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**Ad hoc Working Group
Report on**

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**Greater Caribbean
Energy
and
Environment Future**

**Key Biscayne, Florida
October 26-28, 1980**

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**Ad hoc Working Group
Report on
Greater Caribbean Energy and
Environment Future**

October 26-28, 1980

Presented by:

**Greater Caribbean Energy and
Environment Foundation, Inc.**

In cooperation with:

**U.S. Department of Energy
Florida International University**

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Caribbean Data Atlas maps
published by
IUCN and UNEP/CEPAL Coordination
Environment Programme

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Executive Summary

This report of Workshop I by the Greater Caribbean Energy and Environment Foundation begins an intensive focus on the energy problems of the Caribbean. A previous United Nations Environmental Program study documented energy plans and alternate energy in the Caribbean, but paid little attention to the specific Caribbean environmental problems. This group considered the total Caribbean environmental problem with respect to energy including legal, political, sociological and economic factors. Priorities included information needs and processes by which environmental considerations could enter energy decision and policy making for energy extraction, transmission and production.

The process by which environmental assessments by tropical experts can be successfully integrated into energy decisions is by: 1) international loan institutions requiring or strongly recommending excellent assessments; 2) engineering awareness of total effects of energy projects; 3) governmental environmental consciousness-raising with regard to natural resource value and potential inadvertent and unnecessary resource losses during energy development; and 4) media participation.

Until nations obtain their own environmental assessment capabilities, having energy resource impact assessment by tropical energy-environmentalists is essential to rational resource preservation for future generations. During the interim, advanced training programs for energy planners, developers, engineers and resource managers are necessary in the lesser developed countries.

A. Thorhaug
Key Biscayne, Florida

I. Preamble

- A. There is a growing global awareness of the loss of environmental resources for present and future generations wrought by energy-related impacts and their environmental consequences. This awareness and intention is reflected in the ideas emanating from international bodies as well as national governments and private groups.
- B. In part, this awareness stems from an ever-growing body of scientific knowledge on energy extraction, transmission, and production in addition to its real and potential environmental effects.
- C. A growing body of experts on environmental aspects of energy are now available to do research and implement the results of this scientific knowledge. Increasing numbers of universities and international bodies are engaged in the training of these experts and in the cross-cultural, trans-national environments in which they will work.

II. Introduction

A. Attitudes

While there is a growing awareness of the environment and the damage resulting from pollution in individual nations or societies, there is an insufficient level of awareness of the **Caribbean-wide** implications of pollution to any particular part of the Caribbean. The greater Caribbean is a semi-enclosed basin with a fragile subtropical (upper Gulf of Mexico) and tropical environment. Decades ago when development plans were being formulated and specific energy and industrial projects implemented, awareness of the resulting environmental degradation unfortunately did not exist. A major obstacle to the development of this Caribbean-wide environmental consciousness are the diverse system of political states with widely differing economic, political, social and potential energy development capabilities superimposed on comparatively homogeneous natural resource patterns.

B. This lack of Caribbean-wide awareness is concurrent with a lack of up-to-date technical information readily available in usable form to many Caribbean decision-makers. This weakness has two fundamental dimensions.

- 1. Lack of knowledge about what are least-damaging environmental technologies for energy extraction/transmission/production technology on Caribbean ecosystems.
- 2. Lack of knowledge on when and how to plan for environmental least-damage in the process of energy development. Few decision-makers realize that environmental planning is the most cost-efficient method in the long run.

C. In the final analysis, these inadequacies in energy decision-making with respect to environmental matters have to reckon with the absence of the needed skilled personnel in three critical areas:

- 1. Trained energy extraction/transmission/production environmental managers and scientists.
- 2. Engineers and energy planners who are sensitized to the natural environmental problems likely to occur from various energy types and skilled in techniques of how to minimize environmental resource loss.
- 3. Social scientists with environmental concerns about energy and development plans.

Flowing from this present situation are a series of critical consequences, to wit:

- 1. **Process of Environmental Assessment of Energy Development Not in Place**
 - a. Many countries don't have links between energy development (or energy) and environmental management sections.
 - b. Many countries don't **utilize** or have a **structure** for environmental assessment.
 - c. Other countries which have environmental assessment do not have **feedback** and **checks and balances**.

The major problem of the Caribbean energy development-environmental situation at present is **lack of management** procedures, lack of information for least-environmental damage or a lack of trained technical personnel.

III. Research Tasks: Today and Twenty Years Hence

A. Attitudes

All crucial social change begins with a change in perceptions, a change in perceived interests and advantages. There is a need to increase the level of environmental awareness of decision-makers, technical experts, and the general public in the Caribbean. This awareness should transcend individual societies and eventually become pan-Caribbean. This process of consciousness-raising can be promoted through three specific activities.

