies:

1. Development of a process to continually monitor alternative energy technological development around the world.
2. Development of internal process that leads to identification of the technologies that should be investigated for local use.
3. Development of procedures to evaluate and adapt those technologies.
4. Creation of a technology dissemination program that includes training and education components.

The U.S. Department of Energy should cooperate fully in this approach. DHR recommends that DOE should consider assisting an existing research institution in the Caribbean, such as the Center for Energy and Environment Research (CEER) in Puerto Rico, to be a partner in their role. In addition to CEER, the University of the West Indies and others might become model alternative energy technology adaptation experimental stations.

CONCLUSION

The Lesser Antilles can cooperate internally, and with, international agencies in the development of indigenous alternative energy resources suitable to their needs. That co-

operation probably will have to be based on their well-identified common interest areas, have the promise of recognizing priorities in the countries, and including a large active role to be played by each country. This cooperative effort can be at different levels including government, universities, centers, and/or science institutes, and funding agencies.

As the U.S. Position Paper for the U.N. Conference on Science and Technology for Development, held last August in Vienna, specified fairness is needed along with action in the global transfer of science and technology. It suggested certain norms worth considering.

First, the transfer must be a cooperative and joint effort of governments and the private sector in which development priorities of the recipient countries are respected and in which private industries and organizations enjoy due protection and due returns on their investment and inventiveness.

Second, in order to have an effective transfer, the information base in the developing countries must be broadened to permit them to select what they need from the international supermarket of technology. They must be able to reject what they do not need, to choose among competitive offerings, and to acquire what is most appropriate and economical for their development needs.

Third, the transfer must include an increasing shift in research and development to the developing countries. Research and development that are locally based and oriented toward indigenous resources, needs, and demands contribute not only to the growth of self-reliant capacities but to a widening of markets and technological innovations as well.

Fourth, the transfer of technology must also occur among the developing countries themselves.

With these premises we should be ready to extend our hands on an equal cooperative basis. The important aspect is not to react, but to act now.

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LITERATURE CITED

- Beller, William J. Ocean Islands--Considerations for Their Coastal Zone Management. *Journal Coastal Zone Management*, 1. 1973.
- Brown, Norman L., and James W. Howe. Solar Energy for Village Development. *Science*, 199. 1978.
- Caribbean Research Institute. Proceedings of the Conference on Energy Self-Sufficiency and the Virgin Islands. College of the Virgin Islands, St. Thomas, U.S. Virgin Islands. 1978.
- Commonwealth of Puerto Rico. Puerto Rico and the Sea. Report to the Governor of Puerto Rico, San Juan, Puerto Rico. 1974.
- Commonwealth Science Council. Report on the Project Group Meeting on Alternative Energy Resources. Bridgetown, Barbados. 1977.
- Commonwealth Science Council, et al. Report of the Workshop on Energy Accounting for the Caribbean Subregion. Organization of American States, Office of Energy of Puerto Rico and Center Energy Environment Research/University of Puerto Rico, San Juan, Puerto Rico. 1979.
- Cox, Winston. Energy Consumption and Economic Growth: A Study of the Barbadian Experience, 1960-1977. *Central Bank of Barbados Quarterly Report*, 5. Bridgetown, Barbados. 1978.
- Crommett, Eugene C. Islands . . . and the Sea. Preprint. To be published. Department of Architecture and Urban Planning, University of Puerto Rico, San Juan, Puerto Rico. 1975.
- Donovan, et al. Caribbean Region Solar Cooperation Study. Donovan, Hamester and Rattien, Inc. for the U.S. Department of Energy. 1979.
- Energy User News. "No Honeymoon in Caribbean as Energy Costs Soar." Sept. 11, ed. 1978.
- Gardner, Kenneth. Solar Cooling in the Tropics. *Sun World*, 2. 1979.
- Governor, Netherlands Antilles. Notes on the

- Caribbean Refining Industry and Its Structural Dependence Upon United States Energy Needs. Informal white paper. 1978.
- Hayes, Denis. Energy for Development: Third World Options. World Watch Paper No. 15. 1977.
- Lalor, G.C. Role of the University in Assisting Development of Alternate Energy Sources. Report on the Project Group Meeting on Alternative Energy Resources, Commonwealth Science Council. Bridgetown, Barbados. 1977.
- Lovins, A.B. Soft Energy Technologies. Annual Review on Energy. 1978.
- Muffler, L.J.P. and B.E. White. Geothermal Energy. Science Teacher, 39. 1972.
- National Academy of Sciences. Renewable Resources and Alternative Technologies for Developing Countries. Washington, D.C. 1976.
- New York Times. "Industrial Economics and the Bitter Oil Pill." June 29, ed. 1979.
- Norman, Colin. Soft Technologies, Hard Choices. World Watch Paper No. 21. 1978.
- Oduber-Quiros, Daniel. El Caribe. Second Caribbean Conference. Trade Investment Development. Miami, Florida. 1979.
- Oil and Gas Journal. Refining and Gas Processing. Worldwide Directory, 34th ed. 1976.
- Rensberger, Boyce. Technology Spreading in Third World. New York Times. April 10, ed. 1979.
- Schumacher, E.F. Small Is Beautiful--Economics as if People Mattered. Perennial Library. 1973.
- Tenth World Energy Conference. Proceedings. Istanbul, Turkey. 1977.
- U.S. AID. Alternative Energy Workshop. U.S. Agency for International Development. Bridgetown, Barbados. 1979.
- West Indies and Caribbean Yearbook. 1978.
- Western Geophysical, Inc. Offshore Geophysical Investigations. Environmental Report. Puerto Rico NORCO-SAR. U.S.A.E.C. Docket 50-376. 1974.

STATEMENT BY JAIME HURTUBIA

My presence here as the Deputy Regional Representative of the United Nations Environment Programme (UNEP), Regional Office for Latin America and the Caribbean, illustrates our great interest in the outcome of this Conference. UNEP, as a coordinating organization within the U.N. system, everyday is giving increasing attention to programs relating alternative patterns of growth to life styles; and correspondingly, to the conceptual framework of the interrelationships between environment and development.

I seems to me that this "Conference on Environmental Management and Economic Growth in the Smaller Caribbean Islands" could give us very important suggestions for actions by UNEP. We are willing to receive from this meeting concise and concrete proposals for such actions. We expect in our coordinating capacities within the U.N. system, and using the resources of our environment fund, to act on your proposals in the near future. This is our direct statement to this meeting.

We do expect the Conference to clarify their priorities so we may determine where we should put our attention in the future. On the activities that we are undertaking at the present moment in the Caribbean region, my colleagues will give you comprehensive and detailed presentations.

I would like to stress that what they will present to you during this Conference is one of our first attempts to find and define areas of cooperation with Caribbean countries. This is our first step in our very young program in the U.N. system. And it would be a great satisfaction for me to collect your suggestions and proposals for action. I have instructions from my Executive Director to say that UNEP will do its best to look for additional help from funding agencies and from other specialized agencies of the U.N. system in order to implement the suggestions arising from this meeting. In this effort, we expect to have a great deal of additional and very important support from the UNDP and other specialized agencies.

STATEMENT BY ARSENIO RODRIGUEZ

I understand that you have received in the course of this week a small hand-out, a brochure, answering the question--What is the Caribbean Environment Project (CEP)? Nevertheless, I shall try to identify briefly the major elements of this program, and its relationship to this Conference.

The Caribbean Environment Project, which was requested of the UNEP Governing Council by governments from this region back in 1976, contemplates the development of a plan of action for environmental programs in the region, basically trying to identify its environmental needs, and to promote the type of development that would minimize the negative side effects of development. It is recognized within the context, the conceptual framework of the program, that the basic need of the countries of the Caribbean region is to develop in order to satisfy the basic aspirations of their people. But within this, the development process, there are a series of areas in which, by paying heed to the environmental realities of the region, the type of development that results would be suited to ecological realities. Therefore, you would have development without major negative impacts, which in the long run would be very expensive and would affect the sustainability of the development process itself.

The approach to develop this CEP plan has been through extensive consultations with the governments of the region. We also have an Advisory Panel, which provides a geographical spread of individuals across the wider Caribbean region, which I perhaps should define now.

It is indeed very wide. It takes in the Gulf of Mexico and the Caribbean Sea and the bordering countries. The Advisory Panel has highlighted in both of its meetings that small islands should be paid special attention in the development of the action plan. Therefore, our interest in participating as cosponsors of this Conference is aimed at receiving the input from the delegations of the smaller islands and the other participants as to their needs and priorities. The plan of action, as I said before, has been sought out basically through extensive consultations, which up to this point have been individual consultations. There is forthcoming, however, a formal consultation with government-nominated experts, which meeting is going to be held in Venezuela in January 1980. We see your meeting, this meeting being held right now, as an important source of identifying the special needs of the islands, which needs the Advisory Panel has asked us to determine.

We hope that out of this Conference we can get enunciated a strong position from the islands, which they could then carry to the government-nominated experts' meeting in Venezuela. The islanders would identify the concrete proposals that should be incorporated in the action plan, and we could move ahead into the next phase, which would be implementing these programs through financing, and sources of financing, which would be made available from the international system, both through multilateral financial agencies and bilateral financing agencies.

I would like to make one thing clear: the action plan for the Caribbean, the Caribbean Environment Project, has as its main objective to identify environmental needs and propose specific programs of action to satisfy these needs. We have been asked, as part of our consultation process to pay special attention to the smaller islands. We have not, of ourselves--we are a very small staff--identified any priorities for action because we think these must come from you. We expect that the consultations that we've had, in private, with your individual governments and collectively with delegations present here, will result in a coherent

position as to what are the principal needs of the smaller islands that could be effectively addressed by this program.

I want to stress that the most important thing is to identify the mechanisms for cooperation and, with respect to the opportunities for financing and technical aid, how should these be channelized to help you satisfy your identified needs and the solution to your identified problems.

This basically summarizes what the Caribbean Environment Project is, with particular reference to the smaller islands; and explains why I have been stressing so much the need for you to identify as concretely as possible--your priorities, your needs, and the mechanisms that would be satisfactory to you to achieve satisfaction of these needs.

UNESCO/UNFPA/ISER MAN AND THE BIOSPHERE PROJECT: STUDIES ON POPULATION, DEVELOPMENT, AND THE ENVIRONMENT IN THE EASTERN CARIBBEAN

Christine Barrow*

INTRODUCTION

This project follows an earlier pilot project in the eastern islands of Fiji, conducted in 1974-1976. Its broad purpose--to examine the relationships between population, development, and the environment in island areas--is similar but whereas the Fiji project was carried out in a group of sparsely peopled islands which form part of the national periphery of a single archipelagic nation, the eastern Caribbean project will be conducted in three island countries which have been densely occupied for a long period of time and have for many years been regarded as classic examples of "overpopulation" in relation to limited natural resources.

The three island countries to be studied are, however, strongly contrasted in many ways. Barbados, the most densely populated of the three, is also the most highly urbanized and the most developed. Though its agricultural economy still depends overwhelmingly on sugar cultivation, this is of declining relative importance in an economy which includes also a major tourist industry, a significant manufacturing sector, and a port of regional significance. All parts of the island are closely connected with the capital, and with some two-thirds of its population living in urban or partly urbanized clusters, there are many respects in which Barbados can be regarded as a small "city-state." Within the Caribbean region it is classed as a "more-developed country."

St. Lucia, the second island on which work is to be carried out, is larger--about equal in area to Singapore--with less than half of the population of Barbados, but is also far more mountainous. Since the Second World War, a former sugar economy has been completely replaced by cultivation of bananas for export, and together with food crops and coconuts, this industry dominates the larger part of the island. Even so, there is substantial urbanization, and major ef-

orts to diversify the economy have been made in recent years with the establishment of significant tourist and manufacturing industries. Transformation of the environment is rapid, and whereas the Barbados environment may be regarded as "managed," that of St. Lucia is in a highly dynamic condition.

Planned work on St. Kitts/Nevis/Anguilla depends on the availability of funds, for costs have risen steeply since the project budget was drawn up. Work in this smaller island country would concentrate on Nevis, a relatively dry volcanic island in which sugar production has declined to a minor role and a large part of the island is now grazed by livestock. Tourism is expanding, but remains on a small scale, and a principal role of the island is the supply of food to more highly urbanized St. Kitts. The land-population ratio is lower than on the two other islands for study.

CORE ACTIVITIES OF THE PROJECT

With three island countries so different in economy, environment, and population, it is evident that the research tasks carried out will differ greatly from one country to another. Population trends are sharply contrasted; each island has very different environmental problems; the level of development and the nature of the economy are quite different in each island. Moreover, the state of research already done differs greatly between the countries; far more work has been done on Barbados than in the other countries, and the quality of the data available is much higher. In Barbados it will be possible to model an integrated population/development/environment system at a level of sophistication not possible in the other countries.

There are, however, certain central questions around which work will focus on all islands. They may be briefly described in the following terms:

a. Competition for the allocation and use of limited resources, and the consequences

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of that competition. "Resources" in this sense include not only the natural resources of land, coasts, and seas, but also skilled and unskilled manpower and the financial resources available in economies of limited size. This question will be studied objectively, with emphasis on changes in the balance of competition that have taken place in recent decades, and also in perceived terms, with inquiry both into the perception of decisionmakers, and of a sample of the people of the islands.

b. Vulnerability both of ecosystems and economies to external forces of both natural and human origin. There is evidence that the island countries are strongly contrasted in this respect, and the seemingly greater adaptability of the Barbadian economy--which suffered less from the economic crisis of the early 1970s than most other Caribbean countries--is a matter of particular interest. On the other hand, there are elements in the natural environment of all the islands that are quite seriously liable to erosion, and great differences in the degree to which these dynamic problems are subject to management. The sharp contrast in fertility trends between the populations

of Barbados, on the one hand, and St. Lucia and St. Kitts/Nevis on the other, entails important differences in vulnerability to problems posed by rapid population growth, and there are also important differences in the conditions of environmental health between the islands.

c. The question of the concept of "carrying capacity" was explored by different means in the Fiji project in the context of basically agricultural economies with very limited use of extra-somatic energy. It will be explored further in the much more complex conditions of the eastern Caribbean islands, not only with regard to the population as a whole, but also with regard to the capacity of these islands to continue support of a rapidly growing visiting population of tourists; the latter aspect will be explored through the impact of tourism on other sectors of the economy, its role in increasing vulnerability, and its effect on resource competition. All three central questions are therefore linked, and the ultimate focus--to be developed in theoretical as well as pragmatic terms--will be on the question of the carrying capacity of territories with limited resources.

