

See also: **Inventory:** Modeling. **Mensuration:** Forest Measurements; Timber and Tree Measurements; Yield Tables, Forecasting, Modeling and Simulation. **Resource Assessment:** Regional and Global Forest Resource Assessments.

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## Regional and Global Forest Resource Assessments

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## Introduction

Forests and other wooded lands have been recognized and highly valued as important natural resource for centuries. The list of benefits that people gain from forests is very impressive. Forest resources play a vital role not only for the economic, social, and cultural well-being of local and regional communities, but also for the maintenance of life on earth as a whole. The majority of forest functions, both wood and non-wood goods and services, are well known. For some forest functions and services, their features and potential still need additional research, but all forest resources need a comprehensive and reliable assessment, as a basis for their proper utilization and management in an efficient and sustainable manner.

The Food and Agriculture Organization of the United Nations (FAO) and UN Economic Commission for Europe (UNECE) have implemented assessments of forest resources at the regional and global levels for more than half a century. The assessments are carried out in collaboration with countries and partner organizations. The UNECE, one of the five UN regional commissions, contributes to the forest resources assessments from the regional perspective. Other partners, notably the United Nations Environment Programme (UNEP), carry out multicountry surveys reflecting the global or regional situation regarding different aspects of forest resources.

The periodic international Forest Resources Assessments at the regional, subregional, and global levels are an important source of knowledge about forests and other wooded lands. Traditionally, the Forest Resources Assessments focus on a number of key parameters/variables (areas, growing stock, increment, species composition, ownership categories), their status and changes over time. The list of parameters to measure is evolving from assessment to assessment under the pressure of demands for new and more detailed and accurate information. The FAO and UNECE/FAO Forest Resources Assessments have been carried out at 5–10-year intervals and provided a unique source of data for many forest- and

forestry-related activities, including the ongoing top-level international forest policy dialogue.

### **International Forest Resources Assessment: What It Is and Whom It Serves**

The information compiled, analyzed and disseminated by FAO (Rome) and UNECE/FAO (Geneva) in the framework of international forest resources assessments gives a comprehensive picture of the main features and values of forests, their status, health, and condition. This defines the role of Forest Resources Assessments as an important instrument for many users. Reliable, consistent, and accurate information on the status and trends of forest resources facilitates the development of national and international forest policies.

The list of users of Forest Resources Assessments is long: governments and other decision makers, nongovernmental organizations, researchers and scientists, forest inventory and monitoring specialists, current and potential donors, international aid agencies, the private sector and industries, the general public, and many others needing reliable information on forest resources. Accurate, validated, and harmonized forest resources data are required for monitoring and assessment of the sustainability of forest management by international processes. The Forest Resources Assessment information is also helpful for addressing impending risks of possible misuse or undesirable changes in forest condition.

The United Nations strongly supports the international efforts aimed at promoting sustainable management and development of forests and other wooded land. These efforts have become the subject of many political processes at different global and regional levels. The UN Forum on Forests, the UN Convention on Biological Diversity, the UN Framework Convention on Climate Change, the Kyoto process, and other global and regional processes and initiatives represent the examples of top-level work in this area. The Ministerial Conference on the Protection of Forests in Europe and the Montreal process are examples of regional processes, where countries and their governments have made policy commitments to achieve sustainable management of forests. All these processes require monitoring, assessment, and reporting on state and changes in forest resources.

FAO and UNECE/FAO Forest Resources Assessments constantly make efforts to harmonize and streamline reporting, notably by improving assessment concepts and methods, and harmonizing forest-related terms and definitions. The Forest Resources Assessment databases serve as the major components

of the long-term efforts for establishing a worldwide forest resources information system.

### **Governance of Global and Regional Forest Resources Assessments**

The work of Forest Resources Assessments received a strong impetus from the UNCED Rio Conference (1992). Agenda 21 'The Non-Legally Binding Authoritative Statement on Principles on the Management, Conservation and Sustainable Development of All Types of Forests' and the UN Conventions on Biodiversity, Desertification and Climate Change have made an important impact on Forest Resources Assessments work. One of the program areas of Agenda 21 set up the objective:

to strengthen or establish systems for the assessment and systematic observation of forests and forest lands with a view to assessing the impact of programs, projects and activities on the quality and extent of forest resources...

