Rome, Italy, 20-24 November 1995

FAO Working Group on Forestry Statistics
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EXECUTIVE SUMMARY

Purpose of the Working Group

As part of the mandate enshrined in its constitution adopted some fifty years ago, FAO collects, analyses and disseminates information on all aspects of agriculture and rural development, including statistical data. In forestry, FAO’s international statistical coverage ranges from data on forest vegetation cover in overall land use context to production and trade in forest products.

To draw lessons from its long history of involvement in forest products statistics and to identify priorities for the future, FAO convened the first Working Group on Forestry Statistics in Rome, Italy 20 - 24 November 1995. The Working Group was invited to examine the current data coverage of national and international statistics on forest products, identify emerging needs and priorities for their further development, and recommend priorities, ways and means for country capacity building and institutional and human resource development to meet the requirements identified.

The Working Group was timely in that forests are receiving unprecedented attention in the international debate on environment and sustainable development. With the importance of forests being increasingly recognized, there is growing demand for reliable information on which to base formulation of appropriate policies for their sustainable development.

Arrangements for the Working Group

The Working Group was composed of 21 external experts invited in their personal capacity; many were affiliated with government agencies but some came from inter-governmental organizations, the commercial private sector, and non-governmental organizations. Taken together, participants in the Working Group came from both developed and developing countries and had experience relevant to both major forest countries and those less well endowed. The Working Group, which elected its own chairmen and rapporteurs, worked both as a plenary meeting and three Task Forces focusing respectively on (a) Responding to user needs for international forestry data, (b) Sources and scope for international forestry data including matters related to improving data quality, and (c) Identification of the requirements for building capacity at the national level for production and use of forestry data.

FAO takes this opportunity to record its appreciation to the twenty-one external experts who made up the Working Group for their contribution. FAO also wishes to thank the many national and international institutions which released the concerned experts or otherwise extended cooperation during preparations for the Working Group.

Main recommendations

This Executive Summary presents in brief the main recommendations; readers are invited to consult the main report for detailed conclusions and recommendations of the Working Group as a whole as well as those of its Task Forces. The main recommendations are as follows:
FAO should continue to have as one of its highest priority objectives the maintenance, improvement, and dissemination of the international forestry database and the distribution of a wide range of publications based on the data. Within this objective, the first priority should be to maintain core statistical coverage that allows for long-term comparability;

FAO should also seek to expand the scope and comprehensiveness of data that are collected and compiled. Areas in which such efforts should be focused include: attention to non-wood forest products, products from the informal sector, or those which are not officially recorded (especially fuelwood and charcoal), and data that will contribute to efforts to define and monitor sustainable forest management;

FAO must be responsive to emerging needs for international forestry data and, to this end, should undertake a user needs survey, targeting several different categories of users. FAO should periodically review its programme on statistics and seek and draw upon experts from official and non-official experts from all interest groups in the process;

While recognising the emergence of electronic media for distribution of statistics and information and while working towards their greater use (including through capacity-building), FAO should maintain availability of key publications, such as the Yearbook of Forest Products, in printed form;

Notwithstanding the importance of statistical data themselves, FAO should increasingly also "add value" to data through provision of highlights and by producing and disseminating analyzed information;

In order to address questions of sustainable management, FAO must draw on all of the statistics compiled by the Forestry Department (forest resources, production, trade, etc.), and present them in relation to each other in an integrated format;

Consistent with its own regionalization, FAO should consider more emphasis on regional conditions, trends, and highlights. A regional emphasis will, *inter alia*, allow for greater attention in each region to products and issues that may be important there but not elsewhere and would therefore be relatively marginalised or even neglected in global statistics;

FAO should give great attention to capacity building in countries, given that improvements in national and international data depend critically on increasing capacity at the national and sub-national level for collecting and reporting data. FAO should also ensure cooperation with other international organizations, non-governmental organizations and the private sector;

Improving the quality of international forestry statistics should be given high priority at both the national and the international levels. This will require, at the national level, enhancement of the capacity to collect, process, and understand data, including through training and other capacity building. At the international level, it will require that FAO undertake more extensive and systematic efforts to address problems of data quality and comprehensiveness.
INTRODUCTION

This document is the report of the first FAO Working Group on Forestry Statistics which was convened by the Policy and Planning Division of the FAO Forestry Department in Rome, Italy between 20 and 24 November 1995. It comprises of three main parts: Part I presents the consolidated report of the plenary discussion of the Working Group supported by summaries of the suggestions and recommendations of its Task Force - taking into account the review and discussions at the final session of the Working Group; Part II gives the separate, detailed, reports of the Working Group's individual task forces; Part III reproduces the papers prepared by experts for the Working Group. The document also has several annexes.

Background and objectives

The Working Group was intended to provide an opportunity for the experts involved in forestry statistical work in various parts of the world to jointly review experiences, draw lessons from the past, and propose elements for the way ahead. The Working Group was composed of 21 external experts invited in their personal capacity but affiliated mostly with government agencies although some came from inter-governmental organizations, the commercial private sector, and non-governmental organizations. Taken together, participants in the Working Group came from both developed and developing countries and had experience relevant to both major forest countries and those less well endowed.

FAO collects, processes and disseminates information on all aspects of agriculture and rural development, including statistical data. In forestry, FAO's international statistical coverage ranges from data on forest vegetation cover in overall land use context to production and trade in forest products. The latter was the focus of the Working Group convened in this case.

In particular, the Working Group was invited to advise FAO in the development of its programme on international forest products-related statistics. In summary, the objectives of the Working Group were to:

- examine the current data coverage of national and international forestry statistics in the time perspective provided by the last 50 years of national and international level collection, analysis and dissemination of statistics;

- identify emerging needs and priorities for the development of required forest product-related statistics taking into account the greater attention to inter-sectoral and sustainability issues and to evolution of their utilization for sector planning, natural resources accounting, valuation etc.; and

- recommend priorities, ways and means for country capacity building and institutional and human resource development to meet the requirements identified.

These objectives were emphasized in the opening statement delivered by David A. Harcharik, Assistant Director-General and Head of the FAO Forestry Department (Annex I) and are also reflected in the Agenda (Annex 2).
Being composed of experts from all regions of the world, the Group had a composition which permitted formulation of proposals for the future of FAO international statistics which could balance the needs of developing and industrialised countries. The list of participants is given in Annex 3. At its concluding session, the Working Group was joined by members of the Inter-Secretariat Working Group on Forestry Statistics who are also listed in Annex 3.

Organization of the Working Group meeting

The opening session of the Working Group was chaired by Marc R. de Montalembert, Director, FAO Forestry Policy and Planning Division. Thereafter, the Group elected the following four members to chair individual morning or afternoon plenary sessions:

- Mario Abad Arrambide (Uruguay)
- Dolores R. Catindig (Philippines)
- S.A. Okonofua (Nigeria)
- Philip A. Wardle (United Kingdom)

It also elected David Brooks (USA) to serve as rapporteur. Mafa E. Chipeta, Officer-in-Charge of the FAO Planning and Statistics Branch, served as secretary of the Working Group.

Following presentations and discussions in plenary session and identification of major issues for further focused attention, the Working Group re-organised itself into smaller "Task Forces", each with its own Chair-person and rapporteur, around the following topics:

**Task Force No 1:** Responding to user needs for international forestry data, including consideration of target groups and methods of dissemination.
- **Chair:** Steven Johnson (ITTO);
- **Rapporteur:** Susan Iremonger (WCMC)

**Task Force No 2:** Sources and scope for international forestry data, with consideration of means for assuring continued provision of essential data, improving data quality, and expanding the scope of international forestry data.
- **Chair:** Mario Abad Arrambide (Uruguay);
- **Rapporteur:** Michael Ilbach (CIFOR)

**Task Force No 3:** Identification of the requirements for building capacity at the national level for production and use of forestry data.
- **Chair:** Philip A. Wardle (U.K);
- **Rapporteur:** Amira Awad Mohamed Salih (Sudan)

The reports of each of the Task Forces, which are an essential and integral component of the overall report of the Working Group, comprise Part II of this document. While recognising the usefulness of segregating topics under the Task Forces to facilitate focus, the concluding session of Working Group stressed their inter-related nature which makes it essential to address the recommendations as a package.
PART I

REPORT OF THE WORKING GROUP
REPORT OF THE WORKING GROUP

Context and importance of statistics

The first FAO Working Group on Forestry Statistics was convened in recognition of the fundamental importance of statistics for policy, planning, and monitoring progress towards sustainable forest management, a concern recently highlighted by the UN Conference on Environment and Development (UNCED). The Working Group provided advice to FAO on its programme on international forestry statistics after reviewing the past 50 years of international forestry statistics, examining the coverage of a broad sample of national and regional forestry statistics, and discussing emerging issues and demands for national and international forestry data.

The Working Group was aware that FAO carries out important work on forest resources assessment and was informed of preparations already underway for a global exercise to report on forest cover with base year 2000AD. However, it focused its discussion on forest products data, although it underscored the need for integrated collection and reporting of resource, production, trade, and other data, given that all these provide elements to be used jointly in planning and policy work.

The Working Group noted the fact that forests are receiving unprecedented attention in the international debate on environment and sustainable development, that the importance of forests has never been more widely recognized, and that the challenges for developing public policies have never been greater. Reliable information and clear, timely, and impartial analysis are particular needs at both the national and the international level for a number of contemporary forestry issues.

The Working Group agreed that by collecting and disseminating internationally-comparable data, FAO plays a critical role in helping to shape perceptions and in influencing policy and management decisions. Contemporary national and international forestry issues can be addressed only by policy and analytical studies that require, in turn, the best possible data. This involves topics not so far addressed in international forestry statistics. The demand for reliable, internationally-comparable forestry data has never been greater; if it is to be met, this demand must be accompanied by commensurate support for both national and international level activities that are necessary to supply this information. To provide such support is a challenge shared by national governments and all organizations that wish to contribute to protection and management of the world’s forests.

Priorities in meeting user needs

The Working Group advised FAO to continue to have as one of its highest priority objectives the maintenance, improvement, and dissemination of the international forestry database and the distribution of a wide range of publications based on the data.

The first priority should be to maintain core statistical coverage that allows for long-term comparability. However, the Working Group also advised FAO to seek to expand the scope and comprehensiveness of data that are collected and compiled. Areas in which such efforts should be focused include: attention to non-wood forest products, products from the informal sector, or those which are not officially recorded (especially fuelwood and charcoal), and data that will contribute to efforts to define and monitor sustainable forest management. Prices of forest products, and data that can improve perception of the full value of forests should also get attention. Any such expansion of
the international forestry database must be based on the willing participation of the countries, clear definitions, standards, and priorities, and a realistic assessment of what data are likely to be available at the national level.

At the same time, FAO must be responsive to emerging needs for international forestry data. To this end, the Working Group advised FAO to undertake a user needs survey, targeting several different categories of users. Specific objectives of such a survey should include: identifying the relative importance and use made of the data currently compiled and of the publications currently produced; identifying perceptions of data quality; identifying additional publications that should be produced; identifying the need for additional data; assessing willingness to supply such data; and identifying the formats and the media in which data should be presented.

Significant changes in the content of the statistical programme may be necessary. Given the great importance of the sense of partnership that must exist between FAO and the sources of information (the member countries), and between it and the users of statistics in the public and private sectors, there will be need for further consultation. The Working Group advised FAO to review its programme in statistics on a periodic basis, and to continue to seek the advice of national experts, other organizations, including non-government organizations, and the private sector in its effort to maintain and improve international forestry data and information.

The Working Group advised FAO not to rely entirely on electronic media for distribution of statistics and information; it recommended that, even if electronic channels are adopted, key publications, such as the Yearbook of Forest Products, should also remain available in printed form. However, the availability of new media also should be recognized as a stimulus for revising the format and content of existing reports. Improving access to, and ability to use electronic media must be an integral component of efforts to build capacity to produce and use data at the national and sub-national level.

In considering changes in the statistical programme, the Working Group encouraged FAO to recognize the need to "add value" to the statistics it collects. Therefore, FAO must increasingly emphasize the production and distribution of information (description and analysis) in its publications, in addition to publication and distribution of the statistics themselves. For example, the inclusion of "highlights" in the form of descriptive text and charts will increase the usefulness, at both the international and the national level, of a variety of statistical publications. In addition, and in order to address questions of sustainable management, FAO must draw on all of the statistics compiled by the Forestry Department (forest resources, production, trade, etc.), and present them in relation to each other in an integrated format.

The Working Group also encouraged FAO to consider the use of reports that emphasize regional conditions, trends, and highlights. Such an approach will be especially important in increasing the usefulness of reports, and increasing the recognition of forestry data in a variety of planning and decision-making activities at the national level. A regional emphasis is consistent with broader FAO strategies favouring decentralization; this focus also will allow for greater attention in each region to products and issues that may be important there but not elsewhere and would therefore be relatively marginalised or even neglected in global statistics. The result would be improved understanding of the importance of forests and forest products (of all types) at the regional, as well as at the international level.
The importance of cooperation and collaboration

The Working Group recognized that in its data collection effort, FAO relies on data collected and reported by its member countries. The cooperation and capabilities of the member countries is fundamental to the collection and exchange of national and international statistics. In some countries the capacity to collect and report reliable, comprehensive, and meaningful data is not adequate to meet the need. In other countries, this capacity is being weakened by a lack of support and decreasing budgets for public institutions.