STATEMENT BY WILLIAM S. BELLER

Let me quickly proceed from what Dr. Barrow has said, and her introduction of the Man and the Biosphere (MAB) Program, which was started by UNESCO as a result of the Stockholm Meeting in 1972! Speaking as a chairman of one of the directorates of Man and the Biosphere, the United States program, I would like to say that the United States has taken very seriously the recommendation that man's relationship to his environment and to his habitat be examined, and that this relationship be used or rather understood for the betterment of man.

I would like to identify some of the areas in the Man and the Biosphere Program of the United States because I shall refer to them in a moment. There are at present 25 Federal agencies involved in the Man and the Biosphere Program. Several hundred of the nation's top scientists and administrators are also actively participating. This is a pool of talent of tremendous value. The Directorates that might have information and competence that possibly would be of interest to the smaller islands are :

1. Tropical Forests: the ecological effects of increasing human activities on the tropical and subtropical forest ecosystems.
2. Fresh Water: ecological effects of human activities and the value and resources of lakes, marshes, rivers, deltas, estuaries, and coastal zones.
3. Islands: the ecology and rational use of island ecosystems.
4. Biosphere Reserves: conservation of natural areas and of the genetic material they contain.
5. Pesticides and Fertilizers: ecological assessment of pest management and fertilizer use on terrestrial and aquatic ecosystems.
6. Engineering Works: these are dams and such, effects on man and his environment of major engineering works.
7. Urban Ecosystems; the ecological aspects of urban systems with particular emphasis on energy use.
8. Demographic Change: interactions between environmental transformations and the adaptive, demographic, and genetic structure of human populations.
9. Perceptions of Environmental Quality.

The Directorate that in association with UNEP/ECLA/Caribbean Environment Project conceived and organized the present Conference is Directorate 7B, the Caribbean Islands Directorate. We do have a Directorate 7A and that deals with Pacific Islands. The Directorate 7B, again in conjunction with CEP, was able to arrange for the sponsorship and funding of the present Conference; and we are all looking ahead to see what else we can do to contribute to the Conference; to this end, we shall publish the Transactions. I hope to get them into your hands very soon.

Looking ahead, the Directorate 7B can help you in coordinating any of the needs that you can identify or any information you might seek with the other Directorates of Man and the Biosphere in the United States. That rather lengthy

list I read to you illustrates the type of talent that might be available if you desire information that is available in the United States.

We can also assist you, specifically, in accessing particular United States information and institutions. I believe that yesterday, Mr. Pedro Gelabert, who is a member of the Directorate, spoke of the assistance that he might be able to give you as Chairman of the Environmental Quality Board of Puerto Rico. I would like to speak of the members of the Directorate who can be reached individually or through its Chairman, to assist you in any problems within our capability--Mr. Pedro Gelabert, whom you do know; Dr. Fuat Andic, University of Puerto Rico, Professor of Economics; Dr. Cerame-Vivas, Professor of Marine Ecology, University of Puerto Rico; Dr. Edward Towle, President of the Island Resources Foundation, on environmental questions; Dr. Juan Bonnet can be reached through Dr. Modesto Iriate. Dr. Juan Bonnet is an energy specialist and was one of the Directors of the Power Company in Puerto Rico for a long time; he's now Director of the Center for Environmental and Energy Research; Mr. Cruz Matos of the United Nations Development Programme, also a member of the Directorate; Dr. Ariel Lugo, an ecologist now on his way to help Dominica. In my own capacity as an official at the U.S. Environmental Protection Agency, I believe I might be able to access some information.

We are willing to work in collaboration and cooperation with any of the smaller islands in a quick reaction program of striving with you to try to get funding, and to get the experts and designs for short-term workshops. And we could establish workshops on erosion and soil conservation, specifically dedicated to solving particular problems; or we could have a workshop on coastal zone management. We could have another on solid waste disposal questions; another on project evaluation and the environmental consequences; another on alternate sources of energy with particular reference to garbage recycling, possibly for energy. These are merely suggestions and in the discussion period if there's any interest, please get in touch with any member of the Directorate or with me, and we will see where we can proceed from there.

STATEMENT BY MAXIMO CERAME-VIVAS

I would like to offer the following suggestions, which have been made in private to the delegate from St. Kitts/Nevis/Anguilla but which I think should be made public at this meeting. And our suggestion extends to other institutions in this area that could take some advantage of what is proposed.

Comments have been brought forth to the effect that a workshop is needed, and I offer, then, the University of Puerto Rico, which could set up workshops tailor-made to your needs, but you would have to tell us what your needs are. And these workshops could take one or two weeks, and they could be double-barreled: they could either be workshops where you would come to the University of Puerto Rico; this would perhaps be the case when you wish to use some facilities that may be unique to use, or some of our equipment; or we could bring the workshop to you, in which case a staff of two or three professors would come down, those that have expertise germane to the subject. They would visit your place, and train your people in your house, on-site. These workshops would have to be administered through the University of Puerto Rico but they would carry no academic degree or credit, inasmuch as such a degree would require that you apply into the University with the formal rigamarole of college entrance examinations and so on.

And many of the people who might take these workshops might not be University students or University people. However, they could be set up through mechanisms we do have and these are the extension service, which is a branch of the University that caters especially to this kind of thing; or to the institution to which Dr. Modesto Iriate belongs, which is represented here, the Center for Environment and Energy Research (CEER). The CEER is unique in that it responds to no faculty of the University; it responds only to the President; and responding to the President, it is divorced from the restrictions imposed upon different departments by individual faculties, from admission requirements, residence requirements, and such concern.

The Department of Marine Sciences has been able to offer such workshops in the past. And I can give you just one example: we have offered training to the Puerto Rican police department in rescue underwater work, navigation underwater, diving physiology, and matters of this type. Special curricula could also be offered, and these curricula could be one or two years in duration, and the result of that would be a diploma that would grant, that would call the individuals who participated, Associates in the given field. Associates in Engineering, for example, if it were coastal erosion; or Associates in Marine Sciences, if it were fisheries or any of the marine-science related aspects.

But I would like to indicate to you that there are already existing programs within the University and at other universities for support of what we call "foreign students," and this means individuals from outside Puerto Rico. So there may be funds available already for students coming to the University from other countries. In addition to that, we offer the usual programs, of course, Master's and Ph.D, but this would be subject to the University constraints of academic standing and scholastic aptitude.

What I'm trying to say is that, at the University of Puerto Rico, we have access to a number of facilities and people, and if a request came from you to us, through MAB, or through any other of the groups here, we would seek the collaboration of all the expertise that you and we think is required. For example, at the Environmental Quality Board, which is also represented here by Mr. Pedro Gelabert, there is a staff of the environmental managers, the real "nuts and

bolts" people who go out and sample streams and bring lawsuits against the polluters and against those who infringe upon regulatory constraints.

So we have some expertise on the island and this is carried in CEER, Department of Marine Sciences, Environmental Quality Board, Department of Natural Resources, which handles such things as turtle protection. In summary, if you came to us with a concrete proposal as to what you need, we'll be very happy to work with you.

SUMMARY OF SESSION V - MORNING

Elinor Gittens

The focus of this session was on the opportunities for technical cooperation among Caribbean islands in the area of environmental management. The Conference considered papers entitled "Opportunities for Technical Cooperation for the Lesser Antilles With Respect to Development of Alternative Sources of Energy" and also "UNESCO/UNFPA/ISER Man and the Biosphere Project: Studies on Population, Development, and the Environment in the Eastern Caribbean.

The first paper gives a brief background of the LDCs and looks at their dependence on imported petroleum and economic restraints. It suggested that the hope for solving their energy problems rested on utilization of their common geographical and ecological situations. Natural energy resources exist in the region and include solar radiation, ocean currents and thermoclines, wind, and geothermal formations. It was suggested that these energies be redirected to meet the human needs of the population. Further, the paper discussed different energy efforts and also suggested different approaches to meet the objectives.

There was much discussion on the area of opportunities for technical cooperation in the Caribbean. It was stressed that a regional or subregional approach to deal with common problems was most important. These regional or subregional efforts should not compete with but rather should aim at the strengthening of national institutions. The regional approach needed to be flexible enough to accommodate national differences while at the same time providing a framework or guideline within which national decisionmakers can operate.

Certain specific areas were presented as areas where further assistance was needed. Appropriate training in environmental management was a priority area as far as many of the delegates were concerned. Other areas mentioned included soil conservation; nature reserves; turtle protection; mariculture; wildlife protection; workshops; long-term training programs; development of environmental management planning; oil spill contingency plan; a socio-economic impact of oil reserves on small states; and restructuring of institutional arrangements.

Attention was given to the proposed Environmental Management Advisory Council for the small Caribbean islands. Tentatively, this would include economists, town planners, ecologists, biologists, and other professionals working in environmental management in the region. The proposal calls for the creation of a council consisting of four committees: research and development, information, project coordination, and membership and finance. The proposal is outlined below.

PROJECT PROPOSAL:	Creation of an Environmental Management Advisory Council
SCOPE:	Small Caribbean Islands
MEMBERSHIP:	Economists, town planners, ecologists, biologists, and other professionals working in environmental management in the region.
STRUCTURE:	Cadres of professionals, cross-listed by profession, interests, and project experience.

COMMITTEES:

Research and Development: In conjunction with individuals and organizations, the committee would undertake research on specific problems and techniques relevant to regional concerns.

Information: This committee will undertake to monitor publications and research in progress in other regions relevant to Caribbean interests. It would make this information available on request. The committee would be an information clearinghouse.

Project Coordination: This committee would take charge of allocating the services of council members to projects in member islands. It would monitor and coordinate expert activities and suggest improvements in operating procedures.

Membership and Finance

SOURCES OF POSSIBLE FINANCIAL SUPPORT:

U.S. Agency for International Development
British Development Division in the Caribbean
UNDP, Regional Project Funds
Rockefeller Brothers Fund

In addition to direct financial assistance, the services of experts might be made available to the council.

The Conference was also reminded that the CARICOM Ministers of Health had agreed in principle to the establishment of an Environmental Management Institute for the English-speaking Caribbean. A CARICOM/PAHO-sponsored feasibility team with representatives from CARICOM, CEPIS, Jamaica, the University of the West Indies, and St. Lucia, after consultation with officials in CARICOM countries, reported that the institute should deal not only with environmental health as was originally proposed, but with the general area of environmental management. A feasibility study has already been done and it was presented to CARICOM Ministers of Health in 1979. The facilities at Bellier Institute in St. Lucia have been offered by that country to the region to be the site of the new institute. The institute would perform a coordinating role to strengthen existing institutions in the region. It was suggested that the institute be involved with research; information dissemination; project evaluation and implementation; and training. Among those indicating interest in giving financial assistance were UNEP, U.S. AID, and PAHO.

The Conference was also reminded of the U.N. Statistical Office program on the environment. Five regional workshops are planned on the subject. The first workshop is planned for January 1980 and would deal with the Caribbean. Furthermore, UNEP, on the request of governments has been sending experts to countries in the region, especially in the area of environmental legislation.

AID FROM THE BRITISH GOVERNMENT TO THE COMMONWEALTH CARIBBEAN

VOLUME OF AID

In 1977 (detailed figures for 1978 are not yet available), gross disbursements of British official aid, that is excluding private investment and gifts from nongovernmental organizations, added up to some £600 million worldwide. Of this some £16 million went to the Commonwealth Caribbean (see Annex A for details) under bilateral, or government-to-government arrangements, plus a further amount which came indirectly through various multilateral organizations partially funded by Britain, including CDB, UNDP, the EDF, and CFTC. Bilateral aid comes in a variety of types and on a variety of terms.

TYPES OF BILATERAL AID

<u>Financial Assistance</u>	<u>Technical Cooperation</u>
Budgetary Assistance	Education and Training in Britain
Project Aid	Third-Country Training
Program Aid	Supply Advisers/Consultants
Food Aid/Fertilizer Aid	Supplementation
Disaster Relief	Volunteer Programs
Debt Relief	Educational Assistance
Pensions	Research Assistance

TERMS OF BILATERAL OFFICIAL AID

Most of the aid given to the Caribbean LDCs is on grant terms, with no restrictions on the proportion which can be spent on local costs, although Grenada has also received some aid in loan form.

AID STRATEGY

Britain's global aid strategy is to concentrate its aid program on the poorest people in the poorest countries. This is currently defined as those countries with a per capita income of less than US\$280 in 1976 and no Commonwealth Caribbean countries fall within this category. More specifically there have been efforts to help the rural poor in agriculture, in basic education, health care, and nutrition. In practice the "rural poor" orientation is fairly broadly interpreted,

reaching into such areas as food processing and rural power supply. While the Caribbean is demonstrably not the poorest region of the Third World, Britain has had a relatively large, in per capita terms, aid program for over 20 years in recognition of both its close association with the region and the particular problems of small island states. In recent years the emphasis has been on projects which will create employment and income, rather than on basic infrastructure. In a number of the islands we have supported "self-help" programs designed to involve people at village level.

Apart from the normal aid program described in Annex A, Britain, for example, pledged £18 million last year and a further £5 million this year to Jamaica through the Caribbean Facility to assist with its balance-of-payments problems. Special programs have also been mounted in the last year in Belize and St. Vincent for reconstruction after hurricane and volcanic damage. We will, of course, be playing a part in the international aid effort required to reconstruct Dominica's shattered economy. The exact long term needs have not yet been established, but so far Britain has spent £100,000 on immediate relief assistance.

