Volume 1, No. 2 *July, 2001*

GLOMIS Electronic Journal

An electronic journal dedicated to enhance public awareness on the environmental importance of mangroves

World mangrove resources

The purpose of the 'World Mangrove Atlas' in 1997 was to produce a graphic synthesis of information relating to the distribution and current status of mangrove ecosystems in our increasingly threatened coastal environment (Spalding *et al.*, 1997, Simberloff, 2000).

Inevitably, this atlas contains information or interpretations that not everyone agrees with as well as omissions. As the number of case studies provided in the book was very limited, we have been encouraged to obtain new satellite data, carry out new field surveys and use new analytical methods so that the atlas can be updated in a near future. All the cartographic and statistical outputs are intended to feed into the GLOMIS database.

The present knowledge on the extent of mangroves is summarized in Table 1. The Atlas includes country-by-country analysis and mapping of mangrove coverage. However, the effective monitoring and management of these ecosystems would need a much more accurate inventory for those areas which constitute hotspots for the survival of mangroves, their protection or sustainable use. Let us give three examples selected from coastal areas which are totally distinct from an ecological point of view:

Thailand

-The mangroves of Thailand have been mapped (about 2,700 km^2) and the trends in areal coverage and adverse pressures evaluated (strongly impacted by aquacultural practices). These data do not give any local information. This has to be improved in certain cases. For instance, the mangroves of Phuket, (see Fig. 1) with 780 km^2 of dense, generally well preserved types, are expanding after tin mines were abandoned. They are of special interest in the coastal context of Thailand (Boulbet, 1995).

United Arab Emirates

-The mangroves of the United Arab Emirates were not presented in the Atlas because their total areal extent was unknown and was too small on a worldwide scale. However, these mangroves, which occupy one of the driest habitats in the world, have a very high ecological importance in the Arabian Gulf (Saenger and Blasco, 2000). We know now that the scattered populations of *Avicennia marina* Forsk. Vierh., the only woody species which makes up these ecosystems, covers about 38 km^2 with an estimated standing biomass varying between 70 and 110 t ha^{-1}.

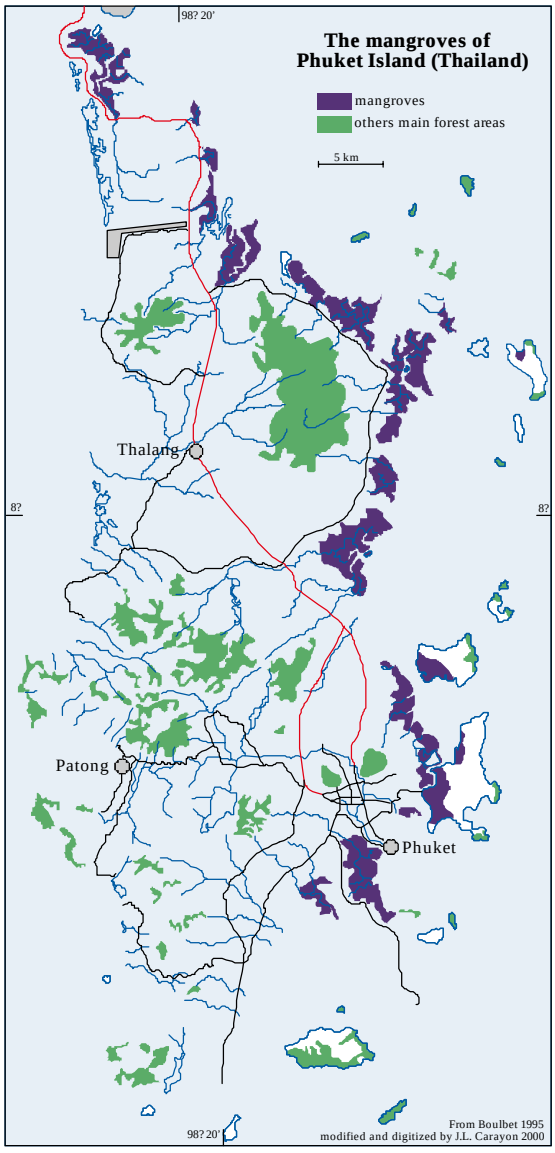

Fig. 1. Mangroves of Phuket island.