1. Center for environmental effects on energy development
2. Media

Continual set of environmental-energy releases to Caribbean media that emphasize positive solutions to the energy-environmental Caribbean problems. In addition, there should be a training program for the media on problems of energy and the environment in the Caribbean.

3. Symposia or conferences in key organizations on energy development with least environmental damage from political, legal, economic and social viewpoints.

B. Important Needs for Knowledge Through Research in Specific Areas

Three subgroups, deliberating independently at the working group meeting, each identified high-priority research areas. Each subgroup recommended the following research topics.

1. Engineering Sub-group

Most Critical Issues

- a. Oil spilling and tankers bilging
- b. Geothermal pollution
- c. Omission of conservation (optimum use of natural resources).

Engineering - Evaluation of

Important low-information, high-priority items:

- a. Geothermal pollution
- b. Tanker bilging
- c. Macrofouling on OTEC
- d. Oil spilling

2. Decision-Maker Expert Sub-Group

Most Critical Issues and Simultaneously, Important Low-Information, High-Priority Items:

- a. Oil and gas extraction
 1. Accidental spills
 2. Gas disposal
 3. Seepage, dispersants, leakage
- b. Conservation of energy
- c. Tankers carrying oil which escapes through collisions, bilging or spills

3. Environmental Expert Sub-Group

Most Critical Issues

- a. Oil spills in ports
 1. Effects on estuaries by transmission and accidental spills of oil
 2. Bilging from ships on all coastal resources
- b. Heat effects on coral reefs and estuaries
- c. Radioactive waste disposal in the greater Caribbean

Evaluation of Areas of High Priority and Low Information: Effects of Energy Development on:

- a. Coral reefs
- b. Estuaries
- c. Rivers
- d. Lakes
- e. Swamps and marshes

C. Group Summary of Priority Research

Commentary

It was recognized that the top three research priority areas chosen by each sub-group emphasized **present** concerns which, to be sure, will extend into the future. In joint-deliberation the working group then singled out additional impacts of energy forms that may become important over the next couple of decades, especially as those interactions are amplified and made more complicated by population growth in the Caribbean area. This list, therefore, summarized the highest priority research areas (resulting from high concern and a low information base) reflecting present circumstances and anticipated future ones that will have to be dealt with over the next two decades.

Group Summary of Important Needs for Knowledge Through Research (In Specific Areas) on Present Problems Summarized From the Workshop

1. Research on the effect of oil spills and tanker bilging on Caribbean coastal resources
2. Research on how to heighten conservation awareness so it can be a force for clean energy development.
3. Research as to feasibility or non-feasibility of radioactive waste disposal in the greater caribbean
4. Research needed for conservation of present and potential energy sources in the area. Analysis of energy sources in the Caribbean and their environmental damage. Research should establish options and identify specific problems for countries.
5. Research on the effect of heat disposal on Caribbean coastal ecosystems (corals, mangrove, seagrasses, marshes).
6. Research on effects of geothermal energy production on Caribbean ecosystems and environment.
7. Research on the effects of ports (oil and other emissions on near-shore environments)
8. Environmental effects on OTEC macro-fouling in near-shore environments.
9. Research on the effects of pipelines (for international oil and gas). Research on explosion and leak effects on Caribbean ecosystems: coastal, middle and upland.
10. Research on the interactive effects of growth in population, energy systems, and the environment. (Population growth is expected as the result of both increased births and reduced deaths and diminishing opportunities for emigration from the Caribbean region to other parts of the world.)

D. Needs for Knowledge of Future Alternate Energy Sources for the Caribbean

It is important to determine the magnitude of the potential alternative energy sources for each individual island or country.

A measurement network should be installed for each of the alternate energy sources (wind, sun, waves, etc.) in order to have quantitative figures of the energy influx.

Parallel to these activities, a thorough investigation should be made of the distribution of each type of energy now used in each individual island or country, e.g., percentages of electricity for lighting, electricity for air-conditioning, gas for cooking, gas for transportation, etc.

A program of applied science should be started on each island or country to try out and adapt alternative energy devices to the local situation. Possibilities of local production of these devices should be explored.