AID ADMINISTRATION

British aid is always dealt with on a government-to-government basis, which means that all requests have to be put through the appropriate government department in the recipient country--usually the foreign affairs or planning ministry. The Overseas Development Administration of the Foreign and Commonwealth Office is responsible for deciding on the allocation of aid, but for the Caribbean LDCs most of these functions are delegated to the British Development Division (BDD). The BDD deals directly with the governments of the LDCs in administering the British aid program in these islands. Its staff of technical advisers can also act as a source of technical advice when required. In Barbados and Grenada a somewhat different system is in operation, with aid being administered by the British High Commission. In these cases, BDD provides advice to the High Commission.

ANNEX A

GROSS DISBURSEMENTS OF UK DEVELOPMENT
AID TO THE CARIBBEAN

Calendar Years 1976-78

	<u>£ Million</u>		
	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>1. Independent Commonwealth Caribbean</u>			
Bahamas	.039	.020	.029
Barbados	.263	.238	.313
Dominica	1.920	1.448	2.603
Grenada	.240	.484	.321
Guyana	1.402	.895	6.395
Jamaica	.921	.872	19.558
St. Lucia	2.964	.602	.580
Trinidad	.895	.181	.088
<u>2. Associated States and Dependent Territories</u>			
Antigua	.754	.855	.734
Belize	3.863	2.523	3.871
Montserrat	1.246	1.583	.481
St. Kitts	.941	.698	.721
St. Vincent	1.432	1.099	1.845
<u>3. Caribbean Regional</u>	.681	.053	.107
<u>4. Non-Commonwealth Caribbean</u>			
Dominican Republic	.039	.053	.107
Haiti	.038	.020	.006
TOTALS	<u>£17.638M</u>	<u>£12.021M</u>	<u>£38.074M</u>

NOTE: These figures include technical cooperation, together with investment by the Commonwealth Development Corporation.

OTHER UK AID

The figures above do not include UK assistance to the Caribbean provided through the medium of intergovernmental organizations such as the Caribbean Development Bank (CDB) and the European Development Fund (EDF).

- i. The UK is a member of the CDB and holds 17.65% of its capital stock. It has also pledged over the last

8 years £14.4M to the Bank's Special Development Fund. Disbursements on these pledges to the end of 1978 were about £4.3M.

- ii. Though not yet fully committed or disbursed, EDF IV allocations to the Caribbean ACP states and Overseas Countries and Territories (OCTs) total about £83M, of which 18.7% or £15.5M represents the UK contribution.

ANNEX B

BRITISH DEVELOPMENT DIVISION
IN THE CARIBBEAN

The British Development Division in the Caribbean (BDD) set up in 1965, is a regional office of the Overseas Development Administration of the Foreign and Commonwealth Office (ODA). Its area of operations includes:

British Dependent Territories

Anguilla
Belize
British Virgin Islands
Cayman Islands
Montserrat
Turks and Caicos Islands

Associated States

Antigua
St. Kitts/Nevis
St. Vincent

Independent Commonwealth Countries

Barbados
Dominica
Grenada
St. Lucia

Foreign Countries

The BDD advises and assists the ODA, the governments concerned, and British High Commissioners in independent countries on the planning and execution of aid programs with the region in accordance with British aid policy. In the present and former Associated States and Dependencies, the BDD is responsible for the management of the British aid programs within the limits of financial authority delegated to its Head by ODA.

The Head of the Division is also the UK Director on the Board of the Caribbean Development Bank.

The Division's work includes:

- i. working up and monitoring bilateral and subregional projects and programs; in 1978, aid to the above countries totaled over £15 million;
- ii. administering bilateral budgetary aid, which requires close monitoring of governments' recurrent budgets;

- iii. local administration of technical cooperation programs (including liaison with TCOs and processing training applications);
- iv. liaison with other donors, including Canada, the US, UN agencies, the Caribbean Development Bank, and the European Development Bank;
- v. provision of technical advice on a wide range of issues related to development; and
- vi. negotiating new aid agreements.

The Division's staff complement is as follows:

Head of Division: J.C. Edwards

Personal Secretary: Miss J.C. Giles

Dominica:

Antigua:

St. Vincent: B.A. Thorpe, Financial Adviser

St. Lucia: M.C. Wood, Executive Officer

St. Kitts:

Belize:

Caymans: Ms. A. Archbold, Financial Adviser

Grenada: D.J.C. Taylor, Executive Officer

Barbados:

CDB:

Regional Matters:

Montserrat: W.J.R. Pincott, OBE, Financial Adviser

Turks and Caicos: M.P. Elliot, Executive Officer

British Virgin Islands:

Anguilla:

Training:

VSOs: P.W. Jesse, Higher Executive Officer

Assistance to Financial Advisers:

Office Manager: T.K. Dines, Executive Officer

Administration of Regional TCOs:

Assistant Office Manager: P.W. Little, Clerical Officer

Classified Registry:

Professional Advisers

Economic Adviser: D. Crapper

Engineering Adviser: P.H. Hilton, M.A.; C.Eng; F.I.C.E.; M.A.S.C.E.

Natural Resources Adviser: P. Tuley, M.B.E.; B.Sc; Dip. Agri. Sci; D.T.A.; M.I; Biol. F.L.S.

Senior Economic Assistant: M.G. Foster

Regional Technical Cooperation Officers

Regional Building Adviser: N.S. Bean, Dip. Arch.; R.I.B.A.

Regional Financial Adviser: D.G. Britton, OBE

Law Revision Adviser: Sir Clifford Hammett

Regional Social Development Adviser: J. Harrison

Regional Water Development Adviser: K.F. Sparkes, C.Eng; F.I.Mun. E.

STATEMENT BY STEPHEN FREE

Representative of the Canadian International Development Agency

When I first started to consider what I could most usefully say today, it became apparent that the potential scope of discussion for any conference dealing with environmental management and economic growth is indeed impressive. In its broadest scope, it could deal with perspectives on the need for global development through major structural reform as envisaged under the new international economic order. In a more limited sense, it involves assessing the impact of specific capital investments on the local environments.

I would, however, like to confine my remarks to examine very briefly, first, at the general policy level, and second, at a more practical level, the relationship of this Conference's emphasis on environmental management to Canada's development program in the eastern Caribbean.

First, at the most general level, the Canadian International Development Agency (CIDA), internally in its consideration of broad policy issues, has increasingly realized that environment and development must be seen as closely related sets of issues; that environmental and development problems are inextricably interwoven, and CIDA has been exploring at the policy level new approaches to development, perhaps best represented by the notion of "ecodevelopment," a term, I believe, first coined by Maurice Strong, when he was Executive Director of the United Nations Environment Programme.

The principles of ecodevelopment are basically: first, a focus on the basic needs of people to insure adequate food, safe water, clothing, and shelter for all; two, an emphasis on self-reliance, that is the ability of people to define and take advantage of experience in their own surroundings and circumstances; and third, establishing a true symbiosis between man and the environment. The important key in this approach is to examine the surrounding environment for the unrealized potentials it may well hold for meeting basic human needs.

Overall, therefore, within conventional aid programs, this means that projects must be appraised in terms of how well they can be expected to promote self-reliant, basic-needs oriented, environmentally sound development. It is, however, not realistic to expect that instant changes will occur at the operational level to accommodate basic strategies based on ecodevelopment concepts and guidelines. As such, one will continue to find some gaps between these overall policy perspectives and actual practices.

Since undertaking a major review of its regional strategy in 1976, CIDA's bilateral program in the eastern Caribbean has sought to emphasize the creation of productive and self-sustaining employment opportunities as its major objective. To achieve this objective, CIDA has recently focused efforts more heavily on identifying opportunities to increase agricultural production for domestic, regional, and export markets; to promote import substitution and exports by the expansion of the manufacturing sector; and to improve technical and managerial skills through training programs. CIDA believes that through a focus on productive employment generation and local wealth creation, that we can assist in the development of a local environment that furthers self-reliance and generates a domestic capacity for meeting individual basic needs, however defined. Having said this, it must be admitted that the composition of our current aid program still reflects an earlier orientation, which emphasized basic infrastructure development such as ports, airports, water supply systems, and in the broader sense, educational infrastructure. It is recognized that a change from a focus on infrastructure development to a productive employment strategy will be a

phased one, and that CIDA will continue to support infrastructure projects in the foreseeable future.

CIDA's assistance to the LDCs in the eastern Caribbean is normally either on a grant basis or a soft loan basis with a 96-percent grant element. Within our overall eastern Caribbean program, about 80 percent of the goods and services provided will be tied to Canadian sources, although the level of financing of local costs in any one specific project can be much higher depending on the nature and priority of the project. Disbursements in the Windward and Leeward Islands during the fiscal year 1978-79 were about Canadian \$7.5 million. They are projected at around \$8.5 million this fiscal year.

CIDA does recognize, I believe, that in the small island economies in the eastern Caribbean, there is a very real need not only to develop but also to protect the existing narrow resource base. In support of this, I would cite some of the following examples: CIDA has under consideration support for an FAO regional proposal to do an intensive survey of fishery resources of the coastal waters of the eastern Caribbean: to obtain an estimate of resource availability and sustainable yields on which to base the development of the existing fishery industries in the islands. Individual projects to assist in some of the local fishing industries are underway or planned in Grenada, St. Lucia, and Montserrat.

In St. Lucia, CIDA is also seeking approval for a proposed forest management assistance project, which will develop a reliable inventory of the island's forest reserves, obtain growth and yield data, and determine sustainable levels for an annual harvest that would allow the full and rational exploitation of timber. CIDA is also prepared to consider the integrated development of water catchment areas, proper soil and water management through terracing, crop planting patterns, drainage, etc., as an important potential for regenerating or expanding the renewable resource base for sustainable development. Assistance in such areas as reforestation, soil and water management, etc., are likely to be integrated together with components that will develop local agricultural production.

Finally, CIDA also provides assistance in training and education. This is done primarily through either specific project-related training most often involving on-the-job training of local counterparts, or through our third-country training program. This latter program focuses on longer term training requirements at the degree or diploma level using regional education or training institutions. At the most recent CGCED conference held in Washington last June, the Canadian delegation indicated it would consider any proposal to support a pool of experts common services-concept under the ECCM.

In addition to our bilateral program, I would also like to mention CIDA's support for the efforts of nongovernmental organizations in the region. Our new Conservative government has already indicated in some of its recent statements that it wishes to place greater emphasis on supporting nongovernmental initiatives in the development area. I believe that this is primarily a result of the recognition that self-reliant and environmentally appropriate development is often being promoted most successfully by Canadian NGOs (nongovernment organizations) working at the village level in developing countries.

Canadian NGOs have been very active in the eastern Caribbean, some of the organizations being Rotary and Lions Clubs, church groups, YMCA, YWCA, university groups, and [unintelligible on the tape.--*Editor's note*].

Again I would like to outline briefly several projects supported by CIDA's NGO Division, which I feel might provide some examples of the types of projects that CIDA through its NGO activities is willing to support in the area of environmental management and basic human needs. CIDA/NGO is supporting the activities of environmental resource projects such as a program for the management of conch and spiny lobster fisheries. This involves a relatively small-scale approach, where we would not overexploit local resources, which is aimed, in part, at introducing more appropriate harvesting techniques. Also involved

is a conch hatchery and growing-in facilities to increase local stocks of this important resource.

CIDA's NGO Division is supporting a local group in St. Vincent to develop a nutrition awareness program based on approved but locally developed and tested food preparations. The major objective of this group is to reduce the incidence of malnutrition by introducing high protein crops into the food production system.

The Canadian Rotary Club has launched a program in St. Lucia to design and test a wind generator for developing power for small land holders; to design and test solar panels for heating water; and also to design and test a refrigerator-freezer unit powered by solar energy. The eventual goal is to determine whether vital industry could be sustained for the manufacture and installation of such units once the basic designs are being developed. This project is being done with the assistance from the University of Wales, School of Engineering.

Finally in Dominica, CIDA had been supporting a project with the Canadian Nature Federation to develop the aspects of an existing national park. This involved development of trails, weather shelters, sanitary facilities, the visitor's centers, signs, publications, exhibits, etc., to better utilize these natural resources of tourism attraction but in an environmentally sound manner. In mentioning these examples, I hope I have been able to outline some of the areas where some opportunities for cooperation between Canada and the small Caribbean islands might exist, particularly in the areas of environmental management.

OPPORTUNITIES FOR INTERNATIONAL ASSISTANCE AND COOPERATION - CDB'S CONTRIBUTION¹

INTRODUCTION

Two observations must be emphasized at the outset. The first is that the Caribbean Development Bank (CDB) is a multilateral financial institution that can only do what is allowed in its Charter. Since CDB has comparatively little funds of its own but must depend heavily on members, donors, and lenders, it can only comply with the specific conditions attached by donors and lenders subject to the broad framework of the Charter. However, this control does not deny the fact that even with those, sometimes necessary limitations CDB has been able to respond to the real needs of its members by interpreting the Charter with as much flexibility as realistically possible and by actively soliciting, with encouraging success, appropriate funds on reasonable terms for its borrowing members and encouraging donors to develop and finance meaningful economic and social programs in its borrowing member territories.

The second observation is that there is a critical relationship between economic development strategies and environmental protection. In our region the "Environment is Everything" and given the small size of these territories and the obvious need for economic diversification, the frailty of our ecosystems and the need to plan to utilize and protect our environment to the full becomes even more critical though equally more difficult. Rest assured that CDB is cognizant of that frail symbiotic balance between environmental protection and economic development and will try to maximize the latter without disturbing the stability of the former. In fact CDB's concern with the environment spans three areas:

- i. the corrective which aims at improving the environment which has deteriorated through earlier neglect;
- ii. the defensive which attempts to minimize the environmental prob-

¹/ U.S. dollars are indicated unless otherwise specified.

lems attendant on traditional development strategies; and

- iii. the offensive and/or prescriptive which assists in devising development strategies aimed at extracting the most from the environment without upsetting its delicate balance. This involves programs for resource and environmental management.

The focus of this seminar is on the smaller territories. Of CDB's membership of 20, 16 have borrowed or are borrowing member countries. These have a combined population of 5.11 million persons using mid-1976 population figures. Thirteen of these borrowing members fall within the definitional parameters ²/ of the focus of this seminar, i.e., having populations of under 0.5 million, and have a population of 1.14 million or 22.4% of the total population of all CDB borrowing member countries.