The World Summit on Sustainable Development (WSSD) held in Johannesburg in September 2002 re-enforced the regional aspects of this work.

The guidance provided by the UN Commission on Sustainable Development (CSD), the UN Forum on Forests (UNFF), and the Collaborative Partnership for Forests (CPF), as well as activities within a number of regional initiatives, have had a direct influence on the scope, coverage, and methodology of Forest Resources Assessments. The links between the Forest Resources Assessment work and criteria and indicators for sustainability of forest management processes have become closer at the regional and global levels.

The FAO Committee on Forestry (COFO), the most important FAO forestry statutory body, provides overall political guidance and gives directions for the global Forest Resources Assessments work. The UNECE Timber Committee and FAO European Forestry Commission have been leading the regional work on forest resources assessment. Periodic global Forest Resources Assessments expert consultations provide technical guidance for the forthcoming rounds of the assessment. The global Forest Resources Assessments advisory group and the regional UNECE/FAO team of specialists also provide advice and detailed specifications, at the global and regional levels respectively.

### **Historical Overview of Forest Resources Assessments**

#### **Periodicity, Scope/Contents, Coverage, Evolution**

When reviewing the historical development and evolution of the international forest resources

assessments during the last five decades, one should keep in mind the changes that the world has undergone during this period. The scope of changes, not only those on the geographic or political map of the globe, but also economic, social, and ecological has been very impressive. The needs of countries and society for goods and services provided by forests have been constantly evolving, with corresponding shifts in the objectives, scope and coverage of forest resources assessments. FAO and UNECE have provided the required information, independent analysis, and policy forum for the sector as whole, adapting their activities to the evolving needs.

These needs have ranged from statistics on wood/timber resources available for roundwood production, sawn timber or wood-based panels to much more sophisticated information relating to biological diversity or carbon sequestration. Of course, all these far-reaching global and regional changes, and consequently evolving demands for the knowledge about forest resources from the simple data on the potential of forests to supply wood to the market, to profound scientifically based analysis, have had a continuous impact on the contents and methods of Forest Resources Assessments.

Initially, the assessments were focusing on the collection of data revealing the existing potential of forests to supply timber. This was motivated by the need for timber and wood products for the reconstruction of Europe after World War II, and the need for defining national forest policies. The quality, comprehensiveness, and comparability of the earlier forest resources data, which were collected from countries with weak (or destroyed in the war) forest inventory systems, varied significantly from country to country. This created a challenge to come up with regional or global totals that would allow reliable analysis and conclusions.

The *World Forest Inventory 1958* stated that the formulation of a sound national forest policy required a precise knowledge of wood (forest) resources. The *World Forest Inventory 1963* already assessed a number of important parameters: forest area (productive and protective), ownership and management status, species composition (softwoods and hardwoods), growing stock and removals. The increasing importance of forests as a source for the environmental and other non-wood goods and services was stated in the forest resources assessments of the 1980s and 1990s. Wood production meanwhile had remained so far the most important function of the forest, especially for the industrialized countries. The public attitudes towards the forest and forestry has continued to change over the past two to three decades, with increasing concern being

expressed in many countries for the protection of the environment, conservation of forests, biodiversity and fuller development of the socioeconomic functions of forests.

The multiple uses of forests, forest protection, water regulation and quality, nature conservation received increasing emphasis in national forest policy and planning. The Global Forest Resources Assessment nowadays aims to report not only on the status, but also on trends of forest resources, their management and uses. Under pressure of demand from the wide range of users, the latest regional Forest Resources Assessment 2000 addressed about 700 parameters ranging from the traditional forest inventory data to very sophisticated information relating to biodiversity, forest conditions, protective functions and carbon sequestration capacities, and potential of forests and other wooded land.

