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Impact on Mangroves

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Abstract

Within the region, there are approximately 3,230,000 hectares of coastal shoreline dominated by mangrove vegetation which represents some 15% of the world inventory of mangroves. Unlike some parts of Asia, the mangroves of the region are not utilized in a sustainable manner although there are a variety of local uses, such as for timber, fuel and charcoal. In less populated areas, mangrove vegetation persists in a relatively undisturbed state. In populated areas, however, the habitat is used for the disposal of wastes, cleared for development projects, or exploited for other purposes, such as shrimp mariculture, all of which are incompatible with the sustainability of nearshore fisheries and environmental quality. In the context of global change, mangroves are more likely to be affected by changes in regional precipitation rather than by rising temperature and sea level. Specifically, mangrove areas that receive substantial precipitation and fresh-water runoff are likely to persist, whereas mangrove areas exposed to full-strength seawater may be overstepped and lost. Because of the importance of intertidal mangroves in shoreline protection, fisheries support and water quality, efforts should be taken by the appropriate authorities and organizations to curb abuses and protect the resource for both ecological and economic purposes.

1 Introduction

Although salt-tolerant mangroves form the dominant shoreline vegetation within the region, the majority of the region-specific data and information on their distribution and current status is sketchy and anecdotal. Any of the data and information obtained for this report are derived from the experience of the author in the region, from a variety of grey literature sources, and from communications with a number of regional correspondents. The resulting report focuses on the characteristics and distribution of mangroves within the region, their current status, and their ability, or not, to cope with and survive global change. The latter includes comments on certain man-related activities that take place in mangrove habitats.

2 The Mangroves of the Region

The ecological grouping of the halophytic spermatophytes known as mangroves occurs throughout the region, and includes *Avicennia germinans* L. Stearn, *Conocarpus erectus* L., *Laguncularia racemosa* L., *Gaertn.* f., *Pelliciera rhizophorae* Triana and Planchon, and *Rhizophora mangle* L. These species

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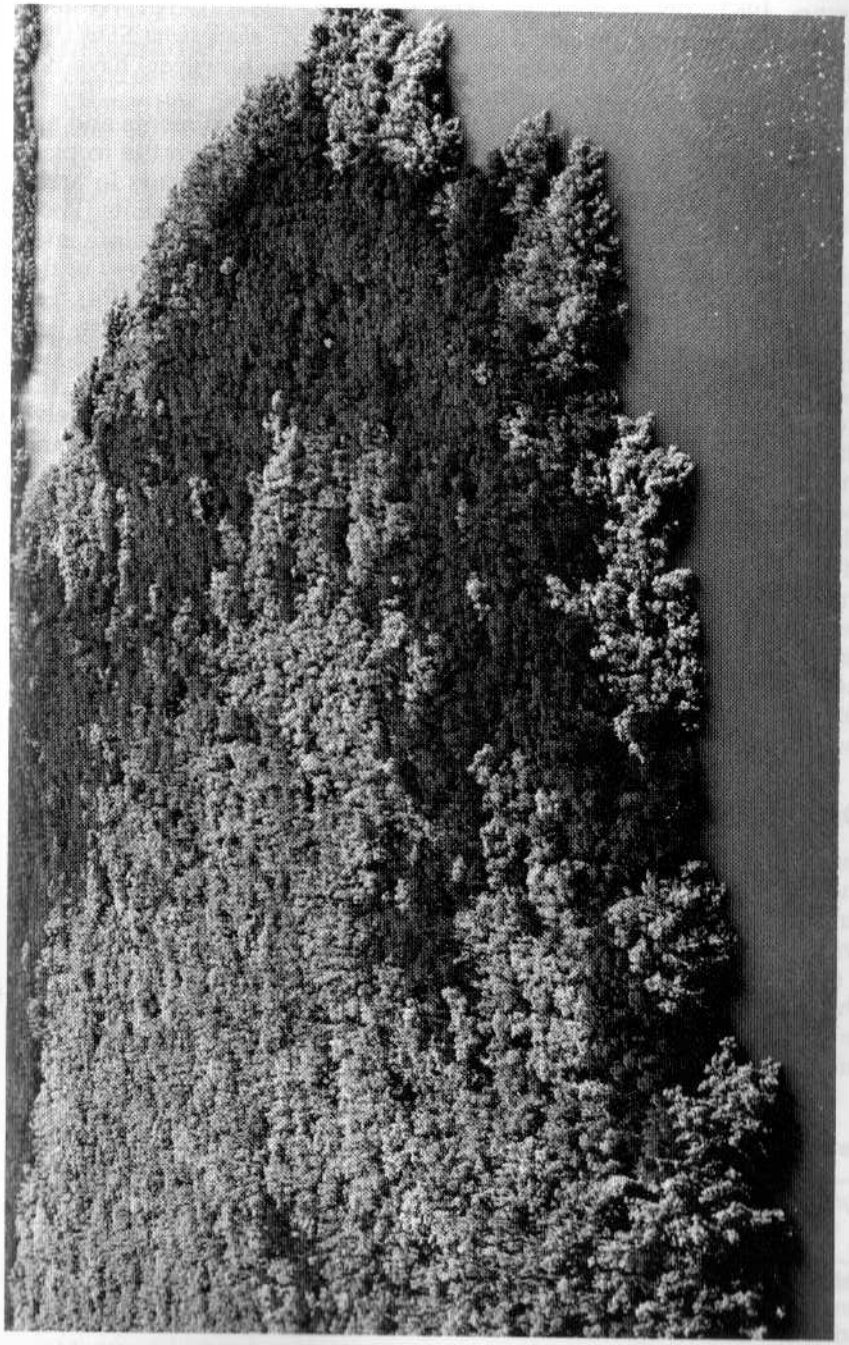

