# Chapter 2
# Methodology

This study builds on the Tropical Forest Resources Assessment 1980 (FAO and UNEP, 1981a,b,c) and on information provided to the Global Forest Resources Assessment 2000 (FRA 2000) (FAO, 2001) and FRA 2005 (FAO, 2006a). While the first of these assessments specifically included mangroves as a distinct forest class, countries were asked to document several variables for FRA 2000 and FRA 2005, including the current forest area according to forest types, using their own classification systems. Since mangroves form a distinct and relatively easily defined forest type, most countries with mangroves provided specific information on their extent. An extensive literature search and inputs from national mangrove experts (Annex 1) yielded additional information. Where recent national information was lacking, an estimate of mangrove area was obtained through interpretation of remote sensing data (a joint effort between UNEP-WCMC and FAO). Local authorities and national experts played a key role in the process of gathering and reviewing the extensive quantitative and qualitative country-level information collected.

## INFORMATION GATHERING AND DATA VALIDATION

Based on information collected during a preliminary assessment (FAO, 2003), a national profile was compiled for each country that has mangroves. Besides the quantitative data on mangrove area trends over time, the national profiles included qualitative information on mangrove species composition and distribution, an indication of their uses, and threats to their survival. This documentation, together with a country-specific questionnaire, was distributed to 110 mangrove experts worldwide and to 107 officially nominated national correspondents to FRA 2005 for feedback. To involve an even broader range of national experts, the information was also circulated to members of the International Society for Mangrove Ecosystems (ISME) – an international non-profit and non-governmental scientific society of mangrove experts – to specific discussion lists, and uploaded on an interactive Web page.

The data collection process first entailed a search for references containing recent reliable national information on the extent of mangroves from countries worldwide. Past estimates were also sought in order to facilitate an analysis of area changes over time in each country. Subnational data for provinces and forests were included where available; in a few cases in which past estimates were lacking at the national level, the subnational figures were used to create a composite national estimate to be used in trend analysis.

Cross-checking of data was done where possible and the information analysed with the assistance of specialists. An initial screening of results included the weeding out of duplicates, discarding of rough 'guesstimates' and selection of one estimate for the trend analyses for those years for which more than one was available. This was followed by regression analyses (best fit of linear, polynomial, logarithmic and power curves) of the most reliable data over time for each country, which provided estimates for 1980, 1990, 2000 and 2005. Where insufficient information was available (i.e. only one estimate within the last 30 years), with no possibility of updating through Landsat imagery interpretation or through the annual forest change rate for all forest types in the country as reported in FAO (2006a), the area was assumed to have remained constant unless qualitative information indicated otherwise. Similarly, where the information

collected was not sufficient for a correct regression analysis, the extrapolation to year 2005 was based on the annual forest change rate for the period 2000–2005 (FAO, 2006a) applied to the latest reliable estimate.

The input of the specialists played a crucial role, facilitating the compilation of updated and nationally validated country profiles and the determination of the most recent reliable area estimate for each country/area. Moreover, drafts of the study were sent to all the official national correspondents for the FRA process for comments and validation.

Details of reference sources, area estimates and regressions used for individual countries are provided in the five regional working papers cited in Annex 2, which provide information complementary to this report.

### DEFINITION OF TRUE MANGROVE SPECIES

Following the classification in Tomlinson (1986), mangroves may be divided into three groups according to their features and morphological adaptations: major elements (strict or true mangroves, which are found exclusively in the mangrove habitat), minor elements and mangrove associates. In the present study, Tomlinson's list of major and minor mangrove species has been adopted and supplemented with selected species listed in Saenger, Hegerl and Davie (1983), which have been considered to be commonly found in mangrove ecosystems. Detailed species lists by country are provided in the regional chapters. Associated species (e.g. in the genera *Caesalpinia*, *Mora*, *Thespesia*) are often found at the landward edge of mangrove ecosystems (also called the 'back mangrove'), along river banks or in beach forests, yet without featuring all the highly specific adaptations developed in the true mangrove species. Consequently, they have not been included in the 'true mangrove species' list in Annex 3.