### **The Information Needs of the Forest Resources Assessments**

The scope and coverage of each Forest Resources Assessments round is based on the estimate of information needs. The information needs have traditionally been defined in advance of launching the new assessment round on the basis of consultation with major stakeholders and interested parties, also by means of specifically elaborated questionnaires. The most recently identified information needs have been the criteria and indicators for sustainable forest management adopted by different regional and global processes.

The list of reporting themes/components, parameters/variables, and data items that are chosen on the basis of the information needs analysis determines the scope of the statistical summary tables, geographical information, graphical and descriptive information, special studies, and other elements, which constitute final outcome of the assessment. The information about forest resources required by policy makers, forest managers, researchers, and many others has become increasingly complex and diverse. Their needs have to be constantly reassessed and classified at the local, national, regional and global levels, and the scope and coverage of the Forest Resources Assessment have to be defined and adopted correspondingly.

The management of knowledge on forest resources and other forest-related information, especially in the light of regional and global processes on criteria and indicators for sustainable forest management, is of paramount importance. Analysis of the policy implications, and responses of governments and other stakeholders to the assessments' findings have

always been an important element of the Forest Resources Assessments' work.

### **Role of the Global Expert Consultations in Forest Resources Assessments**

The international Forest Resources Assessments are traditionally based on the technical guidance and the common platform (framework) elaborated in the process of the global Forest Resources Assessments expert consultations. The necessity to agree on the strategy for the next round of Forest Resources Assessments, to assess the current and future information needs, to elaborate a global platform for the assessments, including the guidelines and definitions to be applied, to set up modalities of implementation, and a number of practical guiding aspects have materialized through the expert consultations. The last four global expert consultations were organized in the Finnish town of Kotka and came to be widely known as the Kotka meetings.

### **Methodological Approaches in the Forest Resources Assessment**

The methodological approaches in the Forest Resources Assessment are defined by a number of factors. Among them are: data sources and analysis, reliability of data, comparability between countries and continuity in Forest Resources Assessment concepts (in order to assess trends over time), adjustment procedures, links to other processes (criteria and indicators for sustainable forest management), clear understanding of results by a wide range of users, responsiveness to new demands for information from different processes and a wider audience, and aspects of the governance of Forest Resource Assessments at the regional and global levels.

The information published before the 1980s was mainly collected by means of questionnaires sent to countries, but in the latest Global Forest Resources Assessment methodology such elements as remote sensing, analysis of country information sources by experts, and statistical modeling prevail. The main instrument for the regional data collection traditionally was an enquiry (questionnaire) based on a proposed global platform. The elaboration of internationally agreed terms and definitions, which are indispensable for guiding the collection, analysis, and dissemination of information, is an important element and a difficult task in the process of Forest Resources Assessment.

The *Global Forest Resources Assessment 2000* was based on validated country information, mainly from national forest inventories, and consisted of a number of activities, including a remote sensing

survey of forest cover change at the pan-tropical level, mapping of global forest cover and ecological zones, and the establishment of a forestry information system. The main results include analytical components relating to the stocking of forests, wood production, and non-wood goods and services. All the Forest Resources Assessment 2000 information including the main report, global forest map, country profiles and working papers is posted on the Internet.