Therefore, the Working Group recognized that sustaining and strengthening the programme in international forestry statistics must be built on the tradition of collaboration and cooperation between FAO and countries, and that improvements in national and international data depend critically on increasing capacity at the national and sub-national level for collecting and reporting data. Success in enhancing national capacities is dependent, in turn, on increasing appreciation in countries themselves of the value of forestry data.

In addition, improvements in international forestry data also will require cooperation among international organizations, and cooperation and collaboration with non-government organizations and the private sector. The Working Group took note of, and strongly endorsed the efforts of the Inter-secretariat Working Group\(^1\) to increase cooperation among organizations collecting and reporting international forestry data with the objectives of reducing the costs and burdens of data collection, and increasing the coherence of databases and data reports.

Quality improvement and national capacity-building

Improving the quality of international forestry statistics was identified as a high priority item. Recognizing the need to improve the quality of the data that are collected, the Working Group advised FAO to address this issue through actions at both the national and the international level.

At the national level, quality can only improve through enhancement of the capacity to collect, process, and understand data. Training of individuals, and improvements in organizational arrangements, especially in developing countries must be recognized as a necessary and essential part of efforts to improve international forestry data. Identifying and establishing individuals who are focal points for data collection and reporting should be emphasized.

At the international level, FAO must undertake more extensive and systematic efforts to address problems of data quality\(^2\) and comprehensiveness. In addition to increased training of correspondents, and improvements in methods of data collection, these efforts also must include a more active programme to review and revise data and, where necessary, to provide estimates for missing data. Where official questionnaires are not returned, FAO should make greater use of alternative reliable sources or, if appropriate, estimate missing data and so label them.

\(^1\) Current membership of which includes UN-ECE, EU, EUROSTAT, FAO, OECD, and ITTO.

\(^2\) In order to enable FAO be aware of the nature of information received, countries could be encouraged to indicate the completeness and quality (e.g. whether actual or estimate) of data they provide.
In the context of capacity building, the Working Group discussed priorities and recognized that no single topic dominates all others in importance. In fact, the challenge of identifying priorities is a consequence of the close relationship and interdependence among actions that must be undertaken at the international level, by FAO, and at the national level. For example, in seeking to achieve improved quality of international forestry statistics, to which high priority is accorded, will require improvements in the ability to collect, process, and report statistics at the national level. Therefore, efforts to build capacity at the national level were also identified as a high priority item. These efforts will be more effective if they are geared towards a well-identified national level core organization which serves as the authority for forestry statistics for each country and as a reference point which handles comprehensive forestry sector statistics.

Progress at the national level will, in turn, require actions at the international level that include infrastructure development, identifying and training individuals, and establishing data collection networks.

Success in building capacity will depend on countries or regional institutions being willing to make the effort. They will take action only if there is a recognition on their part of the value of forestry statistics; this recognition can be promoted and enhanced by actions at the international level. FAO is encouraged to identify countries or country groups where the need for capacity building is particularly important or urgent - possible target situations for priority attention have been proposed by Task Force Number 3. For countries so identified, FAO should prepare and assist in implementing appropriate programmes that will result in a greater capacity for data collection, reporting, and use at the national level.

Summary of Task Force Recommendations

Each of the task force reports contains detailed recommendations for consideration. The following section of the report summarizes specific recommendations made by each of the groups. There is some repetition in the recommendations as a consequence of deliberate overlap in the terms of reference for the three Task Forces. This was done in recognition of the difficulty of dividing the questions facing the Working Group as a whole, and in an effort to draw out the widest possible variety of ideas from the Task Forces. The fact that separate Task Forces came to similar conclusions on common topics lends additional strength to their recommendations.

Task Force No. 1: Responding to user needs for international forestry data, including consideration of target groups and methods of dissemination.

Conduct a user survey to identify uses made of forestry statistics and publications, perceptions of data quality, and prospective use of expanded data collection.

Revise publications and statistical "products" to produce reports that are focused on specific topics as well as "integrated" reports that combine different types of data including provision of summary forest resource data in forest products statistical documents and vice versa.

Increase analysis and interpretation of data for policy or popular audiences. To make statistical "products" more usable, supplement dissemination of tabulated data with highlights of key developments or trends.
Use regional studies and reports to focus on data that may be important in some regions, but not in others.

Improve capture of non-wood products and informal sector statistics through strategic alliances with organizations already collecting such data (also recommended by Task Force No 2).

Stay closely involved with the global forest policy debate by monitoring needs for information and, to the extent possible, by providing more relevant information; consider new data series that will expand the scope of data collected.

**Task Force No. 2: Sources and scope for international forestry data, with consideration of means for assuring continued provision of essential data, improving data quality, and expanding the scope of international forestry data.**

Demonstrate the value of statistics and their use in decision making through, for example, support for regional initiatives.

Improve the quality and coverage of statistics by taking a more active role in data validation, including providing realistic estimates for missing data where this is possible; in addition, publish and disseminate guidelines for data collection.

Expand the scope of data collected and reported to include non-wood forest products, but focus on the most relevant products, and build strategic partnerships with other organizations that are already working in this area.

Reduce discrepancies in statistics reported by various organizations through greater coordination.

**Task Force No. 3: Identification of the requirements for capacity-building at the national level for production and use of forestry data.**

Capacity building has many facets, of which particular attention needs to be given to training, promoting recognition of the value of forestry statistics, and infrastructure development, including institutional arrangements. Key elements include:

Establish or maintain a well-identified core central organization to serve as the authority for forestry statistics for each country.

Identify focal points for data collection, and provide training, including operations manuals, for national correspondents.

Increase the recognition of the value and use of statistics through workshops, seminars, and the dissemination of data through a variety of media.

Assist in establishing better infrastructure for collection and use of statistics at the national and sub-national level.
Promote the recognition of the need for, and identification of adequate financial and technical resources for collection, recording, and processing of statistics.

Identify specific countries where efforts at capacity building, based on collaborative efforts of the country itself and international organizations, should be focused.
PART II

REPORTS OF WORKING GROUP TASK FORCES
Report of Task Force No. 1:

Responding to user needs for international forestry data, including consideration of target groups and methods of dissemination.

Summary terms of reference: The group is invited to identify users of international forestry data, with particular reference to data disseminated by FAO. Consideration should be given to potential users of existing or expanded data. Based on the numbers and types of users, the variety of uses of the data, and knowledge of current technologies, the group may wish, to the extent possible, to answer the general question of the best methods for meeting user needs.

Task Force Group members:

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Report of Task Force No. 1:

Information on international forest sector statistics disseminated by FAO is of great importance for many specialists at different levels. There is currently a major international policy dialogue\(^1\) taking place which needs information and it is FAO's responsibility to provide and facilitate the mechanism for comparable, comprehensive and relevant information and analyses that this process needs, at the highest political level. This has already been recognized by FAO as a highest international priority at a global and at a regional level. However the data that FAO has the capacity to use are limited by what is collected at the national level.

There are several levels of users - scientists, businessmen, planners, policy makers, students. Information is needed at the governmental level for carrying out short- and long-term programmes of national forest sector development aimed at sustainable forest management and environmentally safe production. FAO's statistics enable users to have a global perspective for their work; each country can see itself in a global perspective.

At the scientific level it is needed for analysis and working out trends and prospects of forest sector development in all regions all over the world; such broad analysis can be taken into account by individual countries in planning their own development. At the business level it is used for adoption of the right trade decisions. Research institutions and analysis centres use it for analyzing trends and changing patterns, and predicting future developments in the industry. More recently there has been a bigger emphasis on the sustainability question, with environmentalists and ecologists using the data.

The Task Force recommends that a user needs survey be carried out even though it recognizes that there is a certain amount of "questionnaire fatigue" in the organizations which are surveyed. Several different categories of user groups should be targeted with questions that are simple and direct, for example, as to their use of FAO's data and as to their perceptions of its quality. FAO will get less response if the questions are complicated and confusing. If FAO supplies the questions in categorized sections the respondents can choose the sections in which they have expertise. Particularly, FAO needs to ask if the full range of publications it produces are already being used, whether one or more of the publications should be dropped, or if additional publications need to be added.

FAO needs to invest more time and money on the more used and more important data outputs and put the resources on the less used ones towards any new publications proposed.

The group addressed eight questions, and the results of the group's discussions are summarized below. Owing to the overlap of subject areas there are some points made in more than one section.

\(^1\) Dialogue on forests and their roles in environment and sustainable development, principally under the UN Commission on Sustainable Development forests, as followup to UNCED.
1. What new commodities need to be covered systematically in mainstream statistics and which ones among those currently included should be de-emphasized?

The task Force felt that it was important to establish criteria for FAO to decide on items to be included or de-emphasised (not presented in detail) at global level. The following were proposed as criteria:

- For trade statistics, FAO should use the categories of products that are reported upon using the Customs Classification system.

- FAO should not limit itself to these items for non-trade statistics. A criterion for selection should be whether it is used by a significant number of countries or in significant amounts, remembering the need for compatibility within a uniform global framework. Another factor is the contribution of the product to a country's economy on international markets.

The use of these two points alone however could exclude a number of products more important on a regional or local scale. These could be recorded by the regional FAO studies, or certain periodic thematic studies.

The task Force also made specific suggestions for the following new products to be emphasised and included in the mainstream: recovered paper, medium density fibreboard (MDF), and oriented strand board (OSB). It felt, however, that any changes to the products covered should be the result of a wide-ranging consultation process.

2. Should FAO produce an "integrated" statistics yearbook, with forest resources, products and other relevant information, or introduce some resources information in its Yearbook of Forest Products or other publication/information products in its series?

- Separate publications for each sector are more efficient because, for example, the people interested in paper and pulp would have very detailed publications for themselves, and so on for other groups. FAO should maintain focused statistical publications, with summary resources information in the main forest products publications, and summary product information in the main resources publications.

- There should be a summary document produced encompassing the essential elements of each of these studies. Production, trade and consumption figures, including prices, need to be published each year, whereas those figures which change more slowly over time (e.g., forest areas) can be published periodically.

- The size and cost of the present yearbook should be reduced by reducing the time-series data. Periodically (3- or 5-yearly) there should be a document which would indicate change over time.

- Long time series data can be provided on request in electronic form without the expense of the long publication.
3. What can be the priorities among possible information "products" including types of reports?

It is difficult to set priorities among the different current publications of FAO, because each of them addresses a different user need (the Yearbook of Forest Products, the Forest Resources Assessment). Of the various forest products related databases and associated publications which FAO has, the Task Force recommends that, subject to the outcome of users survey it has proposed:

- the *Monthly bulletin on tropical timber* be restricted to yearly totals. The monthly data can be collected and disseminated electronically if required.

- Any further development of the tropical timber database should be in collaboration with ITTO.

- Some other publications would benefit from expansion of scope and data improvement, e.g. the wood-based products data. Data and short-term forecasts on industrial capacity should be collected on a country level and disseminated in the sectoral publications.

Vehicles for showing the data are the *Yearbook of Forest Products*, sectoral study and other publication types, and the methods used for displaying the data can include graphical forms, CD-ROM, various media, more visually impressive formats such as maps and diagrams. It should be explained why certain trends or figures are highlighted, e.g. the correlation of certain trade statistics with the global economy.

FAO should provide a publication with the raw data and also provide analysis which shows the trends. This form of having data and at least limited analysis in one book is a good policy because it makes the data easier to digest and use, as well as demonstrating the relevance of the data. The pulp and paper report has both of these types of information in it, as does the publication on forest products prices. The *Yearbook of Forest Products* could also benefit from this type of approach.

In general, FAO should keep abreast of the technologically advanced methods of dissemination, while maintaining the hard copy products, possibly on a reduced scale.

An integrated FAO/COMTRADE "direction of trade" statistics summary should be made available on line, and published periodically in paper form.

4. Can the users of FAO statistics be ranked in terms of importance and priority, and how should FAO ensure that these users are being adequately served?

According to FAO's constitution, the countries' governments are the prime users to be served. However, the statistics that FAO produces are so widely used by a variety of other groups that the Organization should also cater to the needs of these groups. The Task Force has decided not to rank these users in terms of importance. In terms of the form of the publication, as mentioned above, *FAO should make the availability of electronic data a priority while maintaining its paper publications in a more streamlined form*. There should be summary trends inserted as a "front end" to the book or CD for users who are not so interested in the data details. The data can then be accessed by those
who are interested by going through the front end or also by going directly to the statistical tables if they know exactly what they are looking for.

If the data are made available and collected in digital form, it is not much extra effort to make them available in book form. Thus the emphasis should be on computerised data, with consideration given to those who do not have access to these (see also question 8, below).

5. How can FAO make member countries appreciate the importance of improved statistics for their own use, with data transfer to FAO being a secondary benefit?