BRIEF REVIEW OF CDB'S PAST CONTRIBUTION

During the period 1970-78, CDB approved a total of \$180.1m of which 72% or \$129.8m was to the smaller territories. Of a total of \$122.6m in soft funds approved, 84.8% or \$104m was to project and program loans in the smaller territories. In fact, if the program loans of \$18m channeled by the U.S. Agency for International Development (US AID) through CDB to Jamaica, Guyana, and Barbados were excluded, the percentage of soft funds approved to the other smaller territories would be 98% of total soft funds approved. The details are highlighted in the charts on the next page.

Table 1 on the next page highlights the relative emphasis, illustrated in per capita terms and softness of funds, which CDB has been paying to the smaller territories.

²/ While the focus is on islands, CDB takes the liberty to include its two borrowing mainland territories: Belize and Guyana with the former being classified as "a smaller territory."

Figure 1.--Distribution of Total Financing (Net)
(Both Hard & Soft)
1970-78

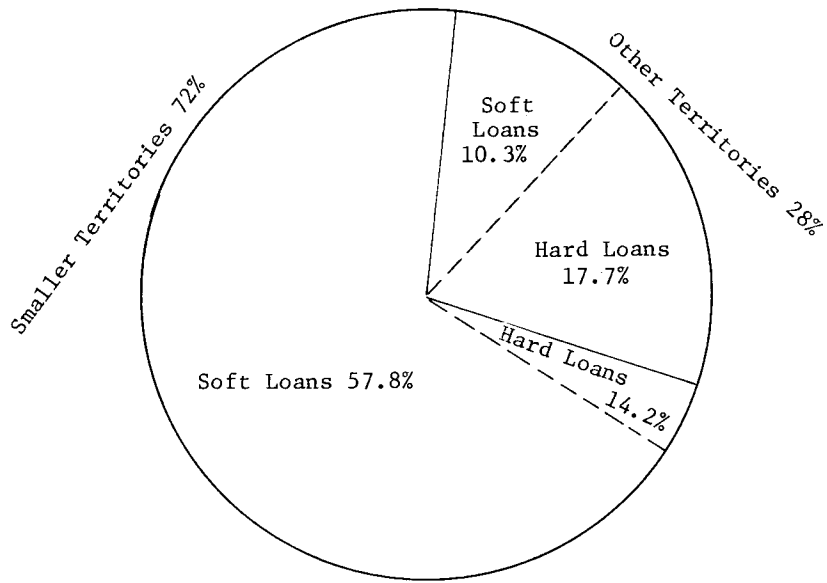


Figure 2.--Distribution of Soft Financing (Net)
Between Smaller & Other Territories
1970-78

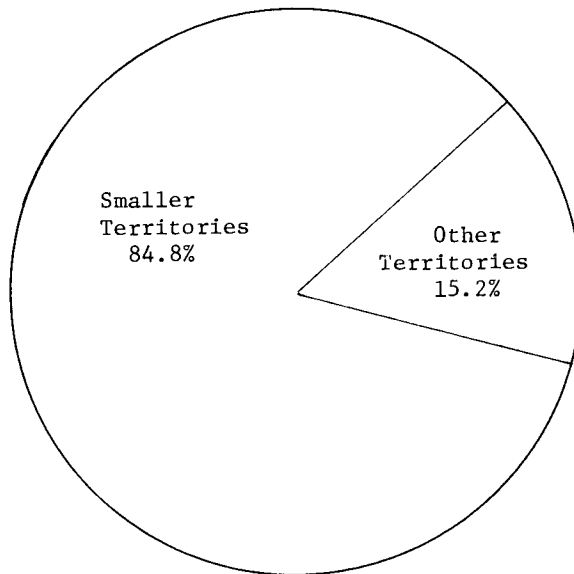


Table 1: Per Capita Approvals of Total & Soft Resources and Average Interest Rates for the Smaller and Other CDB Borrowing Member Territories, 1970-78

	<u>Smaller Territories</u>	<u>Other Territories</u>	<u>Total</u>
Total Approvals per capita	119.78	10.93	35.28
Soft Resource Approvals per capita	91.10	4.69	24.02
Average interest rates (%)	4.9	6.8	5.4

Recognizing that the smaller islands are almost wholly dependent on CDB for external development loan finance, the CDB emphasis has been toward accommodating their needs. Thus approvals per capita are 11 times as great for the smaller territories as compared with the other territories. Cognizant of the economic difficulties which these territories face and the need to reduce intra-CARICOM income inequality, the Bank's terms to these territories have been very concessional.

Thus soft resources approved per capita are almost 20 times as great for the smaller territories as for the others. As a result the lending interest rate spread between smaller and other territories is 1.9 percent in favor of the smaller and would have been larger but for the Caribbean Development Facility (CDF) loans and the presence of two better off smaller territories: Bahamas and Barbados. If CDF loans are excluded and if these two territories are excluded from the list of smaller territories the other 11 territories with populations ranging between 7,000 and 140,000 and per capita incomes ranging between \$309 and \$2,400 but averaging \$579 would have an average interest cost of funds of 4.7 percent.

CDB had at December 31, 1978 disbursements outstanding of \$96.8m of which the smaller territories were in receipt of 70% or \$67.8m with \$13.7m in hard resources and \$54.1m in soft resources.

Thus in approvals, disbursements, concessionality of funds, CDB has been, as provided under its Charter, discriminating heavily in favor of the smaller territories.

And in the foreseeable future CDB will continue to maintain that bias.

BRIEF PREVIEW OF CDB'S EXPECTED 1979-83 CONTRIBUTION

Financial

During the period 1979-83 CDB has programmed to lend \$315m in project loans to its member territories if the funds for that program are made available to CDB. This amount is not a "pie in the sky" figure. The program--notably the public sector investment program, containing the names of projects, estimated costs, timing, and necessary background work required prior to implementation--has been identified by the various governments with the assistance of the World Bank (IBRD), International Monetary Fund (IMF), United Nations Development Program (UNDP), and CDB. With the implementation of the Five-Year Public Sector Investment Program--of which the CDB identified program is only a part--together with the adoption of certain economic and fiscal measures both at the regional and national levels, it is expected that the Caribbean Group for Cooperation in Economic Development (CGCED) recipient territories will be placed on a path toward economic viability, a modicum of economic independence and help provide some of the minimum basic needs of the populations.

The country programs are much above \$315m and other agencies, notably the British Development Division in the Caribbean (BDD), Canadian International Development Agency (CIDA), European Economic Commission (EEC), and U.S. Agency for International Development (US AID), using the CDB as an executing agency, are expected to make substantial grant contributions to the LDCs while the MDC financing will come from multilateral lending institutions, commercial sources, and national savings.

The lending program exceeds an average of \$63m per year as compared with the \$20m average per year achieved during CDB's first 9 years of lending. If the program is achieved, and it is hoped that it will be, this will be more than a 200% increase in average annual lending as compared with the past. This amount is estimated to be a rough 1:1 ratio between hard and soft resources and it is programmed that the smaller territories should receive 73% of the total. Again if the better off smaller territories are excluded the allocated share to the LDCs would be 63%.

The Bank's sectoral emphasis in the smaller territories will be on productive

self-liquidating projects in the areas of crops, livestock, forestry, fisheries, processing, and lines of credit in the agricultural sector; industrial estates, manufacturing, and lines of credit in the industrial sector; hotels and support services in the tourism sector; sites and services, urban renewal, rehabilitation, and credit for low-income and middle-income housing in the housing sector; student loans; and infrastructure to include power, water, and airport improvements.

In addition, the Bank will finance productive infrastructure projects which will so increase output quickly that the public sector borrowers will be able to redeem the loan from taxes and other income accruing from the incremental output in such areas as feeder roads, and main road improvements. CDB recognizes that such other social programs as hospitals, primary school construction, administration buildings, and sanitation services are necessary to maintain and increase productive capacity and provide for basic human needs but feels that such projects whose benefits are not quickly and easily realizable should be funded on a grant basis by other donors.

In relation to terms of lending, the Bank will endeavor to continue the following for the smaller territories:

- i. Advance the best lending terms possible in terms of interest rates, grace, and repayment periods to projects but taking into account the availability of appropriate funds; the equitable distribution of such resources among the beneficiaries and the needs of the project.
- ii. Assist in the financing of projects of up to 100% of project cost depending on the needs of the project and of the borrower and of the availability to CDB of the type of funds which can be used to assist the borrower to meet what should be its normal contribution to the project.
- iii. Meet the local costs of projects with foreign exchange. This arrangement will ostensibly improve the balance-of-payments reserve position of these territories. But it should be noted that while this is designed to help the smaller territories, it could, if not properly monitored by both the Bank and the borrower, lead to a situation where the excess

foreign exchange is used to finance imported consumption and create a foreign exchange liability with no foreign exchange producing asset. For example, projects such as feeder roads and airport improvements have a high local cost component but can generate high incremental foreign exchange earnings; while water, on the other hand, has a high local cost component but earns marginal foreign exchange. Requesting and supplying all foreign exchange to finance the latter type projects may create later balance-of-payments difficulties.

So far the paper has been focusing on CDB's loanable resources to the territories and this is how it has to be since CDB is primarily a lending institution. However, the Bank, cognizant of the need for grant funds to finance social programs necessary to improve basic human needs in the smaller territories, has been soliciting grant funds from donors. To date many donors have responded to this call and one donor, US AID, has provided funds directly to CDB to finance programs in basic human needs in the smaller territories, but with particular emphasis on road maintenance, school renovation and repairs, provision of health centers, public buildings, and drainage; \$10.0m have been offered with \$8.0m to go to the ECCM territories and Belize on a grant basis and the balance to Barbados as a concessional loan. Other donors--also including US AID--either operate their grant programs bilaterally or through other regional agencies.

The Bank proposes to take a more active role in initiating cofinancing arrangements. Already the Bank has been involved in such exercises with the World Bank for projects in the other territories, but it is hoped that this practice can be extended to the smaller territories, particularly the LDCs and with other financing agencies. This proposed arrangement will minimize the problem identified at iii above, to the extent that cofinanciers use local resources. Further this will facilitate CDB in letting its credit be catalytic by having a multiplier developmental impact and hence induce more developmental capital and help develop a regional capital market.

One other aspect of financing which the Bank intends to look at is the sale of part of its more mature loan portfolio to financial institutions in the region which are prepared to provide medium-term credit. By this device the Bank will bring more finan-

cial institutions in the development process and increase its flow of loanable funds. This device has the advantage to the borrower of minimizing or eliminating currency exchange risks to the extent that local sources of funding and currencies are used to displace loans denominated in hard currencies or those with fluctuating exchange rates and such sales are made at opportune times.

To reduce unnecessary duplication of aid donor efforts at project preparation and appraisal, provide a forum to exchange ideas on problems encountered and solutions devised during project preparation and implementation, keep acquainted with other donors in the areas of financial and technical assistance, and to solicit assistance from each other in the interest of successfully and speedily implementing projects, the Bank has formally convened Aid Donor Coordination Meetings--four of which are to be held annually with each focusing on a particular sector or a group of related sectors. The exercise has proven most useful and is expected to continue.

CDB's Technical Assistance Fund

Since its establishment in 1970, CDB has provided increasing amounts of technical assistance to borrowing member states particularly the LDCs. This has been necessary because it is recognized that a major obstacle to the timely and effective utilization of the increased flow of resources to the region is the shortage of middle- and higher-level management, administrative, and technical personnel which imposes a severe limitation on the capacity of borrowing member states. CDB estimates that at least 30 percent of its staff's time is spent on project preparation, but while the demand for project preparation continues to increase, there is an increasingly significant demand for nonproject-related technical assistance.

In 1978, in cooperation with other donors active in the region, that is, Canada, Trinidad and Tobago, UK, USA, Venezuela, CDB established a Technical Assistance Fund, in the sum of US\$4 million. At least 70 percent of the resources of the Fund are to be directed to the LDCs and the balance to the MDCs and regional institutions.

The Fund's resource is to be allocated to four areas of technical assistance, that is general development, pre-investment and project preparation, project implementation, and bank development.

The general development component of the Fund will permit the CDB to respond to non-project-related needs. The pre-investment

and project preparation component allows CDB to assist by providing financing for consultants to prepare projects, while the project implementation component provides CDB with the capacity to finance relevant personnel to assist in the implementation of projects thus reducing the delays presently experienced. The bank development component is designed to assist CDB by providing in-house expertise for fields in which CDB presently has no capacity.

The resources of the Fund can be utilized on a grant, loan, or contingently recoverable basis.

In addition to its Technical Assistance Fund, CDB has negotiated resources for technical assistance purposes from the IDB and the EDF. A portion of the contribution of some of the donors to CDB's Special Development Fund can also be used for such purposes. All these resources can be used to finance project preparation and pre-investment studies, either on the basis of a contingent recovering loan or on a grant basis.

In cooperation with US AID, CDB has recently become involved in an Alternative Energy Systems Project, which would permit the development of energy policy, assessment of energy needs, and the execution of alternative energy subprojects in borrowing member countries using increased energy resources and the dissemination of the relevant information.

CDB has also recently established a Technology Information Unit which would assist in insuring that the design of projects takes into account the appropriate technology needs of CDB's borrowing member countries taking due regard of the labor surplus situation in the region.

All of the above projects will be of direct benefit to LDC borrowing member countries given the dearth of qualified personnel, and the fiscal and balance-of-payments problems attendant on the onset of the oil crisis of 1973-74.

Training

Having established the Fund and cognizant of the dearth of qualified personnel, CDB has gone further and is gearing itself to not only assist in financing personnel, but provide training for personnel in the borrowing member countries, particularly in the area of project administration, with the goal of building a permanent capacity within member states to prepare and administer projects. To this end, CDB, after consulta-

tion with various donor agencies, intends to establish a Project Administration Training Unit with the aim of training 250 persons at the upper levels of the public sector--and to a lesser extent the private sector--in project administration. The mechanism for this will be a series of intensive 10-week regional courses drawing participants from all borrowing member states, particularly the LDCs. In addition it is proposed to train a number of persons at the intermediate level of the public services. The program is scheduled to begin in 1980 with a projected duration of 3 years.