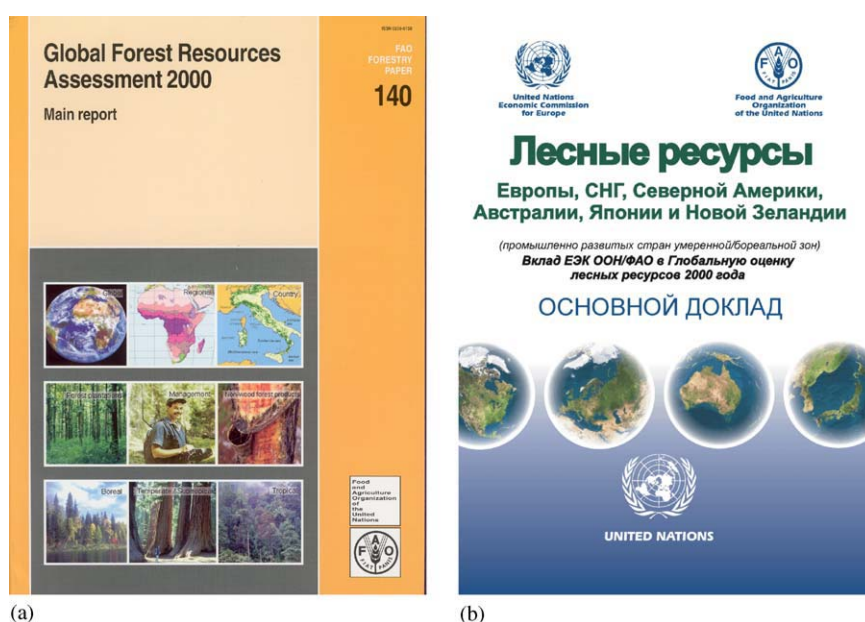
The UNECE as the major FAO partner in this area contributed to the *Global Forest Resources Assessment 2000* by the publication of *Forest Resources of Europe, CIS, North America, Australia, Japan and New Zealand* (Figure 1). This is the latest in the series of surveys of temperate and boreal forests carried out at the regional level, and feedback received from many users and major clients has shown that it was a successful study. Many experts consider it to be the most comprehensive international assessment ever made of the temperate and boreal forests resources of industrialized countries.

Careful data checking and validation are important methodological stages of the Forest Resources Assessment process. The UNECE/FAO secretariat in cooperation with the national correspondents has managed to settle a number of difficult issues and points in the country data sets, that concerned the completeness of the replies from some countries and their consistency, and the comparability of the supplied data.

### **Driving Forces and Partnerships**

Each round of Forest Resource Assessments raises high expectations, and it would not be possible to respond to those expectations satisfactorily without extensive support from countries in providing expertise and funding, and without building the close cooperation and partnership with many stakeholders. For example, the implementation of such a challenging project as the regional Forest Resources Assessment 2000 would not be possible with the limited manpower and financial resources that were available to the UNECE/FAO secretariat. The role and input from national correspondents and the team of specialists were decisive, and the countries' support was invaluable.

The Forest Resource Assessments process has revealed that there are still major information gaps at the national level, especially in the developing and some central and eastern European countries. First of all, this concerns nontraditional parameters, such as biomass, biodiversity, and non-wood goods and services. These countries need support and capacity building in forest inventory and assessment, including methodology development.



**Figure 1** (a) *Global Forest Resources Assessment 2000*, Food and Agricultural Organization of the United Nations (reproduced with permission), (b) a *Regional Forest Resources Assessment 2000* report (reproduced with permission).

FAO and UNECE should continue working with countries and the donor community to revive and/or maintain the interest in committing resources to national forest assessments, as being an important part of national policy development. The capacity building and capacity maintenance should constitute an important component of this work. The coordination of efforts in the field of forest resources assessments is especially needed given the limited resources available.

UNECE and FAO cooperation in this area is the most important feature of the process. The advantages of running the regional forest resources assessments by intergovernmental bodies like FAO European Forestry Commission and UNECE Timber Committee is obvious. Their status allows the collection of official national data, and these two bodies complement each other in a number of aspects. In particular, not all countries of the UNECE region are the members of FAO, so the cooperation of the two bodies in Forest Resource Assessment work allows a comprehensive coverage of the region.

#### **National Forest Inventories (Accounts, Assessments) as the Main Source for Forest Resource Assessments**

The main value of Forest Resource Assessment information is in its original nature. Much of the information called for in the enquiries and provided by countries was derived from data collected in the national forest inventories. The information comes from original sources, where it is obtained by direct

measurement. The main sources of the information in the Forest Resource Assessments is national forest inventories, periodic observations of different variables and their changes by countries and institutions, also on permanent plots, as well as remote sensing techniques. The success of the forest resource assessment depends, to a great extent, on the level of the national forest inventory systems, and the ability of national correspondents to provide comprehensive, consistent and reliable replies to the questionnaires.