The Task Force feels that key here is perhaps to demonstrate how the statistics can be useful to the country. FAO should implement training programmes and put more resources into country-level demonstration and explanation of the use of and importance of statistics in this national context. For example, outlook studies can show what is likely to happen in the future, and every country will be interested in that for planning its future forestry activities.

This Task Force recommends that FAO operate at a regional level on this issue, because most countries are interested in their neighbouring countries' statistics. A regional approach would be consistent with FAO's desire to regionalize and decentralize. There is also a political dimension in that potential partners operate regionally, e.g. the Central American Alliance for Development, or the Andean Pact, or the Group of Cartagena operate on a regional level. FAO can be proactive in highlighting through its analyses of regional patterns (that it can do, with the data for the new products of regional importance being highlighted in the "front ends" of statistical publications).

FAO should investigate the possibility of applying cost benefit analysis to forestry statistics collection and dissemination. Such analysis could help to show countries the benefits derived from reliable, timely statistics.

6. Given that UNCED issues are of a popular nature, how can FAO, as an intergovernmental organization, best meet this new "market"?

FAO should stay closely involved with the global policy debate currently underway through the Intergovernmental Panel on Forests (IPF), the criteria and indicator processes, etc. to monitor the needs for information arising and to provide inputs on the feasibility of providing such information.

- The State of the World's Forests publication, which has a policy focus, should be better emphasised.

- There should be more effort to produce brief, popular publications with simple data visually presented.

- FAO should continue and enhance its role as a clearing house for forestry data.

- Technical advice on what is important to measure should be given.

- Data should be in an accessible format for policy-makers.
- FAO should continue to develop and provide statistics to assist in the assessment of sustainability of forests and forest products.

7. To what extent should FAO attempt to cover two significant areas which are currently relatively neglected: non-wood forest products and data on informal sector production (which can be quite important for certain commodities such as fuelwood and charcoal)?

FAO should seek to form cooperative information links with organizations that are already collecting statistics on informal products such as the hunting of wild forest animals for subsistence and the extraction of orchids for the local as well as the international market. Examples of these organizations would be IUCN, WCMC (the TRAFFIC database, the CITES database), ECE/FAO and also more local organizations (NGOs). Also, the pharmaceutical companies should be surveyed for data on chemical qualities of plants in the forests, uses of these for medical purposes and other purposes. Also we need to survey the national or federal forest federations for these data. Much of this work should be carried out at regional or local levels, emphasising those products which are of more importance in the economies of the various countries.

8. Given rapidly changing access to modern information technologies, how best can FAO diversify outreach to users, bearing in mind the need to avoid leaving behind those countries which lack capacity?

FAO should support the development of technology in the countries which don’t have it so that they can access data electronically and carry out their own analyses more easily. However there are infrastructural limitations to accessing the Internet which are not surmountable through the provision of computer hardware and software: telephone links also have to be operational. Therefore although FAO should make its data available electronically through the Internet, it should also produce CDs or diskettes with the data so that these can be sent to countries with weak telephonic infrastructures. Other non-traditional dissemination methods (broadcast and print media, etc.) should also be promoted.
Report of Task Force No. 2:

Review of the sources and scope of international forestry data, with consideration of means for assuring continued provision of essential data, improving data quality, and expanding the scope of international forestry data.

Summary terms of reference: The Task force needs to make reference to existing data, and particular reference to data compiled and reported by FAO. Based on its knowledge of the data, the group should comment on issues of data quality, and provide advice on methods to improve the quality of data. The group should also consider providing advice on additional data than can be compiled and reported in order to address emerging needs for internationally comparable forestry data, keeping in mind the following considerations: broadly-based and voluntary participation, practicability, clear standards, and cost-effectiveness.

The Task Force is encouraged to consider methods for collecting and compiling data. Particular consideration should be given to the use if partnerships, both among organizations, and between public organizations and the private sector.

In undertaking its tasks, the Task Force will need to recall that the quality of international statistics is only as good as the original data received from countries. Therefore, quality improvement at the international level is intimately linked to improving national capacity. Quality also depends on the interest of countries to provide and improve statistics; this cannot be taken for granted.

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Report of Task Force No. 2

The report of the Task Force addresses the nine specific questions which follow.

1. How can FAO make member countries appreciate the importance of improved statistics for their own use, with data transfer to FAO being a secondary benefit?

The underlying causes for problems of inadequate statistics need to be taken better into account; these causes include lack of access to private sector data, lack of motivation and incentives of data processing staff, etc. The following areas should be addressed in order to raise awareness and interest in better statistics:

- Show clearly the impact of statistics on decisions. Better statistics will contribute to better decisions and ultimately to a better allocation of limited resources. Examples from the past (positive and negative) could help to sensitise people concerned.

- Support regional initiatives, in order to strengthen whole regions through corporate efforts, that could be self-supporting and self-monitoring. Successful examples are the ASEAN and EU countries, where the whole is more than the sum of individual countries.

- Take the initiative to provide analyses on the basis of good statistical data and demonstrate to clients the potential use and usefulness of data.

- Aggregate data, where appropriate. International statistics must concentrate on essential facts; dealing with too much detail is difficult and not cost-effective. It is recognised that this applies more to products and product categories than it does to country information.

2. How can FAO encourage member countries to clarify the completeness of data they provide (e.g. whether only covering officially licensed products, based on estimates, etc.)?

Data published by Finland provide an example: each statistical compilation has attached to it a quality assessment in which information is provided on basic concepts, methods, reliability and comparability. Questions to assess these aspects which the "Finland Model" demonstrates could be included in FAO questionnaires.

FAO should publish guidelines for improved data collection, covering also areas such as data validation mechanisms, common units of measure, standards and definitions, suggestions on how to create more confidence on the part of providers of data, and the potential benefits for data providers. The message to convey is "Data do not harm the providers."

It is also important to note that responsibility for data completeness and validation needs to be shared between member countries and FAO. FAO has an important role in these processes and should consider internal as well as external improvements. For example, the use of automated or semi-automated validation mechanisms that detect errors in reported data should be considered.
3. To what extent should FAO attempt to cover two significant areas which are currently relatively neglected: non-wood forest products and data on informal sector production?

In the case of non-wood forest products, FAO should not set its scope of work too broad, but should instead focus on relevant products and regions. This would help to get things started (or, in some cases, continue existing efforts) with a minimum of effort, both in time and financial resources.

Development of classification schemes for products, uses, or values must have high priority. FAO should build strategic partnerships with existing organizations and centres working in this area (for example, INBAR, Kew Botanical Gardens, PROSEA, CIFOR).

In the case of informal sector production, information could be collected from 'qualified' representatives or experts. In addition, efficient sampling methods need to be developed, harmonised, and implemented.

4. How to maintain or to arrive at consistent standards and common definitions?

Guidelines should be developed, based on feedback from countries. The objective should not be absolute agreement; instead, it is more important that FAO come up with suggestions in order to "get the ball rolling", following a process-oriented approach. Meetings (workshops, seminars) might support the progress considerably.

5. Do current data gathering methods (heavily dependent on questionnaires) remain adequate and, if not, how could they be modified?

Methods to reduce the burden of too many and redundant questionnaires need to be taken into account. The Inter-secretariat Working Group approach (whereby several international organizations share information collected through joint questionnaires or surveys) can serve as a good model.

A combination of questionnaires with interaction/conversation and field surveys could lead to improvements. Better information on data gathering methods could be provided by FAO and attached to questionnaires in order to harmonise efforts and share experience. Pilot projects could be started with electronic forms or related information technology, recognising that many countries still have to rely on printed media.

6. Is collecting and reporting of data for all countries a necessary condition for any data that FAO publishes officially?

In some cases, particularly in relatively new subject areas such as non-wood forest products, it does not seem necessary to collect data from all countries on all subjects, but relevant subject data from concerned countries should be collected and published.

Emphasis should be put on important and relevant economic, ecological and social subjects. Trade-offs between cost of data collection and processing versus data precision and coverage needs to be taken into account. FAO should take an active role in selecting and providing guidance to countries on what is the most important and relevant information.
Strengthening regional initiatives such as the Forest Research Support Programme for Asia and the Pacific (FORSPA) in order to obtain aggregated data on a regional level would, in some cases, improve and facilitate data collection.

7. **How to deal with missing data?**

Some parts of the ITTO model of data handling and cross-referencing of various sources could serve as an example for FAO in dealing with missing data. Decisions have to be made on a case by case basis, taking various methods and issues into account such as:

- Imputing values (deriving missing data through related variables)
- Estimating values
- Reporting figures from previous periods
- Trend extrapolation
- Interpolation

If collected data are very rare, leaving gaps might be necessary and appropriate. Standardised methods need to be developed to advise in such situations. It seems important to note that dealing with missing data requires in the first instance a great deal of "good common sense". The approaches used by ITTO and ECE/FAO are very encouraging examples.

8. **How can agreement on conversion coefficients be secured which reflect varying country/regional situations and technological evolution?**

FAO should support international agreement on the Metric System for all measures.

Periodic interchange of applied systems could provide an overview and indicate developments with regard to conversion factors. Individual agreements between countries and FAO have to be reached and a process of continuous updating is required. Workshops could help to foster agreements, and these subjects could be integrated in a variety of related workshops and seminars.

FAO should provide countries with tables of conversion factors, both in printed and electronic format. More research might be required in this area, and FAO should consult with its partner research organizations on this subject. Countries should be encouraged to develop their own conversion factors where necessary, and should provide brief notes along with their completed questionnaires that explain the application of conversion factors.

9. **How to reduce discrepancies in statistics of various international agencies?**

The obvious answer is "By co-ordination" but the more difficult question is "How to do it?" The following suggestions could be considered in this process:

- Make data sources transparent.
- Validate data and give recommendations.
Develop a description of basic collection and processing methodologies, compile them, and use this information as the basis for formal agreements among all partners involved.

Countries need to be made more aware of their responsibility to provide accurate and consistent data.
Report of Task Force No. 3:

Identification of the requirements for capacity building for production and use of forestry statistics at the national level

Summary terms of reference: The group is invited to consider methods that can be used to increase capacity at the national level, and to the extent possible, should provide advice on objectives and priorities for the role of FAO in this effort. Issues of capacity include (but may not be limited to):

- training of individuals to collect, compile, and analyze data;

- increasing the recognition of the uses of forestry data in a variety of planning and decision-making activities;

- securing organizational arrangements to effectively capture statistics from agencies other than forestry services, including the private sector.

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Report of task force No. 3

The Task Force identified as overall, or leading perspectives, the need to (a) improve organizational arrangements; and (b) strengthen capabilities (including upgrading of skills). The subjects that were addressed include training, promotion, and infrastructure. The Task Force also drew up a strategic proposal for action through technical cooperation and investment in a selection of countries reflecting a diversity of capacity-building needs.

The Task Force was divided into sub-groups to discuss each subject in detail. Each sub-group reported the outcome of its discussions, and these, after consideration by the whole Task Force, led to the following points:

1. Training

Among training needs are those relating to: (a) upgrading knowledge in statistical analysis and data base management with regard to new developments in technology; and (b) developing capabilities in the use of computer hardware and software applications at all levels. Actions to address needs include:

National governments and other related agencies have to consider managing training programmes to meet the training needs. All institutions (government and non-government) have to be involved.

FAO and appropriate international organizations should provide training for national correspondents in focal point institutions. (e.g. continuing programmes of regional workshops, seminars).

Develop operations manual for people involved in statistics at all levels, with technical assistance from International Organizations. International organizations are advised to coordinate and collaborate in their efforts to provide assistance with regard to the preparation of the operations manual.

Priorities include: (a) identification of national correspondents in the focal point institutions (at least 3 persons involved in statistics); (b) train national correspondents in the focal point institutions; and (c) provide appropriate training for people involved at all levels in the organization, processing and collection of statistics.

2. Promotion

Promotion of the recognition of forest statistics is essential to secure commitment to the collection, processing and dissemination. Support at all levels is needed if the required investment and resources are to be forthcoming. Actions required include:

Involving people in the process of information collection - to increase the recognition of uses of forestry data, there is need for organizing seminars, workshops and make use of regulatory functions of the governments.
Taking information back to users through publications, diskettes, and other communication media, to ensure that people can recognize the results of their efforts.

Making regional and international statistics available for use by the national level (e.g. *Statistics today for tomorrow*).

3. **Infrastructure**

**Organization**

It is necessary to establish a well-identified core central organization to serve as the authority for forestry statistics for each country. This will facilitate: (a) easy access to forest statistics as well as the basic database for decision makers; (b) the ability to utilize and compare forestry statistics from other, related agencies with those created by the core organization, in order to improve data quality, and data coverage; (c) occasional review of statistics; (d) ease of utilization of administrative network for data collection; and (e) the coordination of all agencies (governmental, private sector and non-governmental) involved in forestry statistics.

It is necessary to ensure adequate capability at all levels in order to ensure effective linkage between core, regional, and local statistical bodies.

