



L. Davidson:
Environmental assessment
of the Wider Caribbean Region

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ENVIRONMENTAL OVERVIEW

The Wider Caribbean Region, as defined by the United Nations Environment Programme's (UNEP's) Convention for the Protection and Development of the Marine Environment, includes the Gulf of Mexico, the Caribbean Sea, areas of the Atlantic Ocean adjacent thereto and within 200 nautical miles of the Atlantic coasts of all the nations south of 30 degrees north latitude and north of the French Guyana-Brazil border. The region encompasses an area of approximately four million square kilometers and contains an approximate volume of 9.6 million cubic kilometers of water (UNEP 1987). The major flow of surface water is from southeast to northwest (Figure 1). The land masses are continuous along its southern, western and northern borders and are comprised of islands in eastern areas.

After centuries of colonial exploitation, mono-crop agriculture and military use, much of the region has been left with severely damaged terrestrial and coastal marine environments which today are under further stress because of growing populations, expanding tourism, waste disposal methods, industrial activities, oil tanker discharges, deforestation, erosion and over-fishing.

In addition, a number of recent changes in the region are having environmental consequences. The region has become a dumping grounds for hazardous-waste operators trying to evade new, stringent waste laws in industrialized nations. Renewed interest in oil exploration has resulted in plans to place significantly more oil drilling operations in the region. There is a risk of nuclear accidents from submarines, especially in areas where tanker traffic is heavy and offshore structures are prominent.

The increasing potential for environmental disasters spotlights the need for contingency planning and cooperation between nations.

Water-borne Pollution

The Caribbean region is particularly vulnerable to water-borne pollution. The prevailing surface currents move the water very rapidly, linking together many nations which are not immediately adjacent. The deeper areas in the Wider Caribbean Region, which contain most of the volume of water, are under the sill depth and receive very little renewal or flushing (Atwood, 1977) posing a serious risk for accumulation of persistent pollutants.

Water-borne pollution can be traced to three principal sources: untreated sewage, agricultural run-off, and industrial activities, especially those of the oil industry.