National forest inventories and data collection at the country level are being carried out for a variety of purposes. The main national forest inventories and assessment objective is to serve national information needs, to provide aggregated information for the entire nation and subregions within the nation, and to provide basic information for the development of national forest policies and decision making processes.

The ability of national forest inventories and assessments to contribute to the international Forest Resources Assessment is more responsive and efficient if the demand for information originates from national forest policy processes. The Forest Resources Assessment process helps countries to evaluate their forestry sectors within the regional and global context. The great incentive and motivation for countries to provide data for the regional and global assessments is the opportunity to estimate their own levels of knowledge about forests and to make efforts to improve the situation when necessary.

The network of country correspondents, whose knowledge is based, along with the traditional forest

inventory methods, on aerial photos, satellite images and geographical information systems (GIS), and supported by high-level experts' judgment, remains one of the main driving forces of the assessment and sources of information. The importance of national data for the international Forest Resources Assessment will definitely be maintained in the future.

The Forest Resources Assessment 2000 confirmed that not only developing tropical countries but also a number of central and eastern European countries need financial support for national forest inventory and national forest assessment work. This issue is linked to the question of cost of the assessment work, which should be taken into account when planning future Forest Resources Assessment rounds. Countries should themselves assess whether they need external assistance to implement national forest assessments and consider seeking such help, for example through the National Forest Programme Facility implemented by FAO, which has a mandate to offer support.

### Terms and Definitions and Issues of Harmonization

From the first Forest Resources Assessment publications to the latest regional *Temperate and Boreal Forest Resources Assessment 2000* and *Global Forest Resources Assessment 2000*, the international assessments (although regular and systematic) unfortunately do not provide a series of data comparable over time. This is mainly due to differences in terms and their definitions, which had been changing from one Forest Resources Assessment survey to another. Just to note that the common definition of 'forest' based on 10% crown cover (or equivalent level of stocking) was applied globally for the first time in Forest Resources Assessment 2000.

The following terms (and their dates) related to a major component of forest area and used in different Forest Resource Assessments illustrate the situation:

- accessible productive forest (1947)
- forest in use (1953, 1958)
- forest in use (for industrial or commercial purposes) (1963)
- operable closed forest (1970)
- exploitable (operable) closed forest (1980)
- exploitable forest (1990)
- forest available for wood supply (2000).

It is obvious that the definitions of these variables are not comparable, although some harmonization of the data would still be possible. Moreover, some variables (e.g., growing stock or increment) that were linked to 'forest area' were also not directly

comparable over time (e.g., 'growing stock on forest' or 'growing stock on forest in use').

Bearing in mind the wide range of parameters and indicators to be covered by the assessment, the role of 'well-informed' and 'qualified' estimates in closing the information gaps in the Forest Resources Assessment databases is important. For every key parameter for which data are missing, whether the country is small or large, no regional or global totals can be prepared. Such a situation would significantly reduce the usefulness of the Forest Resources Assessment data sets. It should also be noted that the national inventories in individual countries, to which the given data referred in all the Forest Resources Assessments, took place in different periods.

Despite the intensive efforts to harmonize forest-related definitions, which are being applied in different international initiatives and processes, major challenges still remain. Definitions are not comparable within the range of Forest Resources Assessment datasets and between different processes. It is already expected that although no major revision of definitions is foreseen in the next rounds, Forest Resources Assessment 2000 terms and definitions may be amended, in order to build synergies and be more consistent with other international processes, in particular the UN Framework Convention on Climate Change and the UN Convention on Biological Diversity.

To maintain a sense of ownership and continuity of the global (regional) forest resources databases there is an urgent need to stop changing terms and definitions in each following round of Forest Resources Assessments. For that it is necessary to reach agreement on definitions of the main parameters/variables among the main stakeholders. This is by no means an easy task, as was proved by the intensive FAO-led discussion on 'Harmonizing forest-related definitions for use by various stakeholders.' This forum showed that each process has its own agenda, but still there are some common denominations.