Fig. 12.1 The structural complexity and development of mangrove forests are greatest in coastal areas that receive fresh-water runoff from inland catchments. The input of nutrients in the runoff as well as the reduction in salinity result in high rates of primary productivity. See colour plates between pages 210 and 211.

are ubiquitous throughout the Gulf of Mexico and Caribbean Sea, except for *P. rhizophorae* which appears to be restricted to the coasts of Colombia (Calderon, 1983, 1984) and Costa Rica (Jimenez, 1984). Other Western Hemisphere mangrove species (*A. bicolor Standl., A. shaueriana Stapf., R. harrisonii* Leechman, and *R. racemosa* G.F.W. Meyer), however, have not been verifiably reported as occurring in the region.

Whereas mangroves are adapted to saline anaerobic sediments and are commonly found along protected intertidal shorelines within the tropical latitudes (Chapman, 1976), their maximum development occurs in areas of high precipitation or fresh-water runoff from inland catchments (Pool, *et al.*, 1975; see Fig. 12.1). This phenomenon is attributed to the influence of fresh water in maintaining low-salinity regimes, and the delivery of the products of bedrock and soil weathering (Lugo and Snedaker, 1974). For this general reason, some of the largest areas of mangroves forests are associated with large river drainages (e.g., the Orinoco in Venezuela and the Grijalva-Usumacinta in Mexico), high-rainfall environments (e.g., the Boca del Toros region of Panama and parts of Cuba) and areas that receive substantial sheetflow runoff (e.g., the Atlantic coast of Nicaragua and south Florida).

Elsewhere, for example, on many of the islands, mangrove-forest development is limited by aridity, hypersalinity, and the absence of significant areas of protected intertidal shorelines. In these restrictive settings, mangrove vegetation typically consists of a relatively narrow fringe of short- to moderate-sized trees dominated almost exclusively by *R. mangle* in frost-free regions. In more temperate latitudes, (e.g., around the northern coastline of the Gulf of Mexico) winter frosts and freezes allow the existence of only *A. germinans* which has the capacity to regenerate following severe freeze damage (*cf.* Lugo and Patterson-Zucca, 1977).

3 Distribution of Mangrove Vegetation

There are a paucity of data concerning the area of the region dominated by mangrove vegetation. However, based on a variety of published and unpublished reports, and personal communications with knowledgeable individuals within the region, a partial land-area inventory has been assembled (Table 12.1); note that the coverage is incomplete, and that the data are heavily caveated. The tabular total of 3,230,000 hectares represents some 15% of a conservatively estimated total world area of mangroves of 22 million hectares (Fig. 12.2).

Table 12.1 Mangrove forest area*.

Geographic region	*Mangrove forest area (hectares)*	*Notes*
Caribbean		
Bahama Islands	233,200	(1)
Andros Island	155,500	(1)
Grand Bahama Island	51,800	(1)
Inagua Island	26,000	(1)