A Student Loan Scheme which so far has provided or is providing training to over 500 students in the smaller territories--excluding Barbados and Bahamas--will continue. The emphasis on middle management and technical/vocational training at regional institutions will also be maintained to alleviate the acute shortage of that type of personnel.

CONCLUSIONS

The Bank would be amiss in its responsibility if it did not use this forum to exhort borrowers and their decisionmakers and project implementors to assist it in fostering the growth, development, and economic integration of the region. The Bank will just here repeat some of the recommendations addressed to national borrowers, made by the CDB President in his last address to the Board of Governors. These include:

- prepare flexible "rolling" development plans outlining objectives, priorities, policies, strategies, programs, and projects;
- mobilize local funds to serve as counterpart financing for what should be self-liquidating projects;
- capture the financial benefits from directly and indirectly self-liquidating projects--particularly public utilities and certain infrastructure projects--in an attempt to reduce fiscal burdens, to keep the efficiency of the projects and their executing agencies under continual review and to allow the projects to

generate some funds for reinvestment.

- take the urgent DFC problem seriously and restructure the national DFCs by providing adequate capitalization and liquidity, sound and adequate management and staffing, proper interest-rate "spreads," amalgamating public sector financial intermediaries and providing these institutions with broad and general policy directives and targets and assessing them on the basis of their attainment of these targets;
- clarify the role of the private sector in the national economies;
- attach priority to the reorganization of the public sector--both government ministries and statutory corporations--in an effort to increase that sector's efficiency;
- provide professionals employed in the public sector with the right environment within which they can function to the best of their ability;
- accept the fact that some conditionality on loans cannot be avoided;
- recognize that interest rates must to some extent reflect the scarcity of capital and accept that viable projects can bear reasonable interest rates;
- adhere faithfully to any scheme for industrial programming developed at the regional or subregional level;
- show greater willingness to participate in regional projects which can benefit the country, even if such a project is not located in the home country; and
- accept that a modicum of effort is necessary to make the maximum use of CDB funds.

ENVIRONMENTAL MANAGEMENT AND ECONOMIC GROWTH IN THE SMALLER CARIBBEAN ISLANDS

Norman S. MacLean *

Abstract.--All developing countries, islands or the mainland, are beginning to recognize the need for an environmentally sound and self-sustaining development based on a fully integrated planning process. The Inter-American Development Bank Board of Executive Directors has recently approved a policy on environmental management to assist member countries in Latin America and the Caribbean to achieve that result. For those smaller islands which are associated with the Caribbean Development Bank, the Inter-American Development Bank (IDB) is prepared to discuss with the CDB how we can cooperate with them and other agencies in the Caribbean area. It is apparent that training of environmental technicians and the establishment of appropriate institutions for environmental management is a high priority.

INTRODUCTION

Tropical islands or temperate mainland countries require a strategy which recognizes the need for an environmentally sound and self-sustaining development based on a fully integrated planning process. This is not only necessary if costly mistakes endangering the quality of life are to be avoided, but also to obtain the financial assistance of international lending agencies for economic development.

Nations, international organizations, as well as the public in countries around the world are showing an increasing commitment to an overall environmentally sound development perspective as contrasted to a more fragmented approach which has been traditional. New areas of concern, in addition to pollution, include pressures on land, exhaustion of forests, soil erosion, soil fertility, depletion of water and increasing desertification, to cite a few. The emphasis is gradually turning to environmentally sound practice as a dynamic process and away from exclusive concern with environmental impact assessment, usually seen as an "add-on," which slows development.

Accordingly, governments are seeking methods; to assess the financial, social,

and economic effects of measures to improve the environment and to incorporate environmentally sound development goals in long-term strategic policy objectives.

However, although awareness of environmental problems is growing in nations around the world, it is not yet reflected in effective integration of environmental considerations in developmental planning. National environmental agencies have been established in some countries, but they have limited leverage with national planners. Frequently, lack of technical information on environmental impacts among those doing developmental planning and the scarcity of technically trained personnel accentuates the problem.

IDB ENVIRONMENTAL MANAGEMENT POLICY

Since the Conference on the Human Environment in Stockholm in 1972, the Inter-American Development Bank has been increasing its efforts to screen developmental projects which it finances to avoid adverse environmental impacts. In May of this year, the Board of Executive Directors of the Bank approved a formal policy to emphasize its interest in assisting member countries in Latin America and the Caribbean to develop an environmentally sound development perspective.

The new policy authorizes the Inter-American Development Bank to collaborate

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with member countries in four fields, should its help be sought and the project be approved by the Board. The four areas mentioned are the following:

1. Financing of environmental improvement projects.
2. Financing of those measures required to avoid or minimize adverse environmental impacts in all development projects presented to the Bank.
3. Finance training for officials of member countries in environmental technology.
4. Providing technical cooperation to help member countries establish or strengthen their institutional framework in the area of environmental management.

Under 1. above the Bank could cooperate with member countries in the development and financing of projects the purpose of which is to improve the environment through such means as (a) avoiding the entry of polluting effluents into an entire river basin or other body of water; (b) installing "scrubbers" in existing factories in an area or city to minimize the emission of air pollutants; and (c) instituting measures to prevent erosion, to cite a few examples.

Secondly, the IDB will consider financing the hiring of experts to help borrowers in their development of environmentally sound projects and the implementation of those recommendations to avoid adverse environmental impacts.

In the two technical cooperation areas, the Bank will consider training of officials and financing of institution-building in environmental management in member countries.

APPLICABILITY TO SMALLER ISLANDS

Two of the islands included as Con-

ference participants, Bahamas and Barbados, are members of the Inter-American Development Bank and are, therefore, eligible to seek the collaboration of the IDB directly. The requirements are that they take the initiative to develop programs which fall within the environmental management policy of the Bank.

With regard to the other islands which are participants, the IDB is willing to discuss the development of a coordinated policy with the Caribbean Development Bank which, in the past, has received funds from the Inter-American Development Bank for financing development projects in its member countries.

The smaller islands of the Caribbean in general have common areas of concern with regard to at least four types of economic activity: agriculture, fishing, tourism, and small industry. Sound environmental practices have an important bearing on all of them. For example, effluents of sewage from small industry and urban centers can have a deleterious effect on fishing and tourism. However, treatment of effluents could result in fertilizer for agricultural areas and help stem erosion. The inter-relationship of economic planning and enlightened environmental management becomes very apparent.

As noted above, one of the most serious problems in developing countries is the lack of trained technicians in environmental management and a solid institutional base which can contribute to an integrated developmental policy and sound environmental planning. The Inter-American Development Bank is in a position now to discuss with the governments and international agencies represented at this Conference how best to train officials of the smaller Caribbean islands in the environmental sciences and to help in the establishment of the best-suited type of governmental institutions to promote sound environmental management and self-sustaining economic growth.

CONFERENCE ON ENVIRONMENTAL MANAGEMENT AND ECONOMIC GROWTH IN THE SMALLER CARIBBEAN ISLANDS: THE PROGRAM OF THE ORGANIZATION OF AMERICAN STATES

The Organization of American States (OAS) is the oldest regional international organization in the world, dating from 1910 as the Pan American Union. It has also one of the earliest programs of mutual technical cooperation and, in particular, in 1979 the OAS Regional Program for Science and Technology Development (PRDCYT is its Spanish acronym) celebrates its 10th anniversary.

The OAS program is not strictly speaking a grant-in-aid program. It is rather a program of mutual cooperation and technical assistance, conceived with the idea that economic development of the region requires a pooling of talents and resources and a sharing of experiences. The cost of all technical assistance is born by contributions of the member states.

The program takes the form of multinational technical cooperation projects with specific goals and objectives. The program guidelines are set biannually by the Inter-American Council for Education, Science and Culture. Each member state then decides which programs it wishes to participate in, according to its own national priorities. These are communicated to the OAS by a counterpart agency designated by each government. In fact, the translation of national priorities into science and technology projects is itself a project in its own right. Many of the counterpart or liaison agencies participate directly in projects on science policy and planning, policy instruments, or formulation of programs and plans.

The proposed projects are evaluated by the OAS Secretariat and by a technical review panel, the Inter-American Committee on Science and Technology--currently two of the five members of that Committee are from the Caribbean subregion. They are then approved by the governing bodies of the organization. The project may incorporate training, equipment purchases, international experts, local salaried technicians, travel, and publications. Progress of the projects is reviewed periodically at coordination meetings involving all participants in the project.

The most important element of the PRDCYT has always been the multinational exchange and

and horizontal cooperation, and the links which are generated between institutions in Latin American and Caribbean countries. These often have value and extend far beyond the lifetime of the particular project. They are generated through another important component of the OAS program, the regional activities. About 20% of the OAS science and technology budget is set aside for meetings, courses, workshops, and studies in which all interested countries participate; some are specially designed to be of direct interest to the Caribbean territories. The topics are generally chosen by the scientists themselves at periodic coordination meetings, where researchers of different countries collaborating in the same technical area announce and exchange research results and plan cooperative activities, such as exchange visits and sharing of international experts.

In the Caribbean subregion, an additional mechanism has been set up. In order to utilize scarce resources more effectively and to better coordinate science and technology planning activities, the countries organized a Caribbean Science and Technology Cooperation Committee. It held its first meeting in Santo Domingo in September 1977. At that meeting, under the chairmanship of Richardson Andrews of Trinidad and Tobago, the Committee designated five areas of high priority for regional cooperation: marine coastal pollution, alternate sources of energy, agro-industrial research, financial mechanisms for transfer of technology, and science and technology statistics.

During 1978 and 1979, the OAS assigned funds to initiate the programs recommended by the Committee in these areas, and the results included design of a regional plan for oil spill pollution control of which more will be mentioned below, creation of a task force to coordinate energy data collection and analysis, a study of agro-industrial research programs in progress, a Caribbean course in science and technology statistics, and a study of available financial mechanisms for transfer of technology in each country. These results will be presented to the Committee at its next meeting in October in Haiti for decision regarding followup activities and new programs.

Before discussing the proposed oil spill control plan, it might be useful to briefly present some examples of multinational projects in which one or more Caribbean states participate. The examples are principally chosen from the area of environmental management and natural resource development in accord with the theme of this Conference.

- Multinational project in environmental sciences. Four countries participate, including the Dominican Republic. This project is concerned with creation of a master plan for creation and management of a national park system.
- Multinational project in marine sciences. Thirteen centers participate; among them a center in Barbados focuses its attention on the raising of mussels and shrimp in tanks and marine ponds for eventual commercial exploitation, a project in the Dominican Republic on studies of coastal fisheries, and in Trinidad and Tobago on oyster cultivation.
- Special project on Ecology of the Humid Tropical Forest. Trinidad and Tobago joins Venezuela, Colombia, and Brazil in a study of the fertility of tropical soils.
- Special project in Solar Energy. Jamaica and Trinidad and Tobago work with four other countries to develop solar collectors, and apply them to crop dryers, solar refrigerators, and other devices.
- Special project on Utilization of Sugar Cane Residues. Barbados, Haiti, Jamaica, and the Dominican Republic, together with Mexico are developing methods for using sugar products and cane residues for animal feed residues.
- Special project on Ecology of Arid and Semiarid Zones. Haiti, working with seven other centers from Latin America, is studying means for the conservation and protection of arid soils.
- Special project on Marine Biotic Resources. The Dominican Republic, together with five other Latin American centers, is concerned with the ecology of coastal lagoons.

Beginning in 1980, the OAS Science and Technology Program will be reoriented to concentrate a major fraction of the resources

in four principal multidisciplinary areas or sectors. These are Utilization and Conservation of Natural Resources, Renewable and Nonrenewable Marine Resources, Energy, and Agro-industry Food Technology. Each sectorial program will include elements of training and institution building, basic and applied research, and policy formulation and planning. In each of these sectors, programs have been proposed which are relevant to the environmental and economic concern of the smaller islands of the Caribbean.

The sectorial program on Utilization and Conservation of Natural Resources, which is concerned with environmental and ecological problems, has the following principal lines of action:

- i) Protection of fragile ecosystems, including tropical forests, arid regions, coastal zones, and coral reefs. Planning for conservation and utilization of these areas.
- ii) Creation of natural reserves and national parks. Planning of national systems and training of manpower for their management.
- iii) Study of lentic or still waters. Training and research which will complement recent MAB/UNESCO work in this area.

The sectorial program on Marine Resources will be active in the following areas:

- i) Survey and evaluation of renewable and nonrenewable (mineral) marine resources.
- ii) Mariculture, fisheries, cultivation of indigenous and nonindigenous seafood species.
- iii) Control and abatement of marine contamination, planning for protection of coastal zones.

The sectorial program on Energy has three main directions which are relevant to the energy needs of the Caribbean territories:

- i) Bioconversion, cultivation of fuel crops, experimental research on conversion technology, pilot plant and prototype development.
- ii) Direct solar energy conversion: crop drying, solar refrigeration, direct electrical generation.

- iii) Other renewable resources--wind, tides, ocean thermal gradients, geothermal energy; feasibility studies.

The sectorial program on Agro-industry will concentrate on the following cases:

- i) Primary materials: their identification, preservation, storage, and utilization.
- ii) Industrial food processing, quality control, utilization of residues.

Associated with the national projects belonging to each of these sectorial programs will be a full program of regional activities, including training courses and studies in which all member states may participate.

Finally, we would like to describe the Caribbean Regional Oil Spill Control Plan, which was prepared under the direction of the Caribbean Science and Technology Cooperation Committee with the support of the OAS. In May 1979, a task force headed by Hund Hinds, now Permanent Secretary of the Ministry of Energy and Energy Based Resources of Trinidad and Tobago, met in Port of Spain to draft guidelines for a plan of mutual cooperation in the event of an oil spill affecting the Caribbean territories.

The plan operates on three levels. At the local level, each participating country prepares a local response plan and designates an agency to serve as on-site coordinator. In order to assist with the preparation of local plans and the training of relevant personnel, the task force designed a model special project for coastal pollution control to be financed by the OAS at the request of any country that wishes the assistance.