### Data Availability and Accuracy

The FAO collects, analyses, interprets, and disseminates forest resources information. Quite often large forest areas are lacking in information, and the level of existing national forest inventories does not allow assessing some more sophisticated variables, mainly relating to environmental functions of the forest.

Research is needed for some parameters/variables so that they can be assessed at the country level, and brought to a common platform at the international level for comparison, or for monitoring changes over

time. The generally quite satisfactory state of Forest Resources Assessment data does not mean that all data are perfect for every country, but that the general quality (scope and comparability) is good enough to give a realistic picture of the situation with regard to the parameter under consideration.

One major objective of international Forest Resources Assessment data sets, including those from the regional Forest Resources Assessments, is to make it possible to carry out analysis of the situation at the regional or global level. To do this, it is absolutely necessary to have regional and global totals that are complete and comparable between themselves and with other parameters, e.g., land area or population. A total for Europe with one or two countries missing is almost useless, especially if the 'European total' in other tables is missing for some other countries. For this reason, it is of the highest importance that, for the most vital parameters, data or at least informed estimates are presented for every participating country, without exception.

The references to sources of data, e.g., sample plots (field measurements), remote sensing, maps, aerial photography, as well as reference years (dates) of observations are important for evaluating the collected information, and for future Forest Resources Assessment data analysis. The statements on accuracy and data quality control are a relatively new feature of the regional and global Forest Resources Assessment.

### **Forest Resources Assessment and Criteria and Indicators for Sustainability of Forest Management**

The wide range of indicators for sustainable forest management from different regional and global processes constitutes the core information that is needed at the local, national, regional, and global levels to ensure the monitoring and promotion of sustainable forest management. Of course, some of the indicators are highly important for individual countries and regions, others are less important, but all of them have proved to be necessary for overall monitoring and estimation of levels of sustainability of utilization of forest resources. The existing lists of criteria and indicators for sustainable forest management could be considered as forest policy instruments for monitoring, evaluating, and reporting on progress towards sustainable forest management.

The cooperation of the Forest Resources Assessment process with regional sustainable forest management processes and initiatives appears to be not only fruitful, but also mutually beneficial. This

cooperation helps to avoid countries having to reply to multiple enquires and to make the best use of the competitive advantage of the cooperating organizations. The *Global Forest Resources Assessment 2000* platform was designed keeping in mind the criteria and indicators, and the regional Forest Resources Assessment enquiry incorporated an important part (as many as possible) of pan-European indicators for sustainable forest management. The data collection with regard to most of indicators should be combined also in the future with the broader, more detailed and comprehensive data collection exercise like the Forest Resources Assessment.

Continuous work is needed to improve the methodology and implementation of international Forest Resources Assessments with regard to sustainable forest management needs. In practical terms, it is necessary to examine systematically to what extent the data collected through the Forest Resources Assessment process have satisfied the criteria and indicators processes' needs, notably with regard to the quantitative indicators for sustainable forest management.

There is still a long way to go to achieve a system of collecting fully reliable, comprehensive and comparable information which would respond to the requirements of criteria and indicators on all functions of forests, especially those relating to environmental and social aspects.

### **Outlook for Future Regional and Global Forest Resources Assessment Work**

The Forest Resources Assessment variables relating to wood and non-wood goods and services, and functions of forests and other wooded land which provide commercial and noncommercial benefits to society, have been constantly extended during recent years. A broader and more holistic assessment of forest resources will be the main challenge of future assessments. The global Forest Resources Assessment will be more focused in the future on protective functions of the forests and other wooded land, biological diversity, forest health, climate change and carbon-related parameters, and variables relating to hydrology and water cycles.

The meeting of the UNECE/FAO team of specialists on the forest resources assessment, held in Krakow (Poland) in May 2002 noted that future global and regional Forest Resources Assessments should aim (to the extent possible) at evaluating all benefits from forests. The team stressed that the Forest Resources Assessment work should be integrated with international processes on criteria and indicators for sustainable forest management.

