



**Forestry Department**

**Food and Agriculture Organization of the United Nations**

**GLOBAL FOREST RESOURCES  
ASSESSMENT 2005  
THEMATIC STUDY ON MANGROVES**

**SIERRA LEONE**

**COUNTRY PROFILE**

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The purpose of this paper is to provide early information on on-going activities and programmes, to facilitate dialogue, and to stimulate discussion.

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# INTRODUCTION

Mangroves are found along sheltered coastlines in the tropics and sub-tropics where they fulfil important functions in terms of providing wood and non-wood forest products, coastal protection, conservation of biological diversity and provision of habitat, spawning grounds and nutrients for a variety of fish and shellfish. High population pressure in coastal areas has led to the conversion of many mangrove areas to other uses and numerous case studies describe mangrove losses over time. However, information on status and trends at the global level is scarce. The first attempt at estimating the total mangrove area in the world was undertaken as part of the FAO/UNEP Tropical Forest Resources Assessment in 1980, where the world total was estimated as 15.6 million hectares. More recent estimates range from 12 to 20 million ha. For many of these studies, countries with small areas of mangroves were excluded due to lack of information and because their combined area of mangroves would not significantly affect the world total.

A recent initiative by FAO aimed at facilitating access to comprehensive information on the current and past extent of mangroves in 121 countries and areas (FAO. 2003). This built on the earlier FAO/UNEP assessment and on the recent FAO Global Forest Resources Assessment 2000 (FRA 2000). An extensive literature search yielded additional information. More than 2800 national and sub-national datasets were collected, with the earliest estimates dating back to 1918. One of the results was an updated list of the most reliable, recent estimate for each country, mostly based on inventories or analysis of remote sensing imagery. Regression analyses based on earlier data provided estimates for 1990 and 1980 and an extrapolated estimate for 2000 for each country.

The preliminary results of this initiative showed that mangrove deforestation continues, albeit on a slightly lower rate in the 1990s than in the 1980s. The relatively large mangrove deforestation rates in Asia, the Caribbean and Latin America in the 1980s reflect large-scale conversion of mangroves for aquaculture and tourism infrastructure. Most countries have now banned the conversion of mangroves for aquaculture purposes and require environmental impact assessments prior to large-scale conversion of mangroves areas for other uses.

In order to provide the most accurate and comprehensive evaluation of current mangrove status, FAO is presently updating the above cited preliminary results, which have been sent out to all countries and areas in which they exist (124) for information and validation. Additional literature search, active collaboration with national and international mangrove experts and the use of remote sensing imagery interpretation have further supported the preparation of the final report, which will be published in 2005.

Readers are strongly encouraged to provide feedback and additional information to help update and improve this database for the benefit of all those who may have an interest in mangroves.



# Sierra Leone

## Vegetation description

Mangrove forests are found in the coastal area, usually on tidal flats at the mouths of rivers. Stilted shrubs or trees are frequent and mangroves may reach up to 20 m in height. Along creeks, the trees are larger and the forest is dense, resulting in a "gallery forest" effect. The mud flats between creeks have a low mangrove cover, usually less dense. The main tree species are *Rhizophora racemosa*, *R. mangle* and *R. harrisonii*. The first is a pioneer species at the edge of the water. The other two are dominant upstream at the tidal limits, where *Avicennia germinans* (syn *A. nitida*), *Conocarpus erectus* and *Laguncularia racemosa* can also be found. On the fringe of the mangroves, grasses occur together with ferns and halophytes. The mangroves extend far up the rivers to the extent of the tides. *Rhizophora racemosa* is commonly found in association with *Avicennia* on mudflats, but in areas where the soil is well consolidated and there is an input of freshwater *R. racemosa* grows exclusively, sometimes reaching a height of 35 m. The most extensive stands are located in the northern part of the country and major locations are Yawri Bay, the estuaries and islands behind Freetown and the complex of coastline and estuaries behind Sherbro Island which join into a wide waterway known as Sherbro River.