At the second level, three subregional coordinators are designated. For the initial period these would be Trinidad and Tobago for the southeastern Caribbean, Jamaica for the western Caribbean, and the USA (Puerto Rico) for the northeastern subregion. The subregional coordinator would coordinate international assistance to the affected national coordinator where necessary and requested, he would maintain information on the location and state of maintenance of oil spill control equipment in his subregion, and develop in advance a plan for putting it into use in the event of an emergency. He would establish a monitoring and alert system for detection of oil spills. He would conduct periodic subregional drills for training purposes and assist the national coordinators in the formulation and execution of their national plans.

At the regional level, there would be a regional coordinator selected in rotation among the three subregions and an executive secretary based in the country of the regional coordinator. The regional coordinator would establish and carry out training programs, monitor the passage of oil through the region and keep the regional coordinators informed of all developments related to oil traffic and oil spills. He may also serve as a regional voice in international fora on oil traffic.

This draft plan will be presented to the Caribbean Science and Technology Cooperation Committee at its October meeting in Port-au-Prince, Haiti. If the elements of the plan are approved, the task force may be reconvened to fill in the details and design an operational and financial structure. The plan may then be proposed to the Caribbean territories and states bordering the Caribbean for agreement and participation. Conceivably the first planks of the structure may be put in place in mid-1980 which, if recent experience is a guide, may be none too soon.

CARIBBEAN PROGRAM OF THE ROCKEFELLER BROTHERS FUND

William S. Moody *

Abstract.--Current RBF efforts in the Caribbean concentrate on economic development/employment generation and management of natural resources in the smaller eastern islands. Planning has recently begun for an ecodevelopment thrust for further collaborative work in the Caribbean.

The Rockefeller Brothers Fund (RBF), an American philanthropic foundation founded in 1940 by the five Rockefeller brothers, allocates grants to local, national, and international organizations and projects depending on the general public for funds. For more than two decades, the RBF international program has been involved in development assistance in Africa, Asia, and Latin America as well as in international relations. RBF trustees Laurence S. Rockefeller and David Rockefeller have been interested for many years in the problems, needs, and opportunities presented in the Caribbean, and the strong Latin American involvement of the late Nelson A. Rockefeller extended into the Caribbean as well. Out of these long-standing trustee interests, the RBF has in recent years developed a special program oriented toward the Caribbean.

In 1976, RBF staff made several field trips into the Caribbean to consult with a range of people about problems and needs. This planning process led to several general observations:

(1) No private American foundation can hope to have dramatic, immediate impact on the difficult problems in the Caribbean, but, there are initiatives a foundation can take with modest placement of funds that are likely to have specific and general ameliorating effects.

(2) Rather than try to participate broadly in a wide range of needs, a foundation would be more valuable and successful by taking full account of what other agencies are doing in the region and selecting a few specific targets for its work.

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(3) Individuals, organizations, and governments in the Caribbean know what they need to become more self-reliant and self-sufficient. Therefore, a foundation could be most helpful and sensitive by responding to indigenously developed projects in which local people have key design and implementation roles.

In these circumstances, and given the range of challenges throughout the Caribbean basin, the Fund decided to try its best to be responsive to priority concerns of the region in the following areas:

(1) Economic development and employment generation through small agricultural and non-agricultural business advancement and practical training.

(2) Management of natural resources for food, fuel, water, genetic preservation, recreation, and tourism through sound planning and utilization of land and marine areas, such as the establishment of parks and other types of natural area reserves.

During the last 3 years, the RBF has concentrated for a number of reasons on the eastern Caribbean which includes all of the Windward and Leeward Islands: Many of the territories in the region with the lowest per capita incomes and highest unemployment rates are in the Windwards and Leewards. Some of these smaller territories have been heading toward independence and require considerable assistance in their efforts to improve chances for relative self-sufficiency. Deforestation, soil erosion, air and water pollution, degradation of marine resources, and other environmental concerns continue to be major problems throughout the eastern Caribbean.

Since 1977, the RBF international program has been able to allocate around

\$200,000 a year for Caribbean projects. Grants to date--including commitments into the future--have been approved for the following:

(1) Economic Development/Employment Generation

• Organization for Rural Development (St. Vincent)

\$30,000 over 2 years for this self-help organization of local school teachers, farmers, and others that are working to improve agriculture, raise nutrition standards, provide training and create jobs in rural areas.

• Dominica Community High School (Dominica)

\$25,000 over 2 years for this innovative secondary-level school, with strong parent involvement, that is trying to upgrade education with a more Caribbean-oriented curriculum and greater focus on building practical skills for careers in agriculture.

• Antigua-Caribbean Training Institute Limited (Antigua)

\$63,000 over 3 years to launch this institute and start up its first courses in agriculture and food processing. The board and advisory committee for the institute are composed of a diverse group of Antiguans and other West Indians concerned about practical ways to address mounting unemployment among young people.

• King's Hill Youth Group (Dominica)

\$45,000 over 3 years to strengthen and expand this self-help community improvement effort through training and small-business projects such as a sewing scheme that will provide jobs for local women.

• CADEC (Christian Action for Development in the Caribbean)

\$75,000 over 3 years to help establish a business advisory service, particularly for the Windward and Leeward Islands, that will assist community groups, cooperatives, and individual entrepreneurs with basic needs in accounting, production, marketing, and overall management.

• UNICA (Association of Caribbean

Universities and Research Institutes Foundation)

Support has been authorized for a project to prepare manuals and other materials on business management using local case studies. Subjects such as bookkeeping, accounting, business organization, and marketing will be treated in practical ways, and all materials will be tested in workshops attended by personnel from universities and training institutions in the Caribbean.

• Trinidad and Tobago Development Foundation

\$20,000 over 2 years for this indigenous private-sector foundation--the first of its kind in the English-speaking Caribbean--that helps poor, rural, and urban groups and individuals obtain loans for community projects and small business ventures.

• Caribbean Agro-Economic Society

\$10,000 over 2 years to help this region-wide, professional organization for agriculture and related disciplines to develop greater utilization of the 80-plus members in the task of increasing Caribbean self-sufficiency in food production.

(2) Resource Management

• Caribbean Conservation Association (Barbados)

Up to \$210,000 over 4 years toward a new cooperative undertaking, the Eastern Caribbean Natural Area Management Program, that concentrates on the selection, management, and development of forests; coastal, marine, and other natural areas. Projects involve planning, in-service training for government personnel, education of the public and pilot utilization initiatives (such as applied research in conch mariculture in Grenada under the direction of Environmental Research Projects).

• University of Michigan: School of Natural Resources

\$145,000 over 4 years to help plan, launch, and implement the Eastern Caribbean Natural Area Management Program in cooperation with the Caribbean Conservation Association and other public and private local, national, regional, and international agencies.

● Island Resources Foundation
(St. Thomas)

\$75,000 over 3 years to help IRF respond to a growing number of requests for advice and technical assistance from small territories in the Caribbean relating to environmental concerns--ranging from marine pollution and forest destruction to environmental education--and to help IRF with overall strengthening and expansion of its program.

● PRIDE (Foundation for the Protection of Reefs and Islands From Degradation and Exploitation)

\$45,000 over 4 years to help develop a natural resource management and utilization program, beginning in the Turks and Caicos Islands and including marine habitat appraisals, conch research for mariculture, alternative energy techniques as well as environmental education and training of local people and foreign students.

● Sierra Club Foundation

\$20,000 toward a Caribbean mangrove management project that will examine specific causes of losses or alteration in mangrove communities in several countries or territories in the region and suggest reasonable and practical remedies for minimizing adverse impacts of development.

● University of Michigan: School of Natural Resources

\$125,000 over 3 years for a project directed by Dr. Kenton R. Miller to formulate and test guidelines for the selection and management of critical natural areas which are required to support the monitoring and study of environmental degradation. The major thrust of the project is to integrate environmental monitoring into the regular management programs of protected areas throughout the region, and to facilitate human capacity to correct inappropriate land- and water-use practices. The project works closely with international programs currently being implemented by United Nations organizations and the IUCN.

In addition to projects that concentrate on economic development/employment generation and natural resource management, other grants from the RBF international program have a bearing on the Caribbean: (1) The RBF has been concerned for many years with strengthen-

ing U.S. relations with Latin America. A number of grants have been made to the Center for Inter-American Relations in New York, which has important programs in public affairs, literature, and the performing and visual arts. Currently, the Center is engaged in a special Caribbean project involving people from the region and analyzing major issues of the region. (2) The RBF international program has helped the Woodrow Wilson International Center for Scholars at the Smithsonian Institution in Washington, D.C. launch a Latin American program in 1976 aimed at improving the quality of policy studies in Latin American and inter-American affairs and encouraging more communication between North American and Latin American scholars and practitioners. Many people from the Caribbean have been involved in the research, seminars, and other components of this program. (3) Since its inception in 1969, the Overseas Development Council (ODC) in Washington, D.C. has received RBF assistance for research and analyses of development policy issues and the dissemination of information and findings through publications, the media, other nongovernmental organizations as well as face-to-face sessions with policymakers and opinion leaders. (4) A grant to CATIE (Tropical Agricultural Center for Research and Training) in Turrialba, Costa Rica, is worth special mention. Since 1976, the RBF has provided support to launch a wildland management unit at CATIE and a program to improve natural and cultural resource management in Central America. This program has been involved in planning, training, education, and pilot demonstration initiatives in each of the Central American countries. On a number of occasions, people associated with the Eastern Caribbean Natural Area Management Program have participated in meetings and projects of the CATIE wildland management unit. The exchange of information and sharing of experience has been of considerable value to both the Caribbean and Central American environmental efforts.

Further, besides its primary function of grant making, the RBF has also been involved in the Caribbean in another way. RBF staff helped organize an informal consultative donor group of representatives from U.S. foundations with Caribbean interests (Ford, Carnegie, Kettering, and RBF primarily) plus the Inter-American Foundation, Winrock International Livestock Research and Training Center, and several international and governmental agencies. During the past 3 years, periodic meetings of this informal consultative donor group have been held to exchange information and improve prospects for cooperation, including a 2-day workshop at the Winrock Conference Center in Arkansas in October 1977 with representatives from Caribbean organizations.

In planning for the future, the experience of the RBF international program in the Caribbean, Central America and elsewhere in the world, as well as the experience of other institutions with which the RBF maintains regular contact, leads to the belief that ecodevelopment provides a logical approach for bringing together the utilization, conservation and management of natural resources, social and economic development, and other concerns facing decisionmakers. This concept provides the opportunity to create a sympathetic relationship between economic and social planners and resource managers. Under this approach, the benefits to be derived

from natural resources of the forests, the soil, the coastal zones, and the sea have the potential to support human growth and development in ways that are harmonious with the limitations and sustained productivity of the natural environment.

Since the RBF is in the beginning stages of planning an ecodevelopment thrust for further collaborative work in the Caribbean region, we are eager to have the ideas and guidance of the individuals and organizations participating in this important Conference on Environmental Management and Economic Growth in the Smaller Caribbean Islands.

STATEMENT BY TREVOR GORDON-SOMERS Representative of the U.N. Development Programme

Perhaps some of you will be familiar with some of the details I will give, but I hope you'll bear with me because some of them need repeating.

The United Nations Development Programme (UNDP), which is essentially involved in the provision of pre-investment work and technical assistance, responds to the requests submitted by governments and regional institutions. We assist governments in identifying their priorities, and to that extent it's worth saying that we do not assume that we have priorities which ought to be pursued, but in fact, we work with governments in establishing their planning institutions and planning capabilities to identify these priorities. We work with governments--this is worldwide--in establishing a country program approach within a financial framework of a five-year period. At present, we're working within the 1977-81 financial framework.

We encourage the development of regional and subregional institutions, and we would like to see greater consciousness among these subregional institutions, particularly in the Caribbean, toward environmental planning and management. For the CARICOM Caribbean Program, the program with which I'm most directly concerned, we maintain three offices, one in Port of Spain, one in Kingstown, and one in Georgetown, Guyana.

Port of Spain is responsible for its own program in Trinidad and Tobago, and for the programs of the Netherlands Antilles and Suriname. The office in Kingston is responsible for the programs in Jamaica as well as for the Cayman Islands, the Turks and Caicos, the Bahamas, and Bermuda. The office in Georgetown is responsible for the programs in Guyana, in the Leeward and Windward Islands, the French Territories of Martinique and Guadeloupe, and the British Virgin Islands.

Quite aside from the resources that are made available to what you might call the MDCs, the allocations for the Leeward, Windward, British Virgin Islands, and those territories to the north and west that are not as yet independent, we have an allocation of \$22 million for the period 1977-81. Of that \$22 million, \$15 million is set aside and programmed for the Leeward and Windward Islands and for the British Virgin Islands. That \$15 million is apportioned between country projects and what we call multi-island projects.

Now the relationship we establish with most governments, almost all governments when UNDP is providing assistance, is to help these governments in setting up a planning capability and to identify the resources that are available within the U.N. system as well as from other donors.

For the Leeward and Windward Islands, we started off with a physical planning project out of which has grown a number of other projects in various sectors. While we do not identify in the title of any one of the projects, environment or environmental management, we do have various components, which have bearing on environmental management, such as soil conservation, marine resource restocking, solid-waste disposal, water and sewage, to mention only a few. More interesting is that of the \$15 million, we have set aside \$8 million for multi-island projects all in support of strengthening subregional institutions. And through these institutions we hope that we will see a greater consciousness of planning and identification relating to the topics within the environmental field we have discussed today.

ENVIRONMENT AND NATURAL RESOURCES: A NEW FOCUS FOR U.S. DEVELOPMENT ASSISTANCE

Robert O. Otto*

Abstract.--The Foreign Assistance Act Amendments of 1978 authorize the U.S. Agency for International Development (AID) to provide technical and financial assistance to developing countries to enable them to better manage their environment and natural resources. The resulting program of the Bureau for Latin America and the Caribbean is described.

INTRODUCTION

The U.S. Congress has made clear its desire that the U.S. Government provide the means of assistance to developing countries for the protection of their environment. In its guidance to the executive branch of the Federal Government, the Congress has directed that the Agency for International Development (AID): (1) assure that the development assistance which it provides does not cause significant negative environmental impact in the cooperating country or in the global commons, and (2) provide substantial technical and financial assistance to developing countries for protection of their environment and management of their natural resources. Further guidance from Congress includes a determination that deforestation, soil erosion and depletion, and desertification are becoming very serious problems in many parts of the developing world and the Agency is directed to place special emphasis on addressing these problems.