In promoting national capacity building, it will be necessary to pay urgent attention to budgeting and conditions of employment in order to reduce turnover among correspondents. Adequate budgetary resources and equipment must be available for staff, given the importance of sound information and good coverage of statistics. With regard to appropriate conditions of employment, it is necessary to ensure that these exist for staff at all levels, and that material needed for the work of statistical recording, collection and processing is available. Particularly important are computer equipment and transport.

**Establish data collection networks**

Networks that must be established include: internal (to the core organization), inter-departmental, private sector, and international, with the following functions:

An *internal network* to facilitate:

- smooth data collection;
- consolidated data collection from field units; and
- assure the data dissemination into the forest sector.

An *inter-departmental organization network* to enable and support:

- wide-range data collection, analysis and interpretation;
- gathering of necessary information that may exist outside government organizations; and
- avoid duplication of data collection by governmental organizations.
A private sector network:

- to collect private sector data needed to strengthen forest statistics.

An international organization network to:

- better utilize databases compiled by all international organizations; and
- to strengthen communication in order to facilitate the availability and use of forest products trade data in international markets.

4. A strategic proposal

Understanding the priority for development in forestry statistics at the country level requires knowledge of countries’ needs and of their ability in forestry statistics. The exercise of reviewing needs and capability started at this working group meeting, should be pursued in individual countries. For a sample of countries representing the poorest, the structurally adjusted, the countries in transition and the richest countries, the needs and capabilities should be reviewed in depth, including their needs both for national information and international exchange. The aim should be to identify priorities for development in forestry statistics, and to provide guidance on the essential components of this development. This effort will provide support for what has to be continued: a focus on the development of statistics as the basis for a programme in technical cooperation directed at the countries’ most urgent needs.

This review process should form part of a cooperative programme providing for investment in capacity building, support to infrastructure design and investment in equipment. It should include a consultative process at all stages to secure the full involvement and commitment of the people and organizations concerned. This initiative needs to be a collaborative venture between the countries, the international organizations concerned with forestry and forest industry and trade, and the development and investment agencies.
ANNEXES
Annex 1

Statement at the Opening Session of the Working Group on Forestry Statistics
by Mr. David A. Harcharik, Assistant Director-General, FAO Forestry Department

Monday, 20 November 1995, a.m.

Friends,
Colleagues,
Ladies and Gentlemen,

Good morning. And welcome to FAO and Rome for this first Working Group on Forestry Statistics. Those of you who have read some of the papers prepared for this meeting will note that we in FAO have been working with statistics for the past fifty years. I believe, however, that this is the first time that we have convened a working group of this nature to review our statistical activities and especially to determine their future nature and direction. I hope, therefore, that you feel a part of history. I can tell you that from our point of view, this is a very important meeting, and we are, therefore, very pleased that you were able to rearrange your schedules in order to be with us.

Before I go further, I would like to introduce some of my FAO colleagues: Jean-Paul Lanly - Director of the Forest Resources Division; Karl Hermann Schmincke - Director of the Forest Products Division; and Marc René de Montalembert - Director of the Forest Policy and Planning Division who together with his collaboratives, has organized your meeting. And I am David Harcharik. It is my privilege and pleasure to work with these colleagues who are all accomplished professionals and dedicated international civil servants.

Let me also recognize Phil Wardle. Phil worked with our statistical unit for over half our history and led it for much of that period. He left us, though, in July in favour of a more relaxed pace to life. Phil, welcome back. We’ve missed you.

I am especially pleased that we have a fairly diverse representation in this meeting, with two representatives of the private sector and one from the non commercial non-governmental community - we had expected two, but at the last minute the second was regrettably unable to come. Being a strong believer in partnership among international organizations, I also welcome colleagues from the ECE and ITTO, with whom we work on a regular basis. The majority of you, however, are experts who work with, or in close proximity to the member governments of FAO. Governments represent our main contact points in all countries where we collect and disseminate information on the forestry sector. We are very happy to have you with us.

I know that many of you have come from a great distance and may be tired and jet-lagged so I promise not to start your day with a long speech. I will, therefore, try to be short, but I do want to share a few thoughts with you in order to help place your meeting in perspective.

First, let me tell you a bit about FAO. We are a large organization, with 174 member nations. That’s every major country of the world except Russia, and Russia may well join in a
couple of years. Our charter, then, is global. In forestry that means we address the issues of all forests - boreal, temperate and tropical; humid and dry; and from high altitudes to mangroves.

Our subject-matter charter is also broad: we provide a forum for policy dialogue; we collect and disseminate a wide array of statistical and related information on forest resources and forest commodities; we facilitate the exchange of information on technologies and practices; and we provide technical assistance to countries which need this.

With a broad charter like this, the opportunities and challenges are endless, but our resources are not. We must, therefore, prioritize and focus our work, and we must develop strong partnerships with others who can help us.

In terms of priorities, we are doing everything possible to maintain a solid foundation programme in sustainable forest management. I believe that sustainable forest management is the most important concept of our time that directly addresses the future of the world’s forests. It is, therefore, absolutely vital that FAO maintain reasonable capability to address the three primary dimensions of sustainable forest management: environmental protection, commodity production and social participation. We must maintain balance among these three aspects of sustainable forest management if we are to contribute effectively to the protection and wise utilization of the world’s forests and associated natural resources.

Beyond this broad foundation programme, though, we are trying to focus on four areas of special emphasis or priority. These areas are: forest resource assessment, community forestry, capacity building and commodity statistics. It is this latter that has brought you to Rome. I mention these priorities because I want to emphasize again that your work here this week is of vital importance to us. You are helping us shape the direction of one of our top priority areas of work. We want your advice on which are the most important statistical data to collect, keeping in mind that the data must be relevant to user needs. We also want your advice on how best to collect these data, and how to interpret and disseminate them.

Let me expand a bit on these three objectives of your meeting. The first item is to look at the coverage of FAO statistics. We have been collecting these data for much of the fifty years of our existence. Do they remain valid? Does the range of commodities that we cover continue to be satisfactory? Were some of them important in the immediate post-war period but are no longer relevant and should be eliminated or de-emphasized? Are there new products which have come to prominence or are growing rapidly in importance as technology changes and demand shifts? Let me repeat that we want our statistical work to be relevant to user needs. From the diversity of membership of this working group, we should be able to get clear indications on which statistics we should collect.

Also in connection with data coverage, I draw your attention to the follow-up to the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. UNCED elevated concern for the environment and for sustainability in development. To what extent should statistics that FAO produces take into account sustainability dimensions? Should we expand forest products and trade statistics to include the criteria and indicators of sustainable forest management?
In connection with the latter point, we have among the participants at this meeting Pekka Patosaari who has been instrumental in steering what is popularly known as the Helsinki Process to develop European criteria and indicators for sustainable forest management. We look forward to any proposals he may have on how statistics can be adapted to better reflect concern for sustainability.

A second objective is to review our data collection process. Is it efficient? How can we improve it? Related to this is that we want your recommendations on priorities and approaches to improve the capacity of our member countries in the collection, processing and dissemination of statistical information. In many respects, international statistics are only as good as the worst statistics that member countries provide. The quality of our work, therefore, can only be assured if the quality of country data is good. Within the countries, how should we balance the need to strengthen government capacity with a similar need of non-governmental and private groups?

A third objective of this meeting is to advise on the dissemination of statistical information. Is our dissemination balanced in serving governments, the private sector and other interest groups? Is it timely? Or is it out of date by the time you receive it? What of our reliance on hard copy distribution? To what extent should we go electronic?

I appeal to you to give freely of your experience and to not feel constrained in what you provide as advice. Give us an ideal objective to strive towards if you wish, but also give us practical and realistic advice. Remember that our capacity is not unlimited. We live in a world of budget cuts. We must prioritize among our work, and I encourage you to prioritize among the recommendations that you offer. We may need to compromise, at least in the short term, among what is ideal and what is realistic. We shall never be in a situation where perfection is possible in international statistics. Therefore, we should aim to get what is achievable within the means that are available to us and within the means available to our correspondents in member countries, be they in the private, governmental or non-governmental sectors.

In welcoming you again to Rome and wishing you a good stay, I would like to mention that at the end of this meeting, you will be joined by colleagues from a number of international organizations, such as the ECE, OECD, the European Union, Eurostat and ITTO (which is also represented at this meeting). We are pursuing with these organizations an initiative that I believe has particular merit. It is called the "Inter-secretariat Working Group on Forestry Statistics" whose purpose is to promote cooperation among international agencies. In the past, the agencies have suffered from some duplication of effort, overlap of questionnaires and consequent confusion among correspondents. FAO is particularly proud to be associated with the inter-secretariat initiative, which is already making important progress to reduce duplication of effort and to harmonize work on forest statistics.

I regret that I will be unable to participate in much of your meeting, as I will be travelling to Africa on Wednesday morning. My colleagues, Mr de Montalembert and his team, will however remain here to work with you. I look forward to receiving the advice that you have come to give us, and I wish you success.

Finally, don’t forget to work hard, but to also enjoy your work. And to help with the enjoyment part, I hope you will all join me and my colleagues for a cocktail this evening.
Annex 2

Agenda

Item 1: Introduction

Objectives, organization and procedures of the meeting

Item 2: Current status of national and international forestry statistics

Coverage of international forestry statistics; case studies of forestry statistics data collection; national (public and private sector) and international institutional arrangements.

Item 3: Emerging needs and priorities for forestry statistics

New demands and their implications for forestry statistics development; priorities for national and international forestry statistics.

Item 4: Actions to improve forestry statistics

Information technology; capacity building - priorities and approaches.

Item 5: Conclusions and recommendations

Adoption of conclusions and recommendations.
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1 Additional members of this group are Steve Johnson (ITTO), Charles Prins (UN-ECE), and Mafa Chipeta (FAO). Full Addresses for these members are as listed for the Working Group.
Annex 4

List of topics given by participants as priorities for attention at country or international level

At the concluding session of the Working group, an attempt to derive overall priorities proved unsuccessful. It became clear that priorities vary according to country and many other factors; furthermore, they change with time. Mentioned most frequently for both FAO and country attention were quality improvement and capacity building. The particular suggestions mentioned by experts nevertheless appear worth reproducing for record purposes:

1. **Priorities for FAO**

   - To maintain core statistical coverage
   - Capacity building at country level
   - To ensure coordination among international organizations involved with statistics
   - To enhance data quality of international statistics
   - To identify user needs and priorities and respond to them.
   - To prepare a comprehensive manual on the "what and how" of forestry statistics
   - Support to countries to recognise importance of statistics for own use
   - Inclusion of statistics in public information on functions of forests and their sustainability.

2. **For countries**

   - Establishment of national (core) organization for forestry statistics
   - To have focal points
   - To ensure feedback and communication with providers of data
   - Data quality
   - To provide more resources for statistical work
   - Training
   - National core centre and network for statistics
   - Regional centre and network for inter-country cooperation
PART III

EXPERTS' PAPERS PREPARED FOR THE WORKING GROUP
### EXPERTS’ PAPERS PREPARED FOR THE WORKING GROUP

**Topic:** Current status of national and international forestry statistics

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11. Nigeria - building up institutional and technical capabilities at national level for improved collection and analysis of forestry statistics - present and future by S.A. Okonofua, Federal Department of Forestry, Abuja

12. Case study of a national yearbook - requirements for the Philippines by Dolores R. Catindig, Chief, Forest Survey and Statistics Division, Forest Management Bureau, Diliman, Quezon City, Philippines

13. Current status of national and international forest sector statistics: Russian Federation - case study of a country in transition by Viatcheslav E. Sokolov, Vice-Chairman, Russian Union of Timber Exporters, Moscow

14. State of the Forest Sector of Russia in 1994 and its Prospects presented by Viatcheslav E. Sokolov, Vice-Chairman, Russian Union of Timber Exporters, Moscow

15. Institutional arrangements for national forestry statistics in the Near East (including a case study of the Sudan) by Amira Awad Mohamed Salih, Forests National Corporation, Khartoum, Sudan

16. Thailand - case study on national forestry statistics by Pairote Niwawat and Bhadharajaya Rajani, Information Office, Royal Forestry Department, Bangkok, Thailand.