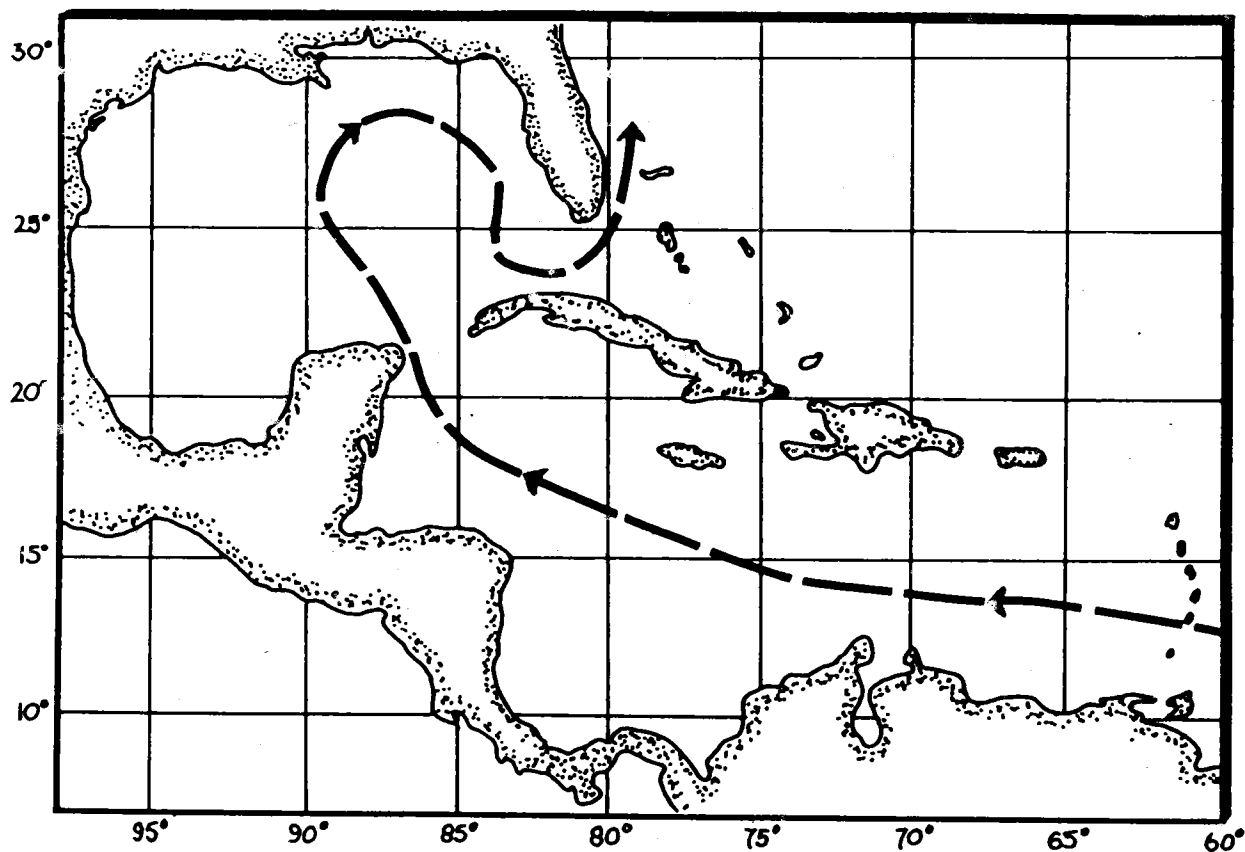


Figure 1: The heavy dashed line is a schematic representation of the major flow through the system when the Loop Current is intact in the Gulf of Mexico (Molinari et al, 1980).

The domestic wastes of approximately two hundred million residents (Table 1 shows Worldwatch's 1988 population and rate of natural increase figures) and more than ten million tourists are discharged annually into the water. A recent study indicates that less than ten percent of the population along the Caribbean basin is served by any form of sewage treatment. Discharge of untreated sewage can produce profound changes in water chemistry and quality when anoxic hazardous materials build up substantially. The capacity of the Caribbean waters to absorb the continual anoxic sewage wastes along with other chemicals is limited.

Agriculture is economically important to every nation in the region, and the use of agro-chemicals is steadily increasing. Pesticides have a diminishing value, however, when they contribute to the pollution of fishing grounds, poison livestock and adversely affect the public health through contamination of drinking water and food. Run-off of agricultural chemicals is estimated at more than one billion pounds per year. Agro-chemical residues are found in the estuarine and coastal sediments as well as in the water in dissolved form. They then enter the food web, progressing from microscopic life to humans. Run-off of nitrogen fertilizers, combined with pollution from sewage, also kills fish through "phytoplankton blooms" that cut off sun light to underwater plants, and reduce oxygen in the water as the plants die.

Most nations in the region allow industries to dispose of large portions of their waste in coastal waters. Coastal ecosystems that border industrialized areas have substantial concentrations of heavy metal contamination (UNEP 1987). The synergy of accumulated wastes with rapidly expanding oil and chemical industries is making the situation critical in some parts of the region.

Industries in the region include processing related to agriculture and fishing (tanning, fish-packing, sugar refining), oil exploration and refining, lumber pulping and milling, nuclear power, chemical factories as well as printing, textiles, automotive repair, and ship building and repair. All of them put large amounts of hazardous materials into rivers, estuaries, wetlands, and coastal waters.

Petroleum pollution is severe throughout the region. Floating tar as well as dissolved and dispersed petroleum hydrocarbons are chronic contaminants that result from oil tanker traffic and from offshore oil development. Windward-exposed beaches from Barbados to Florida are heavily contaminated with tar. The tar levels on many beaches either prevent recreational use or require expensive clean-up operations. Petroleum pollution in the water causes illness and death to marine animals, particularly to endangered sea turtles who feed on the floating tar, and to fish whose enzyme systems are affected, a condition associated with reproductive decline (CARIPOL 1980).

Table 1:

Worldwatch 1988 population and rate of natural increase figures

Caribbean nations	Population	Rate
Antigua and Barbuda	100,000	1 %
Bahamas	200,000	1.9%
Barbados	300,000	.8%
Belize	200,000	3 %
Colombia	30,600,000	2.1%
Costa Rica	2,900,000	2.9%
Cuba	10,400,000	1 %
Dominica	100,000	1.6%
Dominican Republic	6,900,000	2.4%
France		
French Guiana	800,000	2.0%
Guadeloupe	300,000	1.3%
Martinique	300,000	1.2%
St. Barthelemy	-	-
St. Maartin	-	-
Grenada	100,000	1.9%
Guatemala	8,700,000	3.2%
Guyana	800,000	2 %
Haiti	6,300,000	2.8%
Honduras	4,800,000	3.1%
Jamaica	2,500,000	1.7%
Mexico	83,500,000	3.5%
Netherlands		
Aruba	-	-
Netherlands Antilles	200,000	1.4%
St. Martin	-	-
Nicaragua	3,600,000	3.5%
Panama	2,300,000	2.2%
St. Kitts and Nevis	40,000	1.4%
St. Lucia	100,000	2.2%
St. Vincent and the Grenadines	100,000	2 %
Suriname	400,000	2.1%
Trinidad and Tobago	3,100,000	2.2%
United Kingdom		
Anguilla	-	-
British Virgin Islands	-	-
Cayman Islands	-	-
Montserrat	-	-
Turks and Caicos Islands	-	-
United States		
Puerto Rico	3,400,000	1.2%
St. Croix	-	-
US Virgin Islands	-	-
Venezuela	18,800,000	2.4%
Global rate of natural increase		1.7%
Latin America rate of natural increase		2.2%
- = No figures available		

Hazardous materials from the more industrialized nations also are moving to the region--from accidental spills into the waters, improper waste disposal and from the export of foreign-produced toxic wastes. Among these exported materials, agricultural-chemicals and toxic wastes pose the most alarming threats.

Water-borne pollution is most severe in areas where large or rapidly growing populations live in coastal zones and is less severe in Central American nations where the Caribbean coastline is less densely populated.

Living Resources

The living resources of the Caribbean--fish, agricultural produce, timber, and other native plants and animals--are diminishing. New laws to protect these resources need to be adopted and existing laws need to be more rigorously enforced.

The bays, estuaries, seagrass beds and coral reefs that serve as fish nurseries are being destroyed. Because of this habitat destruction, as well as excessive harvests and pollution damage, the number of commercial fish and shellfish are decreasing in many areas or are at a steady-state level despite recent efforts toward better management.

The progressive destruction of tropical forests has resulted in massive erosion causing siltation and turbidity in both inland and coastal waters. Farmlands and beaches are also eroding, producing similar results. Fresh water is being depleted, and fragile coastal environments such as mangrove forests and savannahs are disappearing.

Marine mammals and sea turtles are endangered and threatened throughout the region. The Caribbean Monk Seal is believed to have become extinct in the last decade. Manatee populations are seriously depleted throughout the region, and the decline is continuing. Entanglement in fishing gear, habitat loss and collisions with motor boats are primary causes of manatee mortality. Turtles are being killed for their commercial value and as the incidental result of shrimp trawling, and they are losing many of their nesting grounds because of beach development.

Alarming numbers of dolphins are being captured for display purposes throughout Europe and the Americas; and in 1987 a devastating disease, of unknown origin, killed a large percentage of the Atlantic bottlenosed dolphin population along the US Atlantic coast.

Two species of endangered great whales have breeding and calving grounds in the Wider Caribbean Region. What is done to preserve these grounds could well determine whether these great whales survive or become extinct.

Management and Information Exchange

Many of the environmental management principles in the region are based on standards from industrialized nations, which assume that ocean discharges occur into large well-mixed ocean basins with resilient phytoplankton-based food chains (that exist near the surface). They also assume temperate zones, which are far more resilient to pollution. The Caribbean region is predominantly tropical with the upper Gulf of Mexico subtropical. Most of the fisheries-based food web occurs benthically (on or near the bottom), both for nearshore areas and the continental shelf. The ecosystem is of far greater value nearshore in the tropics, in proportion to total productivity, and is more sensitive to pollution. Environmental policies of temperate industrialized nations are inadequate to protect these more fragile tropical ecosystems.

Although marine expertise is increasing in the region, most environmental management agencies remain understaffed. Centers of learning in the region and in other nations are producing environmental experts, but because of low salaries and other conditions Caribbean governments are not always able to retain trained personnel.

Several organizations have undertaken environmental studies of the region in the past decade, but these studies and other educational materials have not been widely disseminated. Members of the media, and even government decision-makers, are often under-informed about environmental issues. Public libraries and schools do not have sufficient educational materials about the environment.

The funding to help develop regional strategies and programs is insufficient. Certain problems such as oil spills have received detailed planning, while other concerns such as status of fish stocks have not been thoroughly examined.

Conclusion

The Caribbean is at a critical juncture. Given the present trends, the next several years will be a period of

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