## Uses and threats

The rich mangrove forests of Sierra Leone have been heavily exploited due to rapid population increase and high pressure on the ecosystem for the local livelihood. Nowadays mangrove cover is mainly made up of low regrowth with few trees of other size, especially in the area around Freetown, which has apparently been cleared for poles and fuelwood in the past. Some mangrove lands have also been cleared to provide new areas for rice production, while several trees have been cut to provide cheap fuel for fish smoking, a major way of preserving food and for salt production. Important threats are also represented by siltation and pollution of estuaries. On the protection side, the Sierra Leone River Estuary, which is dominated by mangrove systems and includes the 19 percent of the total national mangrove forests, has been declared wetland of international importance in 1999. Despite the ongoing threats to the vegetation, vast areas of pristine mangroves still occur in this site. Traditional fishing and agro-forestry for fuelwood can be sustainably managed in collaboration with an existing EU-funded Artisanal Fishing Community Development Programme.

**FAO.** 1979. *Vegetation and land use in Sierra Leone: A reconnaissance survey*. Technical Report No. 2-SIL/73/002. Freetown.

**Spalding, M.D., Blasco, F. & Field, C.D.,** eds. 1997. *World Mangrove Atlas*. The International Society for Mangrove Ecosystems, Okinawa, Japan. 178 pp.

**The Ramsar Convention on Wetlands.** 2000. *The Annotated Ramsar List of Wetlands of International Importance – Sierra Leone*. [http://www.ramsar.org/profile/profiles\\_sierraleone.htm](http://www.ramsar.org/profile/profiles_sierraleone.htm)

## National level mangrove estimates

In order to provide the whole range of the information currently available on mangrove area extent for this country, all the national level mangrove area estimates collected so far have been reported in the following table.

Differences in methodologies, classifications, mapping scales etc. may have led to discrepancies in estimations. Only the figures considered as the most accurate and reliable (marked in the Trend column in this table) have been used for the analysis of the area changes over time; the remaining have been reported, but not used for the trend analysis.

Year	Area (ha)	Source	Trend	Methodology/Comments
1976	171 600	<b>FAO.</b> 1979. <i>Land in Sierra Leone: A reconnaissance survey and evaluation for agriculture.</i> Based on the work of Birchall, C.J., Bleeker, P., Cusani-Visconti, C. FAO/LRSP Technical Report No. 1. SIL/73/002	X	Aerial photographs 1975-1976. Scale 1:70 000
1976	185 400	<b>FAO.</b> 1996. <i>Review of Existing Sources of information for Forest Resource Assessment in Sierra Leone.</i> By Laumans P. A. Field document. DP/SIL/92/006, Rome, 36 pp.		Updating of the 1975-1976 aerial photographs based on LANDSAT data.
1976	283 761	<b>FAO.</b> 1979. <i>Land resources survey, Sierra Leone.</i> AG:DP/SIL/73/002 Field Document 1. Sierra Leone Freetown.		Cited in: <b>Johnson, R. and R. Johnson.</b> 1993. <i>Mangroves of Sierra Leone.</i> In: Diop, E.S. 1993. <i>Conservation and sustainable utilization of mangrove forests in Latin America and Africa regions, Part II - Africa.</i> pp: 7-9. . Mangrove Ecosystems Technical Reports vol.3 ITTO/ISME Project PD114/90. Okinawa, Japan, ISME. 262 pp. The figure might include also freshwater swamps.
1983	100 000	<b>Saenger, P., Hegerl E.J. and J.D.S., Davie.</b> 1983. <i>Global status of mangrove ecosystems.</i> Commission on ecology Papers No.3. IUCN. Gland, Switzerland. 88 pp.		Secondary reference, no primary source provided. The "Year" is the publication year.
1986	156 500	<b>FAO.</b> 1996. <i>Review of Existing Sources of information for Forest Resource Assessment in Sierra Leone.</i> By Laumans Paul A. Field document. DP/SIL/92/006, Rome, 36 pp.	X	Remote sensing
1987	250 000	<b>Altenburg, W.</b> 1987. <i>Waterfowl in West African Coastland Wetlands: a summary of current knowledge of the occurrence of waterfowl in wetlands from Guinea-Bissau to Cameroon and a bibliography of information sources.</i> Zeist, The Netherlands: Stichting WIWO (Werkgroep International Waden Watervogelonderzoek).		Cited in: <b>Fisher, P and Spalding, M.D.</b> 1993. <i>Protected areas with mangrove habitat.</i> Draft Report World Conservation Centre, Cambridge, UK. 60pp.