**Topic: Emerging needs and priorities for forestry statistics**

17. New developments in policy and planning and their implications for national and international forestry sector statistics by David J. Brooks, Pacific Northwest Research Station, USDA Forest Service, Corvallis, Oregon, USA

18. Users of forestry statistics and their requirements by Susan Iremonger (World Conservation Monitoring Centre - WCMC - Cambridge, UK); and Michael Ibach (Centre for International Forestry Research - CIFOR, Bogor, Indonesia)

19. Pan-European criteria and indicators for sustainable forest management and their implications for the future of national and international forestry statistics by Pekka Patosaari, Director, Finnish Ministry of Agriculture and Forestry, and Head, Liaison Unit - Ministerial Conference on the Protection of Forests in Europe, Helsinki, Finland

**Topic: Actions to improve forestry statistics**

20. Areas for improvement in international statistics - a private sector view by Antti Rytkönen, Jaako Poyry Consulting Oy, Helsinki, Finland
21. **Pulp and Paper statistics - views and recommendations from a private user (a presentation)**
   by Kevin McElhatton, Vice-President, Economics & Statistics, Canadian Pulp & Paper Association, Montreal, Canada

**Topic: Other matters**

22. **Cooperation on forest statistics among international organizations (a presentation)**
   by Charles Prins, Officer-in-Charge, FAO/ECE Timber Section, ECE, Geneva, Switzerland

23. **Preparation for the Forest Resources Assessment 2000**
   by Klaus Janz, FAO, Rome, Italy
FORESTRY STATISTICS, THE PAST 50 YEARS WHAT THEY MEAN FOR THE FUTURE

by Philip Wardle
University of Aberdeen, UK

INTRODUCTION

My objective in this paper is to set out basic features of international forestry statistics, their functions, conditions for their existence, strengths, weaknesses and issues relating to their future development. This presentation is based on a review of events and activities in the 50-year history of forestry statistics in the Food and Agriculture Organization of the United Nations. FAO is the only international organization that has pursued global coverage of all aspects of the forestry and forest industry sector. The collection analysis and dissemination of information about the sector is a basic mandate of the organization. Willingness to participate in the exchange of information on its agriculture, forestry and fisheries sectors is a condition for a country’s membership of FAO. This is all very helpful in making it possible for FAO to offer the service of a World Agricultural Information Centre - for agriculture, forestry and fisheries.

We must, however, bear in mind a fundamental fact about international information and that is the fact that neither the UN nor any of its agencies has the right, authority or capability to collect original information about any country. This is the sovereign and exclusive responsibility of the country itself. Thus international organizations, such as FAO, depend on the countries to make available the information that only they are in a position to collect. This dependency and inter-dependency is fundamental to the collection and exchange of international statistics and, for that matter, of national statistics. Full information is a product of cooperation, collaboration and open exchange, nationally and internationally.

The importance of forestry was incorporated in FAO at its inception in 1945 and earlier international work on forestry was vested in FAO. Early international recognition of the importance of forestry was demonstrated by the consideration of a major forestry study on the agenda of the second session of the FAO Conference in 1946. "Forestry and Forest Products - the World Situation" presented the dual goal of forestry - sufficient area of forests to ensure the benefit of their protective role and a permanent and abundant supply of forest products. Concern for the forestry sector was stimulated in those years by uncertainties about the supply of timber resulting from the disruption of the war period and the risk that this would lead to wholesale destruction of forests to meet short-term needs. To allow monitoring of the development of the situation two major international forestry information systems were initiated:

- forest resource statistics directed at assessing the area, stocking and yield potential of the forests. The first publication was "World Forest Resources" FAO, 1948 and
- the "Yearbook of Forest Products Statistics" first published by FAO in 1947. This presented the volume harvested from the forest - removals and the production and trade in forest products.

The establishment of these two systems provided the basis for international monitoring of, on the one hand, the extent, state and productive capacity of the forest and, on the other hand, the productive use and economic contribution of the forest and the performance of the industry that depended on it.

We can say that this information has been invaluable over the years in helping foresters and forest industry in developing the sector contribution to economies. In the 1970s the world was reminded of the vital role of forests in meeting the subsistence needs of people in developing countries.
for energy and foresters responded by turning their attention to problems of community development. The 1980 Forest Resource Assessment showed both the forestry community and a global audience the existence of enormous pressure on forests and forest land in developing countries and brought the forestry sector to centre stage in the ensuing environmental debate. Although some of the physical dimensions of these developments have been dramatically presented to a wide public, particularly in developed countries, the economic and social costs and benefits of, associated with alternatives, have hardly been explored. Due to unconcern about the forest sector among the national economic policy makers, its economic contribution is virtually invisible in the national accounting system except in a few countries where it is a major sector of the economy. The presumption of the economic insignificance of the sector leads to neglect the necessary investment in infrastructure to secure proper treatment or recognition. The inadequacy of national statistics of the sector has been a contributing factor. The subsistence contribution has remained largely unmeasured, unreported and officially unknown to others than foresters. The industry contribution has either been lost in some greater aggregation or, if it can be identified, is not recognised as an interdependent component of a Forestry and Forest Industry sector.

The conclusion of this review of the importance of forestry is that, though it is well recognised in its many aspects by foresters, the information infrastructure that would ensure its visibility to national policy makers is lacking or poorly developed.

AGREEMENT ON INTERNATIONAL STATISTICS

The collection of international statistics depends on the willingness and ability of countries to provide the information. Collection of statistical information is a costly business so that a first precondition is that the countries regard the information as important for their own use and, therefore, worth collecting nationally. The second requirement is that they actually invest in the arrangements to collect. In practice the collection of international statistics starts by asking countries what they want, what they are able to provide and what they are willing to exchange and want to exchange internationally. Having reached a preliminary position about what is desirable and what is feasible, there is a framework for persuading more countries to collect and exchange information. Thus in the development of international statistical exchange there is a very important component of investigation, consultation and international discussion to arrive at agreement about what is to be collected and to promote the implementation of that agreement. A second requirement is the establishment of agreed standards, classifications and definitions to ensure that data collected from the many countries are comparable. In the formative first year of its existence, FAO held conferences in Washington DC and Rome to establish specific plans for the statistical programme for forestry and to establish uniform definitions. As mentioned above the first statistical publications on forest products and forest resources appeared respectively in 1947 and 1948.

In the following sections the particular issues of the selection of products on which to collect data, standards for classification definitions and measurement are considered taking the case of the "Yearbook of Forest Products" as an example.

What to collect

By reviewing the evolution of the content of the yearbook we may get to grips with some of the factors determining the content of international series. The first requirement from the yearbook was information on the volume removed from the forest. This was to be compared with the estimated growth potential of the forest. The second requirement was for information on the production of wood-based industries. This was to provide a view of the demand for wood from the forest and the efficiency with which the wood harvested was utilised. The third requirement was for information on trade volume and trade flows in wood and wood products. This was to get a picture of the flows
between countries and of the national and regional supply balance. These were the main things included in the early yearbooks.

The detail related to the main uses of roundwood and the principal industries at that time. Thus the main roundwood categories were:- Sawlogs and veneer logs, pit props, poles piling and posts and Fuelwood. The main products were sawnwood and sleepers, plywood, pulp, newsprint and other paper. Fibreboard was a pulp product and grouped with other paper. This evolved over the period to 1970 with the addition of pulpwood as a major roundwood category, the emergence of the main categories of wood-based panel - veneer, plywood, particle board and fibre board and the subdivision of classes of mechanical, chemical and other fibre pulp and the classes of paper - newsprint, other printing and writing and other paper and paperboard with divisions for packaging and sanitary. Up to 1970 the collection of data on forest products other than wood was attempted, but in that year the response from countries was found to be so poor that the series were discontinued.

These developments responded to the increasing interest of industry in these statistics for investment and marketing decision making, which called for greater product detail. From the 1970s there was a counter-pressure from governments resisting the introduction of new series and increased detail. This counter-pressure was greatest in the area of trade statistics. Government representation in the Customs Cooperation Council forced a sharp reduction in product differentiation in the creation of the Harmonised System particularly where there was no relation to tariffs. The concept of differentiating classes for statistical purposes got no support. In the latest revisions, diversity in coding is further discouraged particularly in the European Union countries which are discouraged from maintaining local subcodes, different from the EU norm. The elimination of formal trade recording of flows between EU member countries may significantly further reduce information on the movement of wood and wood product, when one remembers that inter-trade within the EU represents nearly 40 percent of world trade in forest products. From this sketch of the evolution of what to collect, we may draw three conclusions:-

- concentrate on topics which are generally regarded as very important;
- recognise diminishing returns and increasing cost of going into greater detail;
- ensure that the collection is practicable.

Classification and definitions

Having decided what is to be collected, the message has to be got to all those who gather and supply the statistics as to the exact nature of the items that make up the "what". In international statistics this is to make sure that each country is providing information on the same items against each heading and that the statistics are thereby consistent.

Leadership in the development of international classifications has been taken by international trade organizations such as the Customs Cooperation Council [CCC]. This has been for the simple reason that they were required to support legally binding agreement requiring precise grouping of products and rigorous definition of the products within groups. The classification of forest products has followed the lead of international trade classifications and the FAO yearbook classification has evolved with the UN standard international trade classification - SITC through its three revisions. The current version - SITC rev. 3 - corresponds precisely in groupings and definition of its subdivisions with the Customs Cooperation Council "Harmonised System".
The FAO forest products classification follows the broad arrangement of the UN and CCC grouping products into categories of basic raw materials, primary products and further manufactures. Thus we have the broad grouping of:

- roundwood;
- sawnwood, panels and pulp;
- paper and paper board.

In the detailed classification one finds further criteria for subdivision namely:

- type of raw material [coniferous, non-coniferous];
- end-use [sawlogs, pulpwood, fuelwood]; and
- method of manufacture [particle board, fibreboard, chemical pulp].

The subdivisions were of practical importance to those seeking the information. However, as the CCC points out several of them are arbitrary and are difficult or impossible to recognise in the products themselves. It is for this reason that the end-use definitions used to subdivide sawlogs and pulpwood, were rejected by the CCC.

A major review of the classification of forest products was carried out in the late 1970s with careful alignment with trade and other international product classifications [Classification and Definitions of Forest Products FAO 1982]. The classification and alignment with HS and SITC rev. 3 in the Yearbook of Forest Products has been adjusted to take account of the latest revisions in those systems.

In the FAO Yearbook forest products are currently classified in the following groups:- Roundwood, sawnwood, wood-based panels, pulp, paper and paperboard. Within these groups, the elements are unique, mutually exclusive and taken together add up to the total of the group. Ideally the logic is as follows:- \textbf{Sawnwood = Coniferous Sawnwood + Non-coniferous Sawnwood}.

In practice the evolution of the system has resulted in various sorts of asymmetry. For example, in earlier years the above group was - \textbf{Sawnwood + Sleepers = Coniferous Sawnwood + Non-coniferous Sawnwood + Sleepers}. The type of raw material for sleepers was not defined. There are several other product areas where either the production or the trade is not sub-divided in the same detail as other products in the group. This limits the possibility of analysis across the various dimensions of the classification. It also signals the need for caution in ensuring a correct understanding of the structure of the data and to remember that the classification and subdivisions have been revised over time and this may be important in making comparisons of data from different editions of the yearbook.

The data for individual countries have been grouped in two ways, namely:- in geographical regions and in economic groupings. The geographic regions group countries in contiguous areas while the economic groupings bring together countries with some similarity in economic state and development. Important changes in the country listings have arisen in recent years from the changes in national boundaries with the break up of the former USSR and changes to countries in eastern and Central Europe.

This section has:

- stressed the importance of clear and unequivocal definition of products and consistent classification in groups and subgroups;
recognised the value of making maximum use of existing classifications which are also related to established systems of data collection noting that particular importance is attached to international trade classifications;
- in utilising data series it is essential to understand the classification in place and to recognise changes occurring over time.

**Units of measurement**

Measurement systems differ from country to country. Many European countries use the metric system while the USA and some Asian countries use versions of foot/pound systems. The yearbook is now standardised on cubic metres and metric tons [tonnes]. In earlier years, some trade was reported in fathoms.

The measurement of timber has included various approximative measurement conventions to overcome the irregular shape and dimensional instability of timber. These conventions may include imputed allowances such as rounding down from true to conventional standard dimensions. Comparable measurement of different batches of some wood commodities is made difficult by variation in moisture content - as for example, in the case of wood chips. Indeed, this difficulty will arise in any case, where wood quantity is measured in weight units.

Conversion from one measurement system to another is a matter of using the correct conversion factor. The existence in some countries of specialised wood measurement units such as board foot and hoppus foot makes it necessary to take care to identify the correct factor. In the case that the measurement units are not fully specified, for example in the case of panels, only the surface area may be stated, the missing dimension has to be estimated.

Conversion factors are certainly the cause of some uncertainty about the accuracy of international data. The yearbook notes uncertainty about the correct metric volume of sawnwood reported by USA and Canada due to conversion from board feet. The solid wood volume equivalent of chips and particles in trade is subject to the difficulty that the nature of the weight or volume reported is uncertain.

The CCC harmonised system is in the process of introducing standard measurement units for forest products which will include cubic metres for solid wood products and tonnes for pulp, paper and some panels.

In summary:
- the units in international statistics are necessarily standardised for forest products to cubic metres and tonnes;
- an essential part of national reporting is the precise statement of units used; where conventional measurement units are used in national statistics it is desirable that the correct conversion to standard international units is also provided to avoid potentially serious inaccuracies arising from use of wrong factors.