In response to these directives, AID has developed a range of environmental activities that include project impact assessment, technical assistance in environmental sector analysis, advisory services for institutional and policy design and financial assistance for the implementation of environmental and natural resource management projects across a broad spectrum of concerns. The following is a brief description of these activities.

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PROJECT IMPACT ASSESSMENT

The Agency has established procedural requirements for the intensive review of all of its activities throughout the world. To conduct and/or direct these studies, AID has recruited specialists in environmental analysis and management. These environmental officers provide technical and programmatic assistance to personnel in foreign missions who have been designated as Mission Environmental Officers (MEOs). The MEOs are responsible for preparing initial analyses of projects, conducting more detailed assessments of environmental impact (if they may be necessary), directing the work of expert consultants, and coordinating with host country officials.

AID has had what we consider a very positive return for its impact analysis efforts. We feel that the environmental review process has had several effects on our development assistance program. First, environmental compatibility has become a fundamental factor in the early conceptualization and design of projects. Second, environmental analysis has provided the basis for the redesign of projects which have significant negative impact potentials, yet can be made more sensitive to environmental concerns. Finally, the environmental impact review often provides guidance to host country and AID project managers in the design of project implementation activities which avoid previously unforeseen impact relationships.

Several instances have occurred wherein analyses have proved invaluable in substantially changing the design of a project to either take advantage of some natural resource factor or to avoid some environmental hazard. One outstanding example of the potential benefits of instituting an impact

analysis process can be drawn from a recent Panama housing project analysis. A proposed new sewage collection system and outfall was planned which would release 4.5 million gallons a day of raw wastes into Panama Bay. A closer analysis showed that the location of the outfall, in relationship to the prevailing current, would have caused the destruction of a very important shrimp bed. As the shrimp fishery of Panama Bay is a \$15 million per year industry, the potential damage was given special attention. Consultants working in concert with Pan American engineers examined alternative sewage disposal strategies. The adopted solution to this problem involved diversion of the sewage "down current" from the shrimp breeding grounds. The total cost of the environmental study was less than \$25,000; the cost of the diversion scheme was about \$10,000. There was no delay in project approval or implementation.

ENVIRONMENTAL SECTOR ANALYSIS

AID has begun to consult with host countries in the development of environmental sector analyses. These are summary documents which are useful in defining renewable natural resource constraints and opportunities, evaluating resource management policies, plans and programs, manpower availability, and other institutional factors. Host countries and AID are collaborating in this profiling process in order to establish a base of information which aids in the development of a program of technical and financial assistance appropriate to each country.

PROJECT DEVELOPMENT

As stated earlier, the Foreign Assistance Act authorizes AID to provide technical and financial assistance for protection and management of natural resources. Since that authorization, the environmental and natural resource sector has become AID's fastest growing investment sector in Latin America and the Caribbean. Including commitments from October 1977 through fiscal year 1981, a total of US\$104 million will have been allocated to environmental grants and loans within the region. To date, AID has concluded agreements with Haiti, Jamaica, the Dominican Republic, Honduras, Costa Rica, Panama, Peru, and Bolivia.

These agreements are being made in support of expressed host country desires to develop or improve environmental planning and management, the indigenous manpower pool, and environmental policy and program design. Typical projects include watershed management and rehabilitation; management of natural forest stands; the establishment of

parks and forest reserves; development of alternative renewable energy systems; extension services related to agroforestry, soil conservation and integrated pest management; and the development of land capability analyses and resource inventories. While a limited amount of funds has been directed toward the control of air and water pollution, projects in which AID has participated are more generally related to conservation of renewable natural resources. This is a result of a combination of factors including AID's limited resources, the expressed priorities of cooperating countries, and a mutual desire of AID and the cooperating countries to address the problems of the rural poor.

AID funds have been used to develop a soil and water conservation plan and rehabilitation project for the Panama Canal watershed, to avoid excess sedimentation of the Canal's reservoirs. AID has made an agreement with the Government of Costa Rica to provide funding for a wide variety of conservation activities including management plans for some 22% of that country. AID and the Government of Haiti are undertaking several pilot projects in agroforestry in four Haitian watersheds and are currently discussing a major program oriented toward wood fuels production to stem the increasingly serious problem of deforestation for charcoal production. AID and Peru are currently implementing a community forestry project and will be working together in the development of a soil conservation service as well as land capability assessments for most of the Peruvian Sierra and Ceja de Selva.

For the future, we foresee a continued expansion of the environmental sector investment program. As more countries are identifying concerns, establishing priorities, and consulting with us on their program needs, we anticipate a total of commitments in this sector to exceed \$500 million in the next 10 years. While this may seem to be a great deal of money, especially in relationship to past levels of investment, we foresee a greatly increasing need for this type of assistance in the eighties.

ENVIRONMENTAL PROGRAM FOR THE EASTERN CARIBBEAN

AID, through its Regional Development Office in Bridgetown, Barbados, has begun to implement project activities we believe are responsive to the needs of the region. These initiatives include the following:

1. An agricultural research and extension grant which fosters awareness and use of integrated post-management methods for crop protection. It is

expected that this program will be a first step in combatting the overdependence and misuse of toxic chemical pesticides.

2. Through the recently approved Basic Human Needs-Employment Sector Project, several environmental subprojects will be developed. Reforestation activities are planned for Montserrat, Nevis, and St. Lucia, while a soil conservation program is slated for St. Vincent.
3. Through the recently approved Alternative Energy Systems Project, eastern Caribbean personnel will be trained in the management of renewable energy programs. Objectives of this program include a reduction in the amount of deforestation for charcoal and fuel wood production.

Looking to the future, AID has begun to identify some priority areas of concern. Our information to date suggests that the conservation and careful utilization of forest ecosystems, nearshore artesinal fisheries, potable water supplies, agricultural soils, and other natural resources is a developing

priority in the region. Furthermore, industrial and human wastes as well as injudicious land-use decisions are threats to the health and prosperity of the peoples of the region. A program for the region which is designed to assure environmental quality and sustained natural resource productivity must first concentrate its efforts on developing: 1) broad public awareness of environmental issues and concerns; 2) the policy, planning, and legislative basis for action; and 3) the human and institutional resources necessary to carry out the tasks at hand.

The Agency for International Development is prepared to work on environmental and natural resource concerns of the islands through a regional organization or organizations on matters such as: 1) further definition of the environmental problems of the region, 2) development of a coordinated regional approach to deal with the identified problems, and 3) the formulation of specific projects oriented toward resource conservation. Following the establishment of such an institutional framework, AID is prepared to work through this regional entity to implement action projects which assure that a healthful environment and a productive natural resource base will always be found in the eastern Caribbean.

STATEMENT BY MURRAY ROSS Representative of the World Bank

The World Bank, as you probably know, is an institution that was established in 1946, its full name being the International Bank for Reconstruction and Development. It operates in line with its Charter in very many countries of the world. Some years ago, the World Bank recognized the importance of environment in the various projects that it finances; and for some years now it has had, and still has now, an environmental adviser, who in cooperation with the governments that request the Bank to finance projects, examines the environmental aspects, the environmental impact of the projects. Consequently, as you can readily see, the subject of development and the environment has been very close and remains very close to the World Bank's interest.

Now the World Bank has not operated directly in the eastern Caribbean, that is, if we exclude Barbados and take the other LDCs. But it has assisted in channeling some of its resources, I believe \$20 million U.S. equivalent, through the Caribbean Development Bank. As Mr. St. Rose mentioned earlier, speaking on behalf of the Caribbean Development Bank, most of the soft resources of the Caribbean Development Bank have gone to the LDCs. The World Bank also has two kinds of resources, the "hard" window and the "soft" window.

In its first loan to the Caribbean Development Bank, there was a soft loan component; that component was used by the Caribbean Development Bank to extend loans on concessional terms, largely to the less developed countries whose ability for repayment is more limited than that of the others. The World Bank is hoping to be able to continue working with the Caribbean Development Bank in channeling resources for development to the LDCs.

Lastly, the World Bank in December 1977, almost two years ago, was asked to chair a conference on the problems of financial and economic difficulties that confront the region. That conference decided to form the Caribbean Group for Cooperation and Economic Development, to which the delegate from Canada had earlier eluded. This Group, which is chaired by the World Bank, includes in its sponsorship the International Monetary Fund, the Caribbean Development Bank, and the Inter-American Development Bank. The Group has been successful in raising substantial additional resources--both financial and technical--for the area including the small islands. In particular, the first conference of this Group, which was formally held in June 1978, slightly over a year ago, had commissioned the World Bank, the International Monetary Fund, the Caribbean Development Bank and the Inter-American Development Bank, and the United Nations Development Programme, to assist governments in the preparation of their public sector investment programs with realistic financing plans from external and internal resources. I believe this was the first time that an exercise of this magnitude had been undertaken. The public sector investment programs and financing plans were submitted to the second conference, and we are hopeful that the resources necessary to carry out the projects indicated in these programs will become available--resources both financial and technical, which are necessary to carry out these programs, with the view of increasing output, increasing productivity, and increasing employment and living standards throughout the area.

At the request of this Group, the World Bank is continuing to chair this very important undertaking, namely the Caribbean Group for Cooperation and Economic Development and, as I mentioned before, considerably more financial and technical resources have been raised at the first two conferences. We're looking toward a similar success at the third conference, which is now scheduled for next May, immediately subsequent to the Board of Governors Meeting of the Caribbean Development Bank.

STATEMENT BY JOHN CONNELL
Representative of the Caribbean Conservation Association

The Caribbean Conservation Association is an organization that has existed in the Caribbean for many years. It is an organization that is supported by governments in the Caribbean. It maintains a nongovernmental character but it has been supported by governments in the Caribbean.

If international agencies truly want to assist environmental projects in the Caribbean, why can't they filter the funds to the Caribbean Conservation Association? Why not? I imagine that you would want to be satisfied that the projects are feasible, and there are ways of doing this. I imagine that you would want to insure that there is strict accountability for the disbursement of funds. We have accounted for all funds that have come into us and our books are there; you can inspect them before you leave.

You see, I have a feeling that once again, this sort of--I don't wish to describe it as a "sleight-of-hand," but I have a feeling that before my very eyes the rabbit is disappearing.

We have been here for a week. Ivor Jackson and others have made it clear that there are problems in the Caribbean. People sitting around this table live in the Caribbean, live with these problems from day to day. We have a viable Caribbean association that has a long record of success in doing relatively small things. Can we not, in the tradition of the New Testament, having seen that we have successfully discharged our obligation in doing small things, be given greater responsibilities? I think this will be a token of the good will and the sincerity of the donor organizations, if they did this.

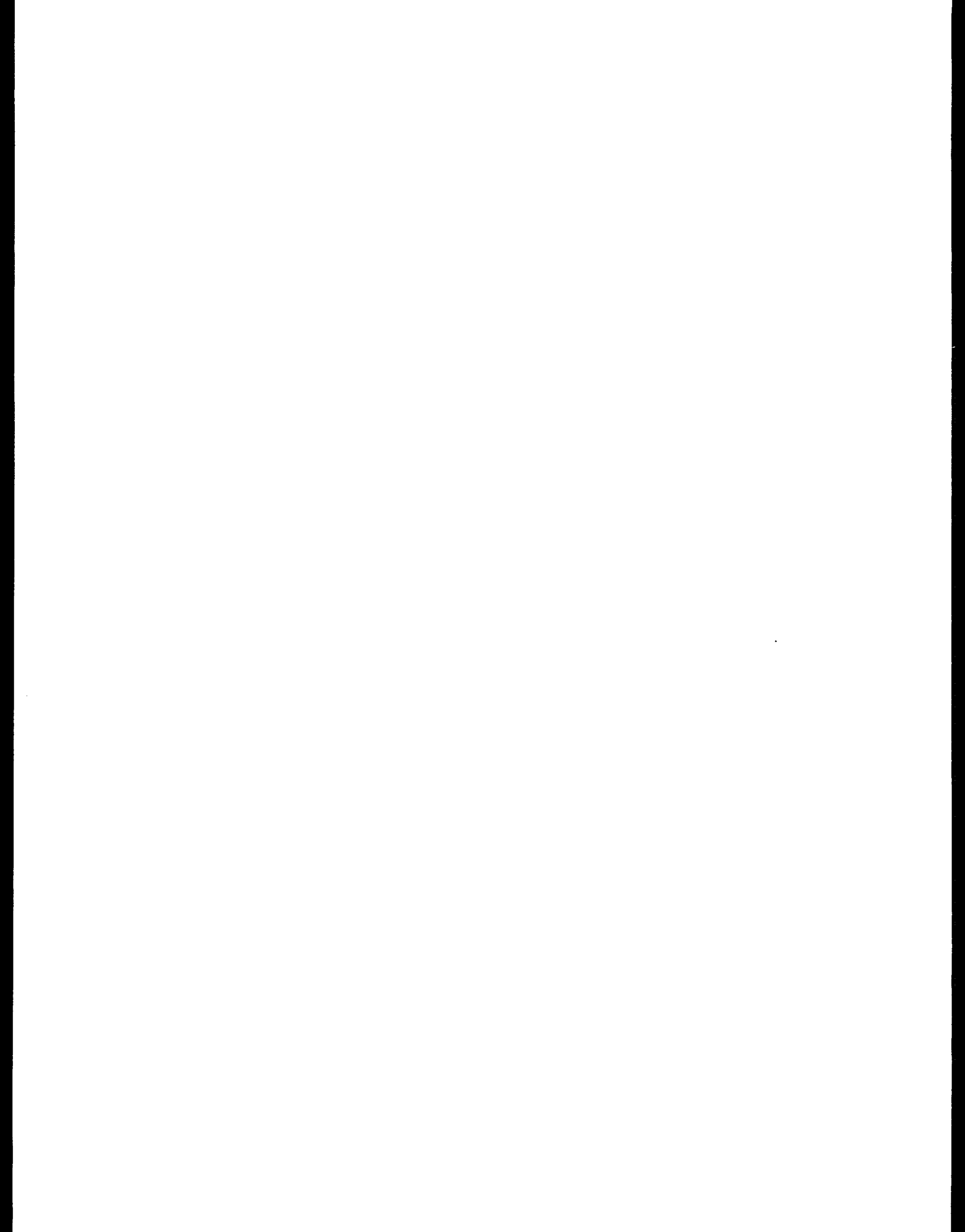
My organization, the CCA, has a record of service in the Caribbean, in Dominica, in particular. And I sit here and I hear all sorts of reasons why it can't be done. "It can't be done because you're not independent." "It can't be done because we simply don't channel aid into this particular area." I must confess I feel a little frustrated before that sort of attitude, and I think that it is quite easy to cut the Gordian Knot and get down to realities. The realities are that there are crying environmental needs in the Caribbean; there is at least one organization in the Caribbean that has a record of performance. Why in the name of goodness can't the funds be channeled to the CCA on consideration that it puts up feasible projects, and that it provides adequate procedures for accountability for funds?