Barbados	12	(2)
Graeme Hall Swamp, Christ Church	8	(2)
Chancery Lane Swamp, Christ Church	<1	(2)
Cayman Islands	11,655	(3)
Grand Cayman Island	10,878	(3)
Cayman Brac Island	100	(3)
Little Cayman Island	677	(3)
Cuba	626,000	(4)
North coast	131,000	(4)
North coast islands and archipelagos	114,000	(4)
South coast	318,000	(4)
South coast islands	38,000	(4)
South coast archipelagos and Isla de Piños	25,000	(4)
Dominican Republic	23,500	(5)
Rio Yuma	6500	(6)
Bahia de San Lorenzo	2100	(6)
Lake Enriquillo	1600	(6)
remaining area	13,300	(6)
Grand Terre	4320	(7)
Guadeloupe	5700	(8)
Haiti	18,000	(9)
Jamaica	20,200	(10)
Black River	7300	(10)
Negru (Negril)	2000	(10)
Martinique	2,200	(11)
Fort de France Parish	200	(11)
Lamentin Parish	500	(11)
Ducos Parish	300	(11)
Riviere Salee	400	(11)
South Martinique (small parcels)	800	(11)
Monserrat	7	(12)
St. Anthony Parish	6	(12)
St. Georges Parish	1	(12)
St. Peter Parish	<1	(12)
Netherlands Antilles	1500	(13)
Aruba	100	(13)
Bonaire	1000	(13)
Curacao	300	(13)
St. Martin	100	(13)
Puerto Rico	6497	(14)
North central coast	475	(14)
Northeast coast	2021	(14)
East coast	1285	(14)
South central coast	937	(14)
Southwest coast	988	(14)
West coast	207	(14)
Northwest coast	48	(14)
Metropolitan San Juan	274	(14)
Culebra Island	26	(14)

Vieques Island	227	(14)
Mona Island	1	(14)
St. Kitts	20	(15)
Trinidad-Tobago	9000	(16)
Northwest	6000	(16)
Caroni Swamp	3500	(16)
Northeast	1000	(16)
Southwest	1500	(17)
Southeast	400	(16)
Tobago	100	(16)
Virgin Islands	310	(18)
Central America		
Belize	75,000	(19)
Costa Rica	35,000	(20)
Caribbean coast	400	(12)
Guatemala	16,000	(22)
Caribbean coast	8500	(23)
Honduras	145,000	(24)
Pacific coast, Bahia de Fonseca	28,000	(25)
El Salvador border to Rio Nacaome	7500	(25)
Rio Nacaome to San Lorenzo outlet	8000	(25)
Rio San Lorenzo to Rio Choluteca	6000	(25)
Rio Choluteca to Nicaragua border	6500	(25)
Caribbean coast	117,000	(26)
Nicaragua	60,000	(27)
Caribbean coast	25,000	(28)
Panama	297,532	(29)
Caribbean coast		
Bocas del Toro Province	64,010	(30)
Pacific coast		
Cocle	25,125	(30)
Chiriqui	66,645	(30)
Darien	28,225	(30)
Herrera	8450	(30)
Los Santos	8800	(30)
Panama	122,925	(30)
North America		
United States	280,594	(31)
Alabama	25	(32)
California	150	(33)
Florida	274,857	(34)
East coast	47,370	(35)
Biscayne Bay	7877	(36)
West coast	15,917	(37)
Florida Bay	14,938	(37)
Whitewater Bay	30,760	(37)
Charlotte Harbor	9504	(37)
Tampa/Hillsborough Bay	7091	(38)
Louisiana	2956	(39)
Mississippi	250	(40)

Texas	2506	(41)
Aransas County	12	(41)
Calhoun County	1500	(41)
Cameron County	400	(41)
Kenedy County	8	(41)
Kleberg County	8	(41)
Nueces County	570	(41)
Willacy County	8	(41)
Mexico	1,420,200	(42)
Caribbean coast	700,000	(43)
Laguna de Mecoacan (Tabasco)	4000	(44)
Laguna de Terminos (Campeche)	250,000	(45)
South America		
Colombia	501,300	(46)
Caribbean coast	50,000	(46)
	73,975	(47)
Islas del Rosario	297	(48)
Canal del Dique Delta	12,000	(49)
Bahia de Cartagena	30	(50)
Cienaga Grande - Magdalena Delta	46,000	(51)
French Guiana	55,000	(52)
Guyana	80,000	(53)
County of Berbice	30,000	(53)
County of Demerara	10,000	(53)
County of Essequibo	40,000	(53)
Venezuela	673,569	(54)
Western region	15,468	(54)
Central-western region	15,616	(54)
Central region	6608	(54)
Central-eastern region	138,377	(54)
Orinoco Delta	495,200	(54)
Margarita island	2300	(54)
Surinam	115,000	(55)

*See Appendix, pp 295–299, for notes and references.

4 Major Regional Problems

To a large extent, the types of problems affecting the mangrove resources are not unique from a global perspective. However, because both island land areas and mangrove habitats are limited, present and potential impacts tend to be accentuated. Two major groupings of problems affecting mangroves are identified and discussed below in sections 4.1 and 4.2.

4.1 Economic Exploitation and Direct Conversion to Other Uses

4.1.1 Non-sustainable logging

In part due to the rising global concern over the continuing loss of tropical rain forests (*cf.* Repetto, 1990), high-volume mangrove forests are increasingly being viewed as alternate wood sources, particularly for wood chips used in the pulp and paper industry, and as a source of cellulose. Up