**GROWTH OF INTERNATIONAL STATISTICAL INFORMATION ON THE FORESTRY SECTOR**

From the base of the forest resource data and production and trade data established in the initial years, the international community has supported the introduction of a number of additional statistical series over the years. A brief review of the main of these is designed to highlight further features of the international system of forestry information and its development.
Pulp and paper

A consultation on the world demand for paper in 1960 involving manufacturers, forestry organizations and international bodies raised questions about industry capacity, investment and waste paper, as well as production trade, and fibre supply. Following the emphasis placed on the need for continuing discussion of these matters, FAO established the Advisory Committee of Experts on Pulp and Paper. An early decision of this committee was to initiate the Pulp and Paper Capacity Survey. This collects detailed data on the capacity by product subgroups and forecasts their development for five years ahead. The data is offered through the good offices of the committee membership, by national associations and paper industry organizations. A detailed classification, designed to fit within the broad framework of the yearbook classification, was worked out in close consultation with the Advisory Committee and the industry and the reporting system was designed in consultation with the national reporting organizations. Around 1980 the processing of this data was computerised and a computer version of the questionnaire was initiated.

Not disaggregated below computer logic indicated a particular problem with the data being reported. Some countries provided every detail as specified in the questionnaire, while others were able to provide detail for some products, but only aggregates for others. The computer system was therefore designed to enter the data at the level of detail in which it was received. Where no detail was provided, the detail was treated as missing. This allows an accurate statement of the volume of detail provided and a clear indication of the volume for which detailed breakdown is not known - not disaggregated below!

Recovered paper

A second series introduced on the initiative of the Advisory Committee was the waste paper or recovered paper series. This was introduced in the 1970s again with the classification and definitions worked out in consultation with the Committee and other international bodies and industry associations. Again the source of the data was mainly national industry associations.

Wood based panels

A parallel innovation was made in the 1960s to collect capacity and production data of the veneer, plywood, particle board and fibre board industries. Unfortunately, the link through a governmental advisory committee with the industry was not so effective and the commitment and active interest of the industry and industry associations was not achieved.

Forest product prices

Work on econometric analysis of the outlook for supply and demand in the forestry and forest products sector led to a concern to secure the availability of time series data on forest product prices. The objective was to identify fully specified series for major products according to location with the aim of obtaining clearer distinction between domestic, import and export products and to overcome the limitations of highly aggregated series, such as unit value in trade, which might obscure real price change. These series were initiated in the 1970s using a combination of national reporting and research into published sources.

The directions of trade

Throughout the history of the yearbook, trade matrices showing origin and destination of trade flows, have been included. With the development of computer-readable data collection by the UN and the improved capability of the computer system, it became possible to consider comprehensive
analysis of trade flows. These data are now available in a timely manner to be utilised in the development of yearbook data and contemporaneous trade matrices. A valuable feature is the possibility to extract at least partial data on non-reporting countries using the information of the collection of trading partners. This possibility existed with printed data, but was dimensionally impracticable for more than a few important countries. The challenge is to develop an adequate process of validation in the vast sea of trade flows that emerges. A sea with some rocky problems of misreporting and dubious conversions which has to be charted, but which has already demonstrated the potential to provide a very rich catch.

Tropical timber

In the late 1970s the international community expressed a particular concern to get better information on tropical timber trade and particularly the species composition of this trade which was needed to monitor success in mobilising the utilization of less known species. The monthly bulletin, tropical forest products in world timber trade was established for this purpose drawing its data from monthly trade statistics or from monthly reports from timber exporters. It compiled data on trade in tropical roundwood, sawnwood, veneer and plywood in total and in species detail where this was available. In 1988 the Harmonised System introduced a revised standard classification for tropical timbers. This involved the establishment of a series of species groups. In 1993 the grouping was totally revised. National authorities provided some information on individual species under the 1988 system. From the early 1990s there has been a strong decline in the reporting of detail so that now virtually no significant information on species is available and importing countries report explicitly as tropical only about one third of the timber volume actually imported from tropical countries. The complexity of Harmonised System classifications makes the logical treatment of detail problematical and computer extraction extremely difficult. The late arrival of data and the difficulty of processing have together made the lead time to produce processed reports uninteresting in relation to monthly data.

In summary this review of growth of forestry statistics suggests the following conclusions:

- successful initiation of international series depends on very strong commitment on the part of countries and their institutions to support the series;
- to gain this support the series must relate directly to their perceived need for the data;
- if the data are to be collected internationally they must be available in a routine manner nationally;
- detail is more difficult to handle than aggregates and more costly to supply and process so it must be strongly supported;
- if detail is justified there should be an adequate approach to dealing with missing data so that failure to report detail by some does not undermine the flow of reported data;
- systems work best when they are founded on discussion and agreement on their content involving data suppliers and data users and when such consultation is used to maintain interest and to ensure response to changed needs and feasibilities.

DEVELOPMENTS IN THE INTERNATIONAL PROCESS

We have mentioned the incremental growth of the data series. In parallel there has been an evolution in the process of collection, data handling and dissemination.

Up to 1970 data was collected through paper questionnaires, transcribed manually and tabulated for printing using typewriters. In the yearbook two-years data could be published. Long-time series could be prepared every decade.
From 1974 data were entered, processed and prepared for printing using computers. This facilitated the process in several ways. Time series could easily be tabulated and printed - the yearbook now published 12-years data. Processing and publication could be completed very soon after the last data was entered - the lead time was reduced from more than two years to 13 months from the end of the last year reported. Validation and checking routines could be applied to the data to identify areas of possible error or inconsistency. Computer readable data could be made available to users. From the late 1970s data could be collected in computer-readable form using microcomputer diskettes. By the end of the 1980s data was both collected and disseminated on diskette and AGROSTAT PC had arrived.

Better access to the computer allowed us to read and process data. Analytical studies using "all" the data became feasible eg. "Forest Products, World Outlook Projections" 1986. As mentioned we have been able to make much fuller use of UN trade statistics eg "Forest Products Direction of Trade" 1987, 1991 and " Forest products trade flow data" 1992 et seq. These things can now be made available on Internet.

We have also been able to carry the data directly into illustrative summaries in the form of maps and graphics - "World Forest Resources 1980" FAO, 1985, "The Outlook for Pulp and Paper to 1995", "Forestry Statistics Today for Tomorrow".

Ready access to the data and ease of analysis increases the demand, stimulates the supply of better data and strengthens the ability to check and validate all leading to a more lively and useful information system.

**QUALITY OF INTERNATIONAL DATA**

The only source of international data is the country itself. International organizations depend on the counties’ institutions to make the data available. The quality of international data depends first on the quality of data collected by national institutions and secondly on success in capturing that data for international use.

With specific reference to quality of forestry sector data, we may say that it is best for trade and for large-scale industry products such as pulp and paper and less good for products of small-scale industry such as sawnwood and most problematical for informal sector products such as fuelwood. National statistics on the sector tend to be best for rich countries with a forest sector that is important to the economy. The forestry sector is relatively of small importance in the economies of many developed countries and forestry information is given low priority by government, but information may be available from industry. In many developing countries the infrastructure for forest sector information has been given low priority. Particular difficulty in information collection arises in countries where the industry contribution is made through large numbers of small firms and most emphatically where it is made by the subsistence sector. In fact half the contribution in developing countries is made by the informal sector use of fuelwood for energy and by forest products other than wood.

In many developing countries then the data are poorest when the forest sector contribution is relatively the most important. The absence of information means that the authorities act in ignorance of the sector’s role whether it be through small industries or through energy supply and may too easily adopt policies that put the future contribution at risk.

Some countries have taken action to rectify the information gap - the Sudan has just completed a consumption survey which has effectively opened the eyes of high level policy makers to the sector’s role. But there remain very few which have effectively assessed the contribution of the sector.
at the subsistence level, so the loss of forest is perceived only in its environmental dimensions while the economic and social are largely missed and ignored due to the dirty or credible statistics.

**SUMMARY**

- Though they may be better, we may not be complacent even about modern sector forestry statistics. They are recognised by users as important but the infrastructure to deliver them is fragile and should be actively promoted to ensure it is adequately supported.

- The poor country and the subsistence sector are at the other end of the information scale where the contribution of forestry is most urgent but is least protected by sound information and most at risk from decisions made in ignorance. This must be a priority for improvement.

**INTERNATIONAL CONTRIBUTION TO NATIONAL CAPABILITY**

International statistics are viable only if they reflect the needs of countries. An important function of the international organization is to work with the countries to identify those needs and to facilitate agreement to collect and disseminate information to meet them. Ideally the statistical framework established for international collection is a valid minimum for the design of a national system which may be promoted with all countries for their benefit. FAO has pursued this approach in the following ways:

- holding international consultations to agree upon basic standards;
- holding discussions about classifications and definitions to establish the detailed specifications to meet information needs;
- propagating the standards through international enquiries to all countries;
- direct assistance to countries through technical assistance aimed at developing necessary infrastructure for information collection and use and assisting with particular information gathering activities such as production and consumption surveys;
- training and awareness campaigns through seminars on forestry statistics;
- country visits to work with national institutions to develop effective response to enquiries and to mobilise cooperation of other relevant institutions;
- collaboration with other international organizations relating to forestry sector information to secure a common approach.

**THE ISSUES OF TODAY**

From the conclusions from review of the various aspects of the history of international forestry statistics in FAO one may identify number of urgent issues: the importance of maintaining existing series to meet established need, the urgency of improving information in the poorest countries where the forest sector contribution is vital but most at risk from bad decisions taken in ignorance. There are also external considerations which suggest priorities for the direction of statistical work. The change in government organization in countries in transition and in countries undergoing severe structural adjustment makes the future of forestry information services uncertain and a particular concern is to ensure that essential services in this area are secured for the future. This is a parallel need to that of the poorest countries for protection against unwitting consequences of ignorance. Finally we have the intense discussion of environment and development that follows from the UNCED and which raises innumerable questions about monitoring and the appropriate criteria and indicators. Ultimately the forestry statisticians will be given responsibility for the collection and dissemination of statistics to meet these needs. It will be important that the lessons about consultation, practicability, standards and the consideration of cost and benefit that can be
learnt from experience with forestry statistics over the past 50 years will be applied to these new ventures in information exchange.

A STRATEGIC PROPOSAL

Understanding the priority for development in forestry statistics requires knowledge of countries needs and of their ability. To decide the next stage in international forestry statistics this knowledge needs to be brought up to the minute. The exercise started at this working group meeting, should be pursued in the countries. For a sample of countries representing the poorest, the structurally adjusted, the countries in transition and the richest, the needs and capabilities should be reviewed, including their needs both for national information and international exchange, with the aim of identifying priorities for development in forestry statistics and guidance on the essential components of this development. This will provide support for what has to be continued, focus on what has to be added and the basis for a programme in technical cooperation directed at the countries' most urgent needs. This initiative needs to be a collaborative venture between the countries, the international organizations concerned with forestry and forest industry and trade and the development and investment agencies.
COVERAGE OF FOREST PRODUCTS STATISTICS IN FAO

by Felice Padovani
Planning and Statistics Branch, FAO Forestry Policy and Planning Division

After briefly outlining the overall roles of the Food and Agriculture Organization of the United Nations (FAO) in agricultural sector information, this paper presents the coverage of FAO forestry statistics today. It provides details on the range of commodities for which statistics are available from FAO; outlines how they are processed; refers to dissemination including the perceived main users and "markets" for the statistics; and draws attention to some issues which the Working Group may wish to address and provide advice on.

Information in this paper, particularly where it covers issues and problems, needs to be complemented and considered together with the very important observations of all experts who have prepared papers for this Working Group. Many are primary users of FAO data and provide insights which benefit from personal experience in using FAO data or collecting and channelling data to FAO.

A CENTRE FOR AGRICULTURAL INFORMATION

Under its Constitution, FAO is required to "... collect, analyze, interpret and disseminate information relating to nutrition, food and agriculture. In this Constitution, the term 'agriculture' and its derivatives include fisheries, marine products, forestry and primary forestry products". Article XI.2 of the Constitution stipulates further that: "All member nations and associate members shall also communicate regularly to the Director-General statistical, technical and other information published or otherwise issued by, or readily available to the government".

In pursuit of these directives, statistical information relevant to agriculture, fisheries and forestry is being collected and processed by various units in the Organization, the main ones being the Statistics Division (overall agriculture), Commodities and Trade Division, the Fisheries Department, Forestry Department and the Animal Health Service. The periodicity extends from monthly through annual to ad hoc questionnaires. FAO is in the process of building up a World Agricultural Information Centre (WAICENT) to be a major clearinghouse and dissemination centre for information in all the above fields.

COVERAGE OF FOREST STATISTICS

Since 1945, FAO has been the leading international organization in collecting and disseminating comprehensive statistical information on the forestry sector for all countries in the world. The FAO Forestry Department (a) collects and disseminates basic information on the forestry sector for all countries, (b) promotes international standards in the collection of forestry statistics, and (c) fosters the development of essential statistical programmes within countries.

Within the FAO Forestry Department, there are two main independent but complementary lines of statistical work: the first covers the global Forest Resources Assessment (FRA) and the second, Forest Products including production, capacity and international trade. The latter is the focus of this meeting.

Forest Resources

Under the Forest Resources Assessment, the first global survey of forest resources was carried out in 1946 and follow-up ones took place with 1953, 1958 and 1963 as reference years. In the
recent past, the 1980 assessment is noteworthy: it triggered alarm at rapid deforestation of tropical forests. The study had two parts: the FAO/ECE survey covering most developed countries, and the FAO/UNEP Tropical Forest Resources Assessment for developing countries.