The next global Forest Resources Assessment will be based mainly on national reporting and supported by independent surveys. Intensive communication with countries and partner organizations should be the key element of the assessment. The process of incorporating national data into the international Forest Resources Assessment database should be open/transparent and well documented. The country forestry profiles should continue to be an important supplementary element of the assessment work. The international Forest Resources Assessment process will maintain in the foreseeable future its main objective: to collect, analyse, and disseminate information on forest resources at the global and regional levels.

The future global Forest Resources Assessment, and *Forest Resources Assessment 2005* in particular, should be structured along the following lines of the commonly agreed thematic areas of sustainable forest management:

1. Extent of forest resources.
2. Biological diversity.
3. Forest health and vitality.
4. Productive functions of forest resources.
5. Protective functions of forest resources.
6. Socioeconomic functions.
7. Legal, policy, and institutional frameworks.

These global thematic areas correlate closely with the pan-European and other processes criteria and indicators for sustainable forest management, and this global Forest Resources Assessment approach might facilitate the sharing of forestry information all over the world in a unified way.

### **Prerequisites for Successful Implementation of Forest Resources Assessments**

Experience with the previous rounds shows that the success of the FAO and UNECE work on Forest Resources Assessment was determined by the following factors:

- The process should be initiated and supported by participating countries, and its general scope and coverage should be defined from the very beginning with countries' involvement and support.
- The process should be transparent for all stakeholders, and these should be involved in the process during its different stages, so as to ensure credibility and consistency of the process.
- A network of national correspondents should be established/re-established on an official, ministerial (or governmental) basis, and in a good time before the initiation of the project.
- A good level of cooperation with national correspondents is vital; it enables sufficient response to be obtained from countries to demanding and challenging enquiries.
- The participating countries, through their national correspondents, have to demonstrate their goodwill, and provide the necessary support at each and every stage of the project implementation.
- The network of national correspondents (focal points) has to be kept operational from the very beginning of the process through different information needs enquiries, discussion of data adjustment issues, data checking and updating figures for interim relevant publication, other queries relating to the process, and briefing ('training') meetings.
- Cooperation between the regional and global sustainable forest management processes and initiatives is an important and stimulating factor for developing and accelerating the whole Forest Resources Assessment process.
- The regional Forest Resources Assessment work should constitute a part of the global process, and it needs to receive the necessary support and partnership from FAO and other international organizations.
- The contribution of the UNECE/FAO team of specialists and the FAO global advisory group on Forest Resources Assessments is significant as a factor in the successful development of the project.
- International organizations involved in the collection and dissemination of information on sustainable forest management should continue to cooperate and harmonize their activities, sharing information collection and dissemination activities as appropriate.
- Internet links between the national and international Forest Resources Assessment databases would be a step towards the continuous assessment of forest resources in the future (European Forestry Information and Communication System (EFICS), European Forestry Information System (EFIS)).
- The main Forest Resources Assessment publications should be accompanied by supplementary studies and papers, which would help to analyze specifically the situation on sustainable forest management in individual countries and in the region as a whole. All modern means (Internet, CD-ROM, etc) should be used for the publication and dissemination of the information.

## Planning the Forest Resources Assessment 2005 Round

The work on improving the quality, relevance, and credibility of forest resources information continues to be the focus of FAO, UNECE and their partners. Close cooperation between the major stakeholders is indispensable for successfully achieving this goal, already in the next round of the Assessment (*Global Forest Resources Assessment 2005*).

The UN Forum on Forests conference to be held in 2005 has to consider the situation and developments in the international forest policy dialogue, and it is supposed to decide on further possible arrangements to promote sustainable forest management. The *Global Forest Resources Assessment 2005* update is expected to be an important contribution to this top-level international forum.