IV. Needed Research, Demonstration and Information Dissemination Projects to Get Knowledge About Caribbean Energy-Environment Used

- A. Build mutual energy-environment education of professionals (engineers, environmentalists, decision-makers and politicians) and the public on energy-environmental problems. In order to accomplish (achieve) this goal and keeping in mind that the future of humankind depends increasingly on the ocean and coastal environments, specific actions such as those listed below should be stressed:
 - 1. Organization by educational institutions of formal courses dealing not only with the technical, (engineering and environmental) aspects of energy extraction, transmission, production and use, but also with the legal and social aspects involved in such activities.
 - 2. Organization of seminars, workshops and conferences on technical (engineering and environmental), as well as legal and sociological aspects of Caribbean energy, both present and future.
 - 3. Promotion of the exchange of experts and cooperative educational programs within the region; specifically more developed nations sharing with the lesser developed nations.
 - 4. Consideration by the different local, national or regional professional societies and associations concerning present and future environmental issues.
 - 5. Organization of special educational programs on the environment for politicians and decision-makers, sponsored either by governmental agencies or political parties, emphasizing the long-term nature of the problem.
 - 6. Organization of programs through communication media to stimulate people in helping to protect the environment.
- B. A Caribbean-Based Environmental Impact Assessment Capability is Necessary
 - 1. An impact assessment capability is now forming in various Caribbean nations such as the United States, Netherland Antilles, Mexico, Costa Rica, Panama, Venezuela, and Puerto Rico. Training personnel in each country who can evaluate environmental-energy impact is essential (see "Training Needs", IV, A-43). In the interim, nations should utilize the present Caribbean energy-environment experts. Part of the future assessment capability includes research on effects, training of assessment personnel, and information availability.
- C. Economic Capability to Support Efforts of Caribbean Nations That Are Unresponsive to the Environment, and to Better Negotiate with Single External Financial Sources Supporting Environmentally-Damaging Energy Projects.

It was recognized that governments of the region might require moral and political support in dealing with large (internal or external) corporations which are unresponsive to environmental concerns of the host countries. While it is expected that governments should develop their own capabilities to deal with environmental questions, it was felt that various agencies could assist by ensuring that environmentally sound policies are followed by developers before their overseas investments are insured. The question of providing assistance for countries who lost foreign investment because of environmental considerations were discussed. It was felt that environmental consideration should form an integral part of foreign economic assistance to countries of the region, thereby ensuring that a reasonable balance could be maintained in the environmental decision-making process.

Of prime importance is the maintenance of fundamental research on how countries of the Caribbean region can become more energy self-sufficient and at the same time ensuring public support to influence the decision-makers of multinational corporations.

D. Information Dissemination on Environmental Aspects

An environmental-energy information center is urgently needed and essential to the process of obtaining a least-environmentally damaged Caribbean in the face of energy development, and to insure environmental assessment of any energy project. It would include the following:

1. A data and literature information center
 - a. Computer access with hookups to as many Caribbean nations as possible.
 - b. Library facility containing all items on Caribbean environment and energy.
 - c. Re-publication and distribution potential.
2. It is recommended that the following areas be examined for accessive, large information and literature banks
 - a. Government reports in the Caribbean on specific energy projects
 - b. Navy Caribbean data and publications.
 - c. United States port data.
 - d. United States Department of Energy.
 - e. EMCO
 - f. IOCARIBE (A Caribbean international oceanographic body)
 - g. Environmental Protection Agencies
 - h. United Nations Environmental Program
 - i. United States National Oceanographic and Atmospheric Administration.
3. Tropical and Caribbean baseline environmental literature and data should be included, not only "energy effects".
4. Other activities of the information center would be
 - a. Syntheses.
 - b. Workshops or seminars to fill in information gaps as needed.
 - c. Intergroup communications.
 - d. Newsletter/advertising
 - e. Lists of specific experts
 - f. Traveling experts.

E. Build Extra-Government Base for Standards and Policies — Recommend that Private International Foundation be Established

An entity is recommended whose funds and other resources can come from a variety of sources. At a minimum, it should include an information-collecting and disseminating center, independent of any particular auspices.

This entity will be able to apply its moral authority and experience to serving Caribbean goals of developing and using its energy resources in environmentally least damaging ways. Such services could include providing specific information on standards and methods for assessing environmental impacts so that countries considering energy activities that could be environmentally damaging (whether sponsored by outside corporations or by the local government) could negotiate from a knowledgeable posture. Moreover, the entity could give helpful moral support to those within the country and to other countries in the Caribbean or elsewhere, who are determined to evolve and reinforce values and procedures that result in least environmentally damaging energy extraction, development and use.

An integral function of the entity would be to encourage and facilitate educational activities in various places aimed at creating understanding among the professions and technical/scientific disciplines in environmental protection. Education for the public would also be a major activity. It was felt that an entity was the most appropriate vehicle for further inputs in the environmental conservation of energy development, taking into account the non-effectiveness of existing international and regional agencies.

F. Develop Means to Enhance UNEP (ECLA or CEPAL) Capability and Influence

In most countries, the council of ministers represents the real decision-makers. Strong efforts should be made to get information on energy-environmental matters to this body so its members would be better prepared to make effective contributions to clean energy development. The Caribbean Environment Program will very likely be endorsed by the ministers of the countries of the wider Caribbean area in the near future. Once the document is signed, it means a commitment on the part of the respective governments to carry into effect the recommendations made in this UNEP/CEPAL-sponsored program.