<b>Year</b>	<b>Area (ha)</b>	<b>Source</b>	<b>Trend</b>	<b>Methodology/Comments</b>
1991	286 000	<b>FAO.</b> 1991. <i>Alleviation of the Fuelwood Supply Shortage in the Western Area - Sierra Leone.</i> FO:DP/SIL/84/003 FO:DP/SIL/88/008 Terminal Report		The figure represents the extent of coastal woodland-mangrove and swamps. It may include freshwater swamps.
1995	183 800	<b>Saenger, P. and Bellan, M.F.</b> 1995. <i>The Mangrove vegetation of the Atlantic coast of Africa.</i> Université de Toulouse Press, Toulouse 96 pp		Secondary reference, no primary source provided. "Year" is the publication year.
1997	169 500	<b>Spalding, M.D., Blasco, F. and Field, C.D.,</b> eds. 1997. <i>World Mangrove Atlas.</i> The International Society for Mangrove Ecosystems, Okinawa, Japan. 178 pp.		Map analysis. Digital dataset entitled West African Forest Data compiled by Henrik Olesen of UNEP-GRID from AVHRR imagery (1km pixels), for the TREES (Tropical Ecosystem Environment Observations by Satellite) project of the EC Joint Research Centre, Ispra, Italy. The map was undated.
<u>2000</u>	<u>105 300</u>	<b>World Atlas of Mangroves initiative</b> <a href="http://www.fao.org/forestry/site/mangrove-atlas">www.fao.org/forestry/site/mangrove-atlas</a>	X	LANDSAT imagery interpretation undertaken by UNEP-WCMC.

## **Mangrove species checklist**

Following Tomlinson 1987 classification, mangroves may be divided into three groups according to their features: major elements (strict or true mangroves), minor elements and mangrove associates. Tomlinson list of true mangrove species have been here modified by adding some species commonly found as exclusive mangrove species (Saenger et al. 1983)

In the context of this assessment, only true mangrove species found in the present country will be reported:

*Avicennia germinans*

*Conocarpus erectus*

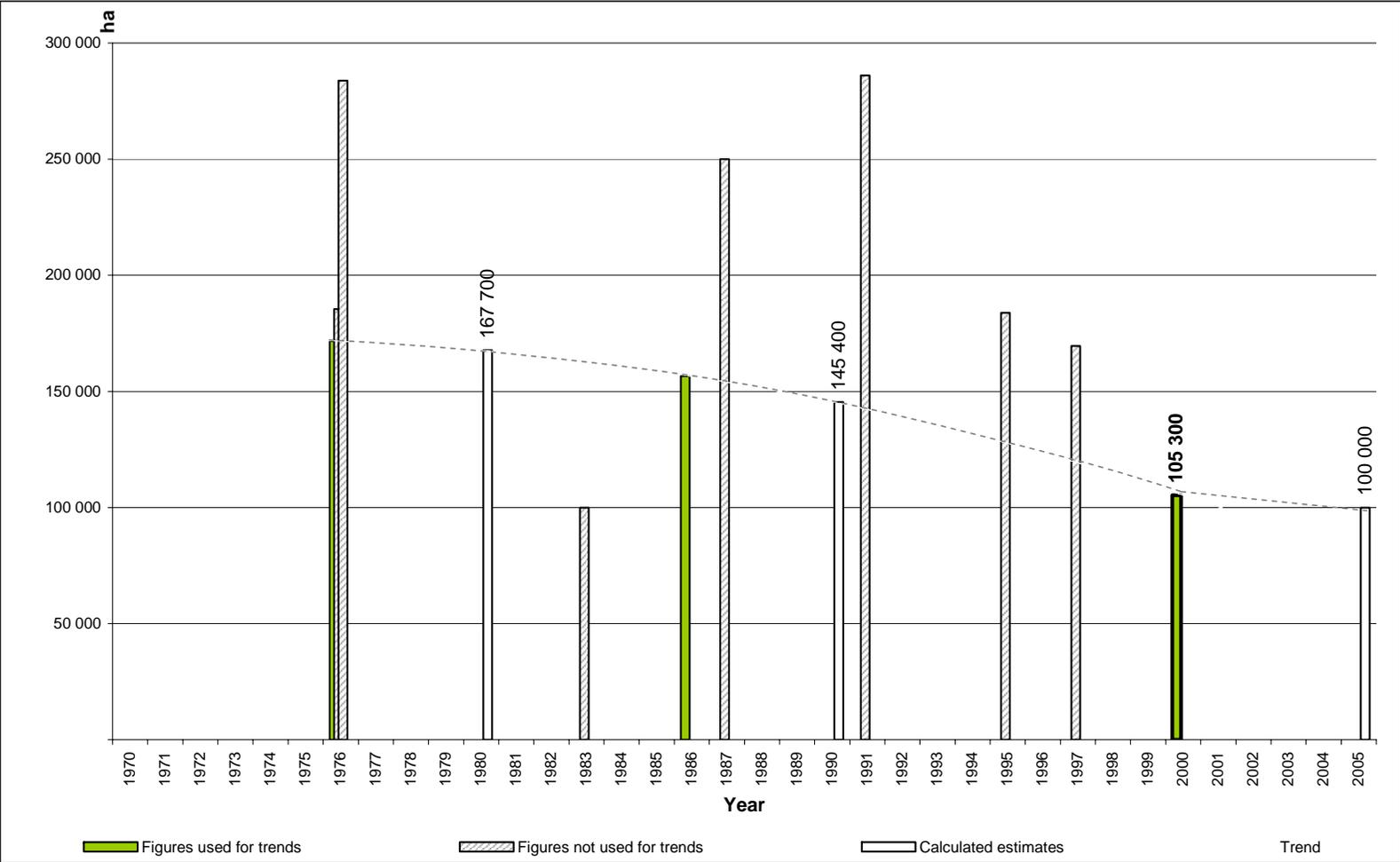
*Laguncularia racemosa*

*Rhizophora mangle*

*Rhizophora harrisonii*

*Rhizophora racemosa*

### Trends in mangrove area extent over time



The 2005 figure is an expert estimate based on the qualitative information currently available.

## Summary status of mangrove area extent over time

	Most reliable, recent mangrove area estimate		Mangrove area estimate 1980	Mangrove area estimate 1990	Mangrove area estimate 2000	Mangrove area estimate 2005
	ha	year	ha	ha	ha	ha
<b>Sierra Leone</b>	105 300	2000	167 700	145 400	105 300	100 000

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## References

- FAO.** 1995. *Forest Resources assessment 1990: Global synthesis*. FAO Forestry Paper No. 124. Rome, 46pp.
- FAO.** 2005. *Global Forest Resources Assessment 2005: main report*. FAO Forestry Paper. Rome. *In press*
- FAO.** 2003. *Status and trends in mangrove area extent worldwide*. By Wilkie, M.L. and Fortuna, S. Forest Resources Assessment Working Paper No. 63. Forest Resources Division. FAO, Rome. (*Unpublished*) <http://www.fao.org/documents/>
- Saenger, P., Hegerl, E.J. & Davie, J.D.S.** 1983. *Global status of mangrove ecosystems*. Commission on ecology papers No. 3. Gland, Switzerland, IUCN.
- Tomlinson, P.B.** 1986. *The botany of mangroves*. Cambridge Tropical Biology Series, Cambridge, 419 pp.

# Explanatory notes

## Figures used for trends

The estimates used for the trend analysis have been marked with an “X” in the “Trend” column of the national level mangrove estimates table; they have been coloured in green - with no patterns - in the chart.

## Most recent reliable figures

The figure chosen as the most recent reliable is underlined in the national level mangrove estimates table; it has been bolded in the chart.

## Formulas used for the trend analysis

Polynomial trend line:

$y = b + c_1x + c_2x^2 + c_3x^3 + \dots + c_nx^n$  where  $b$  and  $c_1 \dots c_n$  are constants.