Given the heightened concern for the status and condition of the world's forests, FAO launched another assessment with reference year 1990 and published the last of the study's reports in Spring 1995. As for 1980, the 1990 study had two main components: the survey of forest resources of the developed countries was coordinated by the FAO/ECE Agriculture and Timber Division in Geneva, and for the developing world by FAO through the Forest Resources Assessment 1990 Project at Headquarters. Preparation for FRA 2000 is underway.

Forest Products

Coverage

The presentation of FAO forestry statistics coverage benefits from the historical perspective given by P. Wardle in his paper *Forestry Statistics, the past 50 years - what they mean for the future*. FAO forest products statistics focus on wood and its products. For these, data are collected for the a spectrum from roundwood, through commodities resulting from first processing (such as charcoal, sawnwood, veneer sheets, wood pulp, wood residues, and wood-based panels) to further-processed products (such as paper and paperboard). Recovered paper is also reported upon. In the UN system, manufactured articles of wood and paper, being from secondary processing, fall under the purview of UNIDO and are outside the regular data collection programmes of FAO.

The core forest products statistical data collection categories are hierarchically structured and mutually exclusive, covering production and/or trade (quantity and value) and/or prices and production capacity for the formal sector1 (roundwood, sawnwood, wood-based panels, pulp and paper). The product categories are given in *Appendix I*, which is a reproduction of the questionnaire for the *Yearbook of Forest Products* (YBFP), the flagship FAO statistical publication on forest products. Increasingly, FAO also monitors collection and use of recovered paper2 which is an important complement to virgin pulp, given the growing environmental legislation favouring ever-higher levels of fibre recycling.

Coverage includes some non-wood materials, some ligno-cellulosic materials bonded with mineral binders, and products of non-wood fibrous vegetable pulps (bamboo, straw, bagasse, etc). As indicated in the paper by Wardle, FAO's efforts to cover non-wood products are not new. From 1954 to 1971, the Forestry Department collected and published "Forest products other than wood" in the *Yearbook of Forest Products Statistics*. For that period, data were collected on production and exports (quantity and value) of: cork; materials for tanning; materials for plaiting; natural gums, resins and lacs; vegetable oils; essential oils; waxes, etc. It was remarked at the time that:

"Statistics on forest products other than wood are difficult to collect in all countries, and the reported figures are therefore likely to fall short on total production, and perhaps also of total trade. For this reason it is not possible at the present time to estimate regional or world totals from the statistics given."

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1 Informal sector data are under-reported, if at all, in current statistics; to capture them requires specific surveys.

2 Available in the database, with extracts being published in "Statistics Today for Tomorrow" but not yet in the Yearbook of Forest Products.
FAO has not resumed routine coverage of statistics on what are now called Non-Wood Forest Products (NWFPs) but there has been a revival of interest: regional expert consultations on the subject have been held in Africa, Asia-Pacific and Latin America and NWFPs featured in recent FAO regional seminars on forestry statistics held in the same regions. The consultations culminated in a global NWFP consultation held in Yogyakarta, Indonesia (January 1995), which has drawn renewed attention to these products.

**Main forest products statistical databases**

The FAO Forestry Department maintains six main databases on forest products: the *Forest Products Production and Trade Database*; the *Pulp and Paper Capacity Database*; the *Wood-Based Panels Database*; the *Tropical Forest Products Database*; the *Forest Products Prices Database*; and the *Forest Products Direction of Trade Database* (under development). A seventh database, on wastepaper, is under development. Of these, the principal and most comprehensive is the *Forest Products Production and Trade Database*, on which is based the YBFP. All other databases are specialized in that they cater for a narrower range of commodities or aspects even though they provide more detail on their focus topics.

**The Forest Products Production and Trade Database**

The *Forest Products Production and Trade Database* has annual time series of production, import and export (quantities and values) of forest products for the years 1961-1993 and is growing steadily. The data are collected by country worldwide. The basic data are often aggregated as shown in *Appendix 1* for purposes of publication and analysis. Country aggregates are the standard aggregates used in the UN system (such as "Developed", "Developing"; geographical regions).

For nearly 50 years, one of the most important, best known and most used outputs of the Forest Products Production and Trade database has been and remains the FAO Yearbook of Forest Products (YBFP). The Yearbook data is hierarchical and its products exclusively defined, has annual data on production, or/and on trade (either volume, value or both) for some 50 products and product aggregates, with each edition covering 12 years. On magnetic tape and on FAOSTAT floppy disk, Yearbook data go back to 1961 but published data go back to 1946.

Many studies of the forestry sector, be they worldwide, regional, or even national, use data published in the Yearbook, in particular where long term timber trends are required. It is also those used in the computation of FAO's agricultural indices.

There are some problems with the *Forest Products Production and Trade Database*. One is that although before 1989 the YBFP was quite consistent with the SITC Rev 2 Classification, adoption since then of SITC rev 3 meant that some traded forest products disappeared and others were added. This change is shown in *Appendix 2* (Data structure) of roundwood production and trade. The definition of some aggregates is different for production and trade and ideally should be revised so that the aggregation and commodity nomenclature would be the same. However, an issue is that while the forestry sector may be able to control definitions for production, it has little influence on trade where customs authorities have full control. Thus, while foresters may wish to have all the

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1. The two periods show that the clear separation of coniferous and non-coniferous for the removals has changed or disappeared; the two became elements of the total. This change is not only misleading but it is a radical change to the hierarchical structure for categories of "Roundwood". There are practical problems for users: this change will not allow, for example, to relate production with trade and derive the apparent consumption, to analyze input-output consistency at country level, or to follow changes over time.
products traded have corresponding production data, they would have to convince customs authorities of the need for such categories.

Other problems include: lack of separate production data on residues (trade is already reported); a commodity coverage which appears not fully up to date (e.g. MDF remains excluded while less prominent older products - such as dissolving pulp, compressed fibreboard - are reported); lack of quick reference capacity for each commodity such as key producers, traders and trade flows; absence of routine coverage of statistics on waste paper collection, trade and reuse; and lack of bridging to information on forest resources.

The Pulp and Paper Capacity Database

The *Pulp and Paper Capacity Database* contains annual producer-country time series of current production, capacity and five-year forecasts for pulp and paper products. Data are derived from the *Pulp and Paper Capacity Surveys* initiated in 1969 - they cover 65 products for the period 1969 to 1994. The historical data and five-year forecasts of capacity are available in computer-readable form on diskette and/or on WAICENT via Internet. The forecasts are highly valued by industry and are used extensively in outlook studies, in investment analysis and in research on the economics of the international pulp and paper sector.

The main outputs of the Pulp and Paper Capacity Database are the annual FAO publication entitled *Pulp and Paper Capacities Survey* and *Estimated Production in Certain Countries* produced in 3000 and 1500 copies respectively. The results are discussed at annual meetings of the FAO Advisory Committee on Pulp and Paper which is comprised largely of private sector members. The data are tabulated by country and by commodity. Summary totals, Pulp and Paper capacity ratios over time and annual capacity utilization are also provided for the main commodity groups, in table and graphic form.

The Wood-Based Panels Database

The *Wood-Based Panels Database* is based on seven international surveys started in 1968, initially done regularly on a three year cycle, in conjunction with FAO Expert Consultations on Wood Based Panels. It has historical data on number of operating plants, annual production, capacity, number of operating days in a typical plant and number of shifts per day. When it was still active, until 1987, the database had, in addition to the historical data, two-year forecasts.

The main outputs of the Wood-Based Panels Database used to be the FAO publication entitled *World Production Capacities Plywood, Particleboard and Fibreboard* produced in 1500 copies and discussed by the FAO Expert Consultation on Wood Based Panels held every three years - with the last meeting being in 1987. The latest edition of the publication covered the five-year period to 1990. The suppression of the private-sector dominated FAO Advisory Committee on Wood Based Panels and of regular expert consultations may explain cessation of activity for this database. Given the dynamism of demand for certain panel products, the loss of activity has left an important vacuum.

The Tropical Forest Products Database

The *Tropical Forest Products Database* consists of monthly time series of imports and exports, in quantity and value but only for major importing countries (Australia, Belgium/Luxembourg, France, Germany, Italy, Japan, Netherlands, Singapore, Netherlands, United Kingdom, United States of America) and for four commodity groups (Logs, Sawnwood, Veneer, Plywood). Information is distinguished by country of origin, and by species to the extent possible. On the export side, only total exports are reported, without indicating destination or species.
should be mentioned that the tropical timber trade appears increasingly reluctant to break down its information by species.

The main output from the Tropical Forest Products Trade database is the Monthly Bulletin: Tropical Forests Products in World Timber Trade, published in 1500 copies, twice a year.

The Forest Products Prices Database

The Forest Products Prices Database, which is updated every year, covers 70 countries and 20 forest products or forest products aggregates, from 1961 onwards. Text information is also kept in the database to describe the price series. It has prices in national currency and in equivalent US Dollars (using IMF exchange rates) and indices of the dollar price.

The principal output of the Forest Products Prices Database is the FAO Publication entitled Forest Products Prices, a compendium which is published every two years. It would be useful for this database to be made available in computer readable form and to be issued more promptly. Descriptive text specifies the nature of the series, the source of information and the original units of measurement. Price indices, both in nominal and real terms, are weighted averages of national prices, the quantities produced serving as weights, expressed relative to their level in a specified reference year (e.g. 1990 = 100), with the UN index of manufactured goods export unit values as deflator.

The Forest Products Direction of Trade Databank

The Forest Products Direction of Trade Databank (under development) contains data on quantities and values of forest products exported/imported between specified countries in a given year. The database houses the results of returns of Forest Products Production and Trade Questionnaires and from COMTRADE data tapes supplied through the UN Statistical Office in Geneva. FAO contracted the European Forestry Institute in Finland to develop a system (which has been applied on trial so far to 1993 and 1994 data) under which the UN tape data undergo computer processing and formatting into direction of trade matrices that can be cross-checked between source and destination countries, screened for reasonableness of unit values, and compared with alternative data sources.

The computer techniques (which are still under trial) hold promise for capturing the trade of certain countries which have incorporated exports but whose trade is recorded by importing countries. The main outputs of the Trade Databank at present are the Direction of trade tables published in the FAO YBFP.

**HOW DATA ARE COLLECTED AND PROCESSED**

**Data collection**

Questionnaires - annual, periodic or occasional - are a key means of collection information. Annual questionnaires, which feed into the appropriate databases presented earlier, cover the following:

- Pulp and Paper Capacity (Appendix 3) (in hard copy and/or on LOTUS 123 spreadsheet computer diskettes) - sent mostly to pulp and paper industry or trade associations but also to
government agencies in all countries.  Seeks information on the previous year capacities as reported by the country, the present capacity, the 5-year forecasts;

- Forest Products Prices (Appendix 4) - questionnaire information is heavily supplemented by sources such as national statistical yearbooks, field reports and specialized journals; and,

- Forest Products - Production and Trade - a questionnaire in hard copy and/or on computer diskettes.

Official Forest Products - Production and Trade questionnaires (Appendix I) are despatched by the FAO Forestry Department to all governments every year except for Europe where they are despatched from the FAO/ECE Timber Section in Geneva. In general, the addressees for questionnaires are the forestry authorities in member countries. In countries where FAO has had participants at its recent statistics seminars - now numbering 55 - the contacts are used as focal points due to their familiarity with FAO requirements - this has resulted in improved response rate for those countries. An experiment has been carried out to send the Forest products Production and Trade Questionnaire to countries in diskette using LOTUS 123 in order to receive data in computer readable form. The pilot trial has been undertaken since 1987 in all regions with success (see the paper feedback from participants at recent FAO Regional forestry statistics seminars).

Not all questionnaires are returned or are filled in fully or properly. Therefore, a large amount of data on production as well as trade has to be estimated or collected to supplement the official data. It may be noted that FAO is never certain whether its sources of questionnaire information have taken full account of production by private sector interests; this aspect can be easily cross-checked for pulp and paper and (in the past) for wood-based panels where FAO had direct contact also with industry.

Until FAO stopped sending them out, questionnaires for Wood-Based panels (Appendix 5) went out to industry associations and/or government agencies in all countries every three years on paper and/or LOTUS 123 diskette - in English, French, Spanish. Data on Tropical Timber Trade do not come from questionnaires but from trade returns supplied by statistical offices in corresponding countries and the African Timber Organization. For the Forest Products Direction of Trade Databank (under development) relies on Forest Products Trade Flows Questionnaires and on UN Statistical Office COMTRADE data subsequently computer-processed. Details of computer data manipulation and related manual cross-checking of validation will not be presented here.

Data processing

In general, processing of data involves more than merely accepting received data. Some control is applied to see that data are plausible or do not imply highly abnormal unit values or apparently impossible changes in a given year, etc. This work involves much judgement based on

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1. On average, 45 countries (mainly developed) return questionnaires on time, accounting for 90% of world capacity. Returns from developing countries on average cover 65% of their total capacity.