Table 1. Various estimates of mangrove areas, together with percentage figures of global totals (km^2)

Region	Mangrove Area Spalding *et al*. (1997)	Mangrove Area Fisher and Spalding (1993)	Mangrove Area IUCN (1983)
South and Southeast Asia	75,173 (41.5%)	76,226 (38.3%)	51,766 (30.7%)
Australasia	18,789 (10.4%)	15,145 (7.6%)	16,980 (10.0%)
The Americas	49,096 (27.1%)	51,286 (25.8%)	67,446 (40.0%)
West Africa	27,995 (15.5%)	49,500 (24.9%)	27,110 (16.0%)
East Africa and the Middle East	10,024 (5.5%)	6,661 (3.4%)	5,508 (3.3%)
Total Area	181,077	198,818	168,810

Indonesia

- The once luxuriant equatorial mangroves of the Mahakam River in Borneo (Indonesia) have lost, during the last 10 years, nearly half of their *Nypa* stands, which were destroyed by uncontrolled and widespread conversion to aquaculture. This striking local case does not appear in the general statistics of the country which has one of the largest mangrove areas in the world (more than 40,000 km^2).

The revised version of the world cartographic mangrove inventory is aimed at serving the needs of the scientific community and those of decision makers, as such, the data provided by satellites are not sufficient (Blasco *et al*., 1998; Green *et al*., 1998 and Ramsey *et al*., 1996). The spectral signature of mangrove components relates almost exclusively to the 'Phytocenose' which is the most visible fraction of the ecosystem. Data on other components ('zoocenose', human interactions, microorganisms, etc.) are generally derived from ancillary sources. This is also the case for the 'geocenose' (habitat peculiarities) which includes hydrological rhythms, geomorphological features, bioclimatic properties, soils and water peculiarities, etc.

For each part of the world, an integration of all these heterogeneous and complex date help understanding of the present status, the ecological equilibrium and the evolutionary trends of each mapped mangrove (Hutchings and Saenger, 1987).

In theory, 70 countries having mangroves, have to be studied and mapped including small islands of the Southern Pacific and the Lesser Antilles. However, the following 18 countries taken together represent about 80% of the mangroves of the world (Table 2).

Hence, the logical statistical hypothesis is that a thorough study of the above 18 countries could be sufficient to provide a faithful illustration of the present status of the mangroves of the world. However, this is incorrect in practice, as already discussed (Phuket island, UAE, and Mahakam delta). Local specific cases and exceptional situations need special attention even in a study carried out at a worldwide scale.

The adopted classification system for the world inventory of the mangroves is based on physiognomic and structural attributes of each ecosystem, primarily because of its applicability to almost all mapping procedures including those using various computerized analysis of high resolution satellite data (Aizpuru *et al.*, 2000).

This current activity can be considered as an essential step towards a monitoring system of the main mangrove ecosystems in the world.

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Table 2. Estimates of mangrove areas from major mangrove holding countries (km^2)
(Aizpuru *et al.*, 2000)

America		**Africa**		**SE Asia**		**Oceania**	
Brazil	13,800	Guinea-Bissau	2,500	Vietnam	2,500	Australia	11,700
Colombia	3,700	Nigeria	10,500	Bangladesh	6,300	PNG	4,100
Cuba	5,600	Gabon	2,500	Indonesia	42,500		
Mexico	5,300	Cameroon	2,400	Malaysia	6,400		
Venezuela	2,500	Madagascar	3,200	Myanmar	5,200		
				India	6,700		
Total	30,900	Total	21,100	Total	69,600	Total	15,700

Suggested literatures:

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