## Concluding Remarks

The three pillars of sustainable development (economic, social, and environmental) constitute the core of sustainable forest management. Sustainable forest management may only be achieved if it is based on comprehensive and reliable information on forest resources, i.e., if forest policy makers, managers, and practitioners are well informed. Reliable national forest inventory and assessment systems are vital for sustainable forest management and monitoring. The ultimate objective of the Forest Resources Assessment program is to provide a comprehensive picture of the status, developments, and trends of the world's forest resources, so that users may make conclusions and take measures aimed at sustainable forest management in different countries and regions.

The information on forest resources should adequately respond to demands and needs of in-depth forest policy dialogues, which involve all major stakeholders, cover major concepts, strategies and monitoring of sustainable forest management. The global Forest Resources Assessment actively moves in this direction. The regional dimension of the international forest policy dialogue has received during the last decade increasing attention.

The international Forest Resources Assessment work provides important guidance for countries; it serves as a 'standard' for forest inventory, assessment, and accounting at the national level. The national realities concerning the forest inventory and assessment at the country level, especially for a number of developing countries and some central and eastern European countries, should be taken into full consideration.

Outside financial, material, and methodological support from donor countries and organizations is needed for the setting up, reinforcement or further development of national forest inventory and assessment systems in many developing and central and eastern European countries. The lack of forest resources information at national level undermines the process of the development of effective national forest policies. Support for national forest assessments and building the national forest inventory capacities should be an important part of the global Forest Resources Assessment program.

It is extremely important for Forest Resources Assessment that the profile and importance of forestry at the country level should be maintained at a sufficient level. The close links of developing and central and eastern European countries in transition to market economies with the international forest community is an important prerequisite for establishing comprehensive and reliable data sets, and ultimately for sustainable forest management in these regions.

**See also:** **Inventory:** Large-scale Forest Inventory and Scenario Modeling; Multipurpose Resource Inventories. **Mensuration:** Forest Measurements. **Resource Assessment:** Forest Resources. **Sustainable Forest Management:** Certification; Overview.

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## Non-timber Forest Resources and Products

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### Introduction

Forests provide resources that are gathered from the canopy, the understory, the forest floor, and below ground level. The diversity of flora within these strata ensures forest health and productivity.

Although many of the products fashioned from these resources are important for household subsistence, as well as for generating income, their ecological and economic value has not been fully appreciated nor integrated into forest management. Without management, many of these resources may be lost, reducing forest ecosystem diversity, sustainability, and greatly affecting peoples' livelihoods. To ensure that the collection is sustainable, forest management practices need to include assessments of growth, yield, and productivity, as well as inventories of the resource from which the products originate. A small body of knowledge exists that addresses resource and product inventory and assessments. In a few countries, this knowledge is being used to incorporate more prominent non-timber products into forest inventories, and these may be useful models for other less advanced countries.

Although a great deal of effort has been given to assessments of market and economic development opportunities for non-timber forest products, the primary focus of this article is biological, ethnobotanical, and social resources. Wong and others summarized much of the body of knowledge concerning inventory and resource assessments of non-timber forest resources and associated products in a seminal document published by the UN Food and Agriculture Organization. While some discussions of non-timber forest products may include wildlife and other fauna, the generally accepted definition excludes animals, and therefore they are not included in this article.

### Non-Timber Forest Resources and Products

A variety of terms have been used to describe the flora collected from forests for products that are not timber based. The Food and Agriculture Organization of the United Nations describes them as 'non-wood forest products,' a term that includes food and game, fibers, resins, gums, and plant and animal products used for medicinal, cosmetic, or cultural purposes. The US Department of Agriculture Forest Service, in a recently released national strategy, uses the term 'special forest products,' which excludes sawtimber, pulpwood, cull logs, small roundwood, house logs, utility poles, minerals, animal parts, rocks, water, and soil. Recently, the US Congress, in legislation that supports improved management for these products, introduced the term 'forest botanicals' and defined them as naturally occurring mushrooms, fungi, flowers, seeds, roots, barks, leaves, and other vegetation (or portions thereof) that grow on National Forest System lands.