G. Create Research and Development Funds for Development of Appropriate (Smaller) Local Technologies

Each nation or state in the Caribbean should know its energy potential (quantitative figures of sun, wind, wave, etc. energy influence).

Knowledge of these energy potentials enables energy experts to give the decision-makers options (at the given state of the art) from which they can choose in accordance to their socio-economic goals. Within these options the least environmentally damaging possibilities should be emphasized.

To arrive at well-balanced energy options, it is necessary to create funds in order to develop appropriate energy systems. Local experts can then work together with outside experts in these research and development areas.

Local production of appropriate energy devices should also be one of the aims in the research and development activities.

V. Summary

In sum, to improve the quality of the environment in the Caribbean, we have to know...

1. Who is polluting?
2. What is the pollutant?
3. What are their plans to avoid that?
4. What action are we going to take?
5. Who is going to act?
6. Who is going to support?

VI. Recommendations

Research is needed to gain more knowledge about the interplay between energy sources and environmental impacts on the fragile Caribbean ecosystem. Research is also needed on how to increase the likelihood that this new knowledge will, in fact, be used at appropriate stages of policy-making, planning, and management by private developers, government decision-making persons and groups, public interest groups, and the media.

There are topics of great concern regarding the extraction, production, transmission and use of environmentally clean energy on which information is absent or insufficient. These topics include:

- 1 Research of the effects of oil spills and tanker bilging on Caribbean coastal resources.
- 2 Research on how to heighten conservation awareness so it can be a force for clean energy development.
- 3 Research on feasibility of radioactive waste disposal in the greater Caribbean.
- 4 Research needed for survival on present and potential energy sources in the Caribbean. Analysis of energy sources in the Caribbean and their environmental damage.
- 5 Research on heat disposal on Caribbean coastal ecosystems (corals, mangrove, seagrasses, marshes).
- 6 Research on effects of geothermal energy production on Caribbean ecosystems and environment.
- 7 Research on effects of ports (oil and other emissions) on near-shore environments.
- 8 Research on environmental effects on OTEC macro-fouling near-shore environments.
- 9 Research on the effects of pipelines (for international oil and gas). Research on explosion and leak effects on Caribbean ecosystems: coastal, middle and upland.
- 10 Research on interactive effects of growth in population, energy systems, and the environment.

Topics of high concern and low information regarding how to get the knowledge about energy and environment used appropriately include:

- 11 Building mutual energy-environment education of professionals (engineers, environmentalists, decision-makers and politicians) and the public on energy-environmental problems.
- 12 Establishing a Caribbean-based environmental impact assessment capability.
- 13 Furnishing economic capability to support efforts of Caribbean nations to redirect developments that are unresponsive to the environment, and to better negotiate with single external financial sources supporting environmentally-damaging energy projects.
- 14 Information dissemination on environmental aspects.
- 15 Building an extra-government base for standards and policies — Recommending that a private international foundation be established.
- 16 Developing means to enhance UNEP (ECLA or CEPAL) capability and influence.
- 17 Creating research and development funds for development of appropriate (smaller) local technologies

These topics regarding knowledge utilization also lend themselves to immediate activation in the form of a foundation, initiated and guided by the working group members, and established for the purpose of getting the research done and used throughout the Caribbean region and in ways responsive to local needs, problems, and opportunities.

VII. Generalized Conclusions

Based on our assessment of the weaknesses in the levels of awareness, knowledge and available skilled personnel, we draw the following general conclusions:

- All nations in the Caribbean are pursuing their own best interests keeping the area environmentally clean for future generations. In many nations, large present revenues are obtained from "clean" resource-related activities, such as tourism, fisheries, etc.
- This workshop recognized the Mediterranean as example of a semi-enclosed basin which has lost much of its clean "water quality" through development. Our aim is rational management of the future development energy byproducts in the Caribbean so that the major share of the water and resource quality remains intact and any environmentally degraded areas are rehabilitated.
- Recognizing the far greater effectiveness, cost-benefit and management features of pre-planning minimal environmental damage into development, we urge rational energy planning to include strong environmental "least damaging" planning.
- Considering the fragility of Caribbean ecosystems and the slow rate at which they can recover, any kind of waste from energy extraction, production, and/or transmission in the area or elsewhere which can potentially damage the ecosystems should not be dumped or disposed of in the area.

Acknowledgements

FGOI

The working group gratefully acknowledges the grant 80EV10454 from the U.S. Department of Energy which allows travel, maintenance, organizational and operative costs for the workshop. Dr. Walter Garst and Mr. and Mrs. John O'Connell are thanked for their gracious support of the workshop. Florida International University is thanked for co-hosting the workshop. Applied Marine Ecological Services for the organizational and salary support given.

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Sea Grasses
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