I am throwing this out as a challenge to the various aid agencies because I do not wish them to escape from this Conference secure in the feeling that we have not been able to penetrate the veil of the various procedures that they very comfortably surround themselves with. Mr. Chairman, that is my intervention at this stage.

TABLE OF CONTENTS

Session VI

	Page
SUMMARY OF SESSION VI, Edward L. Towle	181
STATEMENT OF CONCERN OF THE GOVERNMENTAL DELEGATES - September 21, 1979, Attachment	185
CLOSING REMARKS, Program Chairman	186



SUMMARY OF SESSION VI

Edward L. Towle

Mr. Beller opened the meeting and noted that all delegates should feel free to speak openly, since it is understood that their individual recommendations and comments are not in any way binding regarding their respective governments. It is hoped, however, that each delegation might take back to its government the recommendations which come out of the Conference for future consideration in planning environmental management and economic development programs. Mr. Beller then turned the meeting over to Mr. Robert Creque, Chairman.

Mr. Creque introduced the final summary session of the Conference by noting that:

1. Environmental management and economic growth strategies must be rooted in the broad parameters of West Indian experience, and local institutional, political, social, and economic factors which shape the lives of West Indian people.
2. Such strategies must take into consideration the need to improve the lives of people while at the same time offer adequate protection to natural areas, wildlife, land, and water so that the processes of nature may continue without undue human interference.
3. Institutional structures for environmental management must reflect new departures to deal with new kinds of problems.
4. Strategies for environmental management should be fashioned around basic country needs but also reflect a unified or regional approach to most problems.

Mr. Creque then invited comments from the delegates on the rapporteur reports of previous sessions. After minor questions of clarification and amendments by delegates from Grenada, St. Lucia, and St. Kitts, and by Simon Jones-Hendrickson of CVI, and Dawn Marshall of UWI, the summary reports were adopted as amended.

Mr. Creque then invited Mr. Trevor Boothe of UNEP/ECLA/CEP to present a brief summary of the CEP Action Plan and its areas of emphasis.

STATEMENT BY TREVOR LOUIS BOOTHE

I do not want to take the time of this Conference at this late hour to again go into lengthy presentation on CEP. I think, however, it would be useful just to recap some of the principal points and to also tell you how we see the followup action coming out of this Conference feeding into CEP from our particular perspective.

I would just like to recall that in CEP we have basically eight areas of concern which we have been looking at. These are the sea, environmental health, human settlements, tourism, natural resources and ecosystems, industry and technology, natural disasters, and energy. These eight areas basically represented what we have understood to be the commonality of concern amongst the governments in the environmental sphere. And thus, the work of the project has been based on activities in these eight areas.

Operating on this we have had a number of studies prepared which are

evaluations and analyses of the environmental situation in these eight sectors. Those studies each bear recommendations for action on three levels--national, subregional, and regional. In addition, those studies, those sectoral overview studies, as they are called, which are based on these eight areas and which I've said each study carries recommendations for action on three levels. Those studies form the basis for the so-called Action Plan.

Now the Action Plan has as its objective, and I will read from our brochure--The first priority will be the improvement of the capabilities of the Caribbean territorial communities to assess and manage their natural resource base; and to monitor the changing features of their environment, particularly in coastal and marine areas. That Action Plan together with those sectoral overview studies which as I said has recommendations for action on three levels will be presented in two stages to the governments. First to the Experts Meeting in January of next year, where we expect there will be a technical in-depth examination of the studies, the evaluations, and analyses sector by sector and of the recommendations sector by sector. Finally, the Action Plan and the supporting sectoral overview studies will be presented to an Intergovernmental Meeting in March of next year for adoption, and we expect that that will lead on, as I said, to implementation.

As I pointed out yesterday evening, implementation, we expect, will be funded largely through a trust fund where it is expected that the funding will be obtained from both bilateral and multilateral funding sources. In addition, it will be up to the governments to decide whether or not they wish to establish some basis for making their own contributions, which might be very small, to the funding office implementation base. In essence, therefore, we expect that what we will have are concrete proposals for action in these eight areas and funding. It will then be up to the governments to decide how they want to assign priorities for implementation of that total package that is the Action Plan--how they want to use the funding available, in what areas they would wish to see action go forward on a priority basis. It is here that I think it's extremely important for the islands to lay claim to priority attention for those areas which are of particular concern to you and that is why I think that this Conference is particularly valuable.

I think that this will be the point, to say how I see the outcome of this Conference feeding into all of this. First and foremost, we will be using the outcome of this Conference to help us at CEP complete a paper, a major paper, that we're doing on alternative strategies of development for smaller islands. This paper will be presented to a seminar on the subject of alternate patterns of development for Latin America and the Caribbean which is being held by the Economic Commission for Latin America in November of this year. This will be the definitive paper essentially on the islands and alternative patterns of development for the islands. It is to be expected that the outcome of that seminar will be a spin-off, in terms of activities, I hope that they will be concrete activities, involving the agreed recommendations coming out of that seminar. So that is the first thing, that we will definitely use the information that we have obtained here from you, the representatives from the islands, to feed into that paper which the seminar will be considering.

Secondly, we will be using the information obtained here at this Conference to assist us as we prepare the final draft of the Action Plan, which is to be presented at the Experts and then the Intergovernmental Meetings next year. In addition, of course, the transactions of this Conference when published will be made available to all the governments covered by the Caribbean Environment Project as, in effect, an overview on the smaller islands. And I think it's very important because it will be an overview that essentially will have been put together by you, the representatives of the islands rather than an overview that has been prepared by some expert coming in from outside the region and saying these are the prob-

lems. There is somebody here instead of three days ago, traveling around, consulting us, taking our time, and then using our words to put together a report that reflects our own views. Instead of that you will have, in fact, an overview that you yourselves, in essence, will have put together here in your work this past week so that your views will be represented there, at the Experts Meeting and at the Intergovernmental Meeting, in the transactions of this Conference.

I hope that I have been as clear as is necessary. If, however, there are any questions, even now or afterwards, I am, of course, ready to answer them. I thank you very much for letting me have the floor at this time Mr. Chairman.

Mr. Boothe concluded his remarks by noting that the results of the Conference and especially any recommendations derived from the final session would be useful to CEP in future meetings regarding the CEP Action Plan.

Mr. Creque next invited discussions of the statement prepared in draft by the delegates the previous day. After an extensive exchange of queries and comments, and some debate over intent, language, and anticipated impact of the statement of concern, the following single recommendation was adopted:

It is recommended that where it appears that there exist no adequate structures within present Governmental institutions to monitor and manage environmental concerns, the delegates of the Conference wish to place on record the need for structuring Governmental institutions to facilitate more profound environmental management and control.

The delegates also endorsed:

- 1) Ongoing efforts toward establishing an Oil Spill Contingency Plan for the Caribbean;
- 2) Efforts toward assisting Dominica, and for additional help; and
- 3) The need for an Environmental Management Advisory Council. Recommended that the Council be incorporated in existing regional institutions.

The Chairman next invited the delegates to address the draft list of regional projects of immediate need bearing upon environmental management and economic development. Following some discussion, the basic draft list was amended by the addition of 5 additional projects and the following list of 10 priority project areas adopted.

- Establish a Regional Talent Pool
- Workshops and Training Activities (dealing with Project Evaluation, Environmental Impact Studies, Socio-Economic Impact Studies, etc.)
- Coastal Zone Management
- Soil Erosion, Reforestation, Reforestation
- Mariculture Development and Management
- Nature Reserves and Parks
- Wildlife Protection
- Information Retrieval
- Environmental Education (especially at the community level)
- Compilation of Socio-Economic Data

N.B.: It was noted by the delegates that the order of listing does not signify any ranking of priority, since projects have differing priorities in various countries. But all are of regional significance as viewed by the smaller island states and territories.

Delegates concurred with the suggestion to include the master list of projects and areas of interest and concern worked out on the blackboard Wednesday morning during Session IV in the transactions (see page 127).

The Chairman then introduced Mr. Arthur B. Archer with the Ministry of Health and National Insurance, Barbados, who announced that the Barbados Government, in collaboration with the Commonwealth Human Ecology Council (CHEC) and the Pan American Health Organization (PAHO), was sponsoring a workshop in Barbados on "Human Ecology and Development in the Caribbean" during April/May 1980. The express purpose of the workshop is to bring together government and nongovernment personnel and institutions in the Caribbean to achieve better utilization of development facilities with greater involvement of individuals in the planning, implementation, and maintenance of programs for environmental and social improvement.

The workshop would be followed by a series of educational programs in the various islands to demonstrate how individuals and communities can assume a large role in the development process. Topical areas of emphasis include:

1. Agriculture and Rural Development
2. Community Health, Nutrition, and Environmental Health
3. Tourism and Its Effects on Community Life
4. Industrial Development and Its Impact on the Environment

The Chairman concluded the session with the following:

It has been a pleasure to be associated with you in this Conference, with my colleagues from the islands, and with the sponsoring agencies, looking in-depth at environmental management and economic growth with a commitment to improving the lifestyles of all people in the region. Thank you.

The conference closed.

Attachment

STATEMENT OF CONCERN OF THE GOVERNMENTAL DELEGATES

September 21, 1979

An expression of concern about the level of some Caribbean institutions' participation at the Conference.

RECOMMENDATION

It is recommended that where it appears that there exist no adequate structures within present Governmental institutions to monitor and manage environmental concerns, the delegates of the Conference wish to place on record the need for structuring Governmental institutions to facilitate more profound environmental management and control.

AREAS OF INTEREST

- Delegates
- 1) Endorse efforts towards Oil Spill Contingency Plan through efforts by OAS, CEP, and CARICOM.
 - 2) Endorse efforts towards Dominica and call for further assistance.
 - 3) Recognize the need for an Environmental Management Advisory Council. Recommend that an Environmental Management Advisory Council be incorporated in the existing regional institutions.

The following regional projects are of immediate need:

- Regional Talent Pool
- Workshops and Training
 - Project Evaluation
 - Environmental Impact Studies
 - Socio-Economic Impact Studies, etc.
- Coastal Zone Management
- Soil Erosion; Reforestation; Reforestation
- Mariculture Development and Management
- Nature Reserves and Parks
- Wildlife Protection
- Information Retrieval
- Environmental Education
- Compilation of Socio-Economic Data

CLOSING REMARKS

Program Chairman

I would like to say on behalf of the five sponsors of this Conference, we are very pleased with the way it has gone and the conclusions reached; and with the total spirit of professional cooperation that has been exhibited.

This Conference seems to have had a life of its own, building to the climax of the recommendations of today. We could not have started midway through, as many Conferences can, where you have only papers given; if you arrive on a Wednesday, it could be Monday or Tuesday--you're simply an auditor. We could not have been on Monday where we were on Wednesday.

This Conference built itself up so that we did come up with a cohesive group of recommendations that, as Bill Moody said, will be entertained by such as the Rockefeller Fund, and with certainty by other major funding organizations.

The results of the Conference are that we now know, I believe with strong certainty, what some of the major environmental problems of the smaller islands in the Caribbean are at this time. Some international agencies have expressed their desire to help solve them. I believe that contacts have been made with people who can help, and I would urge that there be strong follow-ons through personnel communications with those organizations that have said they would like to help. This Conference is lost unless these follow-ons do occur.

The smaller islands now, regardless of any mechanism that may or may not be set up, have within the delegates, the power to coordinate their environmental considerations. You can come together periodically to voice your concerns and act as a unit to focus considerations of the world on your problems. I don't think you should go away from this Conference forgetting that you do have a cadre of associates that can be counted upon.

Lastly, I would like to say that the contributions of many of the observers here have been exceedingly high. The Conference could not have come away with what I feel is an excellence of information without these valuable contributions.

I would like to thank all participants, all Chairmen. Mr. Creque served twice, and no man deserves that, as Chairman. He did a remarkably good job, as did all the Chairmen, and the Vice Chairmen/Rapporteurs.

I would like to take this occasion to thank the Secretariat of the Conference, namely, Trevor Boothe for the magnificent job he did, in getting the delegates here and making many of the fundamental arrangements; and in working very closely with us from the beginning in putting this Conference together not only in terms of acting as Secretariat but also on the program; and also his associate, Arsenio Rodriguez.

Many of you realize, I hope, that this has gone fairly smoothly, and I would like to take this occasion publicly to tell you of the work of Phylis Rubin who has been working with many of you almost to the point of exhaustion. Others who have worked very hard at the Secretariat are Elinor Gittens, researcher on Trevor Boothe's staff, Tessa Jardine also on Mr. Boothe's staff, Julia St. John, and Heather Welch. Natalie Lee, our editor from the U.S. State Department, was inexhaustible.

One important individual who has been behind the scenes is Mr. O.K. Yhap, and he furnished this very natural setting for us in which to work--this environmentally pure setting; but not being facetious, we do very much appreciate his help and that of the Caribbean Development Bank.

Ms. Jill Sheppard, Executive Director of the Caribbean Conservation Association, assisted us immensely with all arrangements in Barbados.

I now formally, unless there's objection or observation, close this Conference.

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