2. Even though publication is biennial.

3. For Europe, completed questionnaires are returned to the FAO/ECE Timber Section in Geneva where they are processed and results for a given year published by June in the year following; for the rest of the world, completed forms or diskettes are returned to FAO in Rome and results for a given year are ready for publication, generally by November in the year following. The gap between publication dates between Geneva and Rome permits some data for Europe to be revised and updated, hence a few cases of discrepancy exist between these two sources.
experience and in cases of doubt, alternative estimates or information is used. A guiding principle is that for the Yearbook of Forest Products no gaps should exist in the data series as this would make derivation of "totals" impossible. Therefore, where replies are not received, informed guesstimates must be used or (as is often done) the last received annual information data is repeated¹ and labelled as such.

Certain aspects of data collection and processing may be highlighted for comment:

- there has been improved response rate to questionnaires for countries where FAO has focal points. The use of diskettes also seems to lead to improved returns;

- for some countries, the difficulty of being sure (and of checking when unsure) whether data received truly cover all production/trade or if they report only government (or even forestry authority) figures;

- in the event of non-response to questionnaires, the problem remains of how to select substitute estimated data. The FAO tradition is to repeat the figure for the last year for which official data were received².

DISSEMINATING FAO FOREST PRODUCTS STATISTICS

FAO is owned by governments and they therefore have prior claim on its information; consequently, published information is distributed first to governments as a statutory obligation - a case of one assured "market".

Since 1985, some country dissemination is carried out through the same national focal points mentioned earlier who also receive FAO questionnaires and other requests for information. Other elements related to dissemination which may be highlighted include:

- FAO has not carried out a market survey of users of its information. Nor has it reviewed the efficacy of its dissemination channels or relative merit of its focus on its present range of publications in comparison to alternatives or complementary dissemination channels;

- from a "feel" for trends (which are not based on any proper market study), the relative importance of various users for statistics since 1945 could be as follows:
  * in the period until the mid 1970's: the main users were international agencies and their consultants (including FAO itself) in preparing baseline data and demand/supply studies for postwar planning and later for dimensioning assistance/investment in newly emerging countries. Governments in developed countries were important users for themselves but also as they sought to assist newly emerging countries;

  * between the mid-1970's and 1980's: the consulting industry which had grown rapidly in the post-independence era of developing countries continued to be even more important as the user of FAO data;

¹ Members of the working group may wish to exchange experiences on how they handle cases of missing data in their national statistics.

² Some have questioned the wisdom of this, especially where several alternative non-official sources offer plausible figures.
* since the 1980’s and even more after UNCED: concern for the environment has
drawn considerable attention to forestry with indications of increased interest in
statistics including on forest products from non-specialized audiences;

- An important user of FAO statistics is FAO itself. FAO is involved in international
perspective or outlook studies and uses much of its own statistics as a basis;

- Hard-copy publications1 of varying periodicity are the main means of dissemination FAO
statistical information; they are increasingly being complemented by electronic means.
Indicative volumes of distribution for selected examples of forest products publications and
computer medium stored data are as follows:

* **Yearbook of Forest Products** (1994 edition) - produced and distributed world wide2:
  # Hard copies 5500 copies
  # Magnetic tape:
    . Requested by 3 national organizations 15 copies
    . Requested by International Organizations 12 copies
  # AGROSTAT-PC diskettes:
    . Promotional use 100 copies
    . Official requests3 250 copies

  # Publication 16000 copies
  # Accompanying slides 100 copies

* **Pulp and Paper Capacity Survey**

* **Recovered Paper Survey**

* **Pulp and paper Towards 2010**
  # Publication 2500 copies
  # Accompanying slides 90 copies

* **Wood-based Panels Industries**

* **Forest Products Prices**

* **Monthly Bulletin - Tropical Forest Products in world timber trade**
  1500 copies

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1 A partial list of publications on statistics and related outlook studies is attached as Appendix 7.

2 The entire Forest Products Production and Trade database is also accessible by Internet through FAO’s WAICENT (World Agriculture Information Centre).

3 Distributed as follows: 48% to Europe and North America; 13% South America, 12% Asia, 4% Africa,4% Middle East)

4 A summary picture of the main forestry sector data on both forest resources and products using both basic and derived data and indicative forecasts.
TOPICS FOR DISCUSSION BY THE WORKING GROUP

The building-up of international statistics is a collaborative process and any result that FAO is able to present to its member countries and the broader international community depends for its quality, timeliness and overall reliability on the cooperation it receives from all its partners, both national and international.

Production and trade of forest products is not a monopoly of governments; indeed, in many countries, governments have little to do with it. Yet government officials are the main source of information for FAO. Given its inter-governmental nature, FAO will continue to rely on this channel for securing information and also for disseminating it. A major consideration is, therefore, how to ensure that it can at the same time secure proper coverage of the production and trade carried out by the private sector.

The points presented below for possible discussion are by no means exhaustive; they are grouped for convenience according to the topics suggested for attention by the task forces of the Working Group. The topics can be supplemented by others identified in many papers prepared by the experts at the Working Group.

Responding to user needs

It is an established part of modern thinking that organizations should be responsive to the "markets" they are set up to serve. If this principle is applied to FAO, several aspects would need to be considered in its work on forest products statistics. The Working Group may wish to advise, inter alia, on the following:

- what new products need to be covered systematically in mainstream statistics and which ones among those currently included should be de-emphasized;

- to what extent FAO should attempt to cover two significant areas which are currently relatively neglected: non-wood forest products and data on informal sector production (which can be quite important for certain commodities such as charcoal);

- to what extent and in what way to integrate the sustainability and environmental concerns highlighted by UNCED in forest products statistics¹;

- given that UNCED issues are of a popular nature, how to meet this new "market" in an inter-governmental organization setting;

- given rapidly changing access to modern information technologies, how best to diversify outreach to users, bearing in mind the need to avoid leaving behind those countries which lack capacity.

Quality improvement

A fundamental fact is that quality of international statistics is only as good as the original data received from countries. Therefore, quality improvement at international level is intimately linked

¹ Monitoring of wastepaper recovery could be one example; recording the volumes or ratios of traded commodities which meet sustainability certification standards could be another. The working group could suggest more and link this to systems of criteria and indicators for sustainable forest management.
to improving national capacity. Such national capacity development pre-supposes inherent interest by the countries in improving statistics; this cannot be taken for granted. The Working Group may wish to advise FAO on how it can assist member countries appreciate the importance of improved statistics for their own use, with data transfer to FAO being a secondary benefit. Specific elements related to quality improvement could include the following:

- how to maintain or to arrive at consistent standards and common definitions; priority topics could include resolving discrepancies between production categories for commodities and SITC rev 3 classifications in international trade as well as discrepancies among principal producer/consumer countries on classification of recovered paper;

- securing agreement on conversion coefficients which reflect varying country/ regional situations and technological evolution;

- how to reduce discrepancies in statistics of various international agencies.

**Capacity building**

Both the ability to respond to user needs and to improve quality are dependent on capacity building. In addition to what has been said above, the Working Group may wish to consider capacity building from two perspectives: (a) improving organizational arrangements and (b) strengthening capabilities (including upgrading of skills). The Working Group could include among the aspects of the latter the question of developing abilities to use modern technologies to collect, process and disseminate information and to use it.

Regarding organizational aspects, the capacity to effectively draw upon agencies other than forestry services which FAO mainly deals with could be an important area for Working Group attention.\(^1\) Similarly, the strengthening functions could require attention to the needs of agencies beyond the forestry services. The Working Group may wish to suggest priorities.

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\(^1\) At international level, FAO's ability to work with agencies other than in forestry has been demonstrated in the past through expert consultations and committees for Pulp and Paper and Wood Based Panels - heavily attended by industry. The possibility or need for similar arrangements for other aspects of forest products statistics.
### Appendix 1: FAO Yearbook of Forest Products - Questionnaire

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Unit X 1</th>
<th>Production Quantity</th>
<th>IMPORT Quantity</th>
<th>Value</th>
<th>EXPORT Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
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<td>CUM</td>
<td></td>
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\(^1\)Since 1989 "Industrial roundwood" has been changed in composition, see Annex 2 (contrast 1961-89 vs. 1990 and after).

\(^2\)In direction of trade data separated into "tropical" and "other".

\(^3\)In the direction of trade statistics, combined chips and particles and wood residues.

**Key:**
- XXX = This information is not requested.
- * = for these products, direction of trade statistics are produced by FAO.
Appendix 1 (Contd.)

FAO Yearbook of Forest Products

Questionnaire

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FAO Yearbook of Forest Products

Questionnaire

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Please note that the Yearbook also presents unit values but these are calculated and not derived from questionnaires.

* = Forest Products (overall total, by value)
FAO YEARBOOK OF FOREST PRODUCTS

DATA STRUCTURE

Legend:
C.: Coniferous
N.: Non-Coniferous
P.: Production
I.: Import
E.: Export

NOTE: The four digit number is the Forest Product Code.
Appendix 2 (Contd.)

1 ROUNDWOOD: Production 1961 onwards
Trade 1961-1989

Roundwood 1861 PIE
1862-1863 PIE
C 1862|N 1863
P--P--P--P--

Industrial Roundwood 1865 PIE
C 1866|N 1867
P--P--P--P--

Pulpwood + Particles 1870 PIE
C 1868|N 1869
P--P--P--P--

Other Ind. Roundwood 1871 PIE
C 1863|N 1864
P--P--P--P--

Pulpwood Round & Split 1874 PIE
C 1865|N 1866
P--P--P--P--

Chips & Particles 1869 PIE
C 1869|N 1870
P--P--P--P--

Wood Residues 1860 PIE
C 1860|N 1861
P--P--P--P--
Appendix 2 (Contd.)

1 ROUNDWOOD
Industrial Roundwood Trade: 1990 onwards

--- Diagram ---
Appendix 2 (Contd.)

2 PROCESSED WOOD AND PANELS PRODUCTS

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| C.1632|N.1633 | PIE---+PIE---+
Appendix 2 (Contd.)

3 PULP

Wood pulp
1875 PIE

Dissolving pulp
1667 PIE

Mechanical
1654 PIE

Semi-chemical
1655 PIE

Chemical
1656 PIE

Other fibre pulp
1668 PIE

Waste paper
1669 PIE

Unbleached Sulphate
1660 PIE

Bleached Sulphite
1661 PIE

Unbleached Sulphite
1662 PIE

Bleached Sulphite
1663 PIE
Appendix 2 (Contd.)

4 PAPER AND PAPERBOARD

```
+-------------------+
| Newsprint         |
| 1671 PIE          |
+-------------------+

+-------------------+
| Paper and         |
| Paperboard        |
| 1876 PIE          |
+-------------------+

+-------------------+
| Printing & Writing|
| 1674 PIE          |
+-------------------+

+-------------------+
| Other paper & PBD |
| 1675 PIE          |
+-------------------+

+-------------------+
| Household &       |
| sanitary          |
| 1676 PIE          |
+-------------------+

+-------------------+
| Wrap.ing & Pack.ing |
| 1681 PIE          |
+-------------------+

+-------------------+
| Other NES         |
| 1683 PIE          |
+-------------------+
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Appendix 2 (Contd.)

Derived data

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### Appendix 3: FAO Pulp, Paper and Paperboard Capacity Survey: questionnaire

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</tr>
<tr>
<td>2.4 PULP OF OTHER FIBRE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 DISSOLVING PULP: WOOD+OTHER RAW MATERIALS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 NON-CONIFEROUS DISSOLVING PULP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2 CONIFEROUS DISSOLVING PULP</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1000 METRIC TONS (AIR DRY) PER YEAR
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>PAPER AND PAPERBOARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>NEWSPRINT</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4.2</td>
<td>OTHER PRINTING AND WRITING PAPER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2.1</td>
<td>COATED PRINTING AND WRITING PAPER</td>
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</tr>
<tr>
<td>4.2.11</td>
<td>COATED WOOD CONTAINING PRINTING &amp; WRITING PAPER</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>4.2.2</td>
<td>UNCOATED PRINTING AND WRITING PAPER</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.2.21</td>
<td>UNCOATED WOOD CONTAINING PRINTING &amp; WRITING PAPER</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4.2.22</td>
<td>UNCOATED WOODFREE PRINTING &amp; WRIT PAPER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>OTHER PAPER AND PAPERBOARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.1</td>
<td>HOUSEHOLD AND SANITARY PAPER</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4.3.2</td>
<td>WRAPPING AND PACKAGING PAPER AND BOARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.2.1</td>
<td>LINENBOARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.2.11</td>
<td>KRAFT LINER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.2.111</td>
<td>UNBLEACHED KRAFT LINER</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>4.3.2.112</td>
<td>BLEDAKH KRAFT LINER</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.2.12</td>
<td>OTHER LINENBOARD</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.3.2.2</td>
<td>FLUTING MEDIUM</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.3.2.21</td>
<td>SEMI-CHEMICAL FLUTING MEDIUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.2.22</td>
<td>OTHER FLUTING MEDIUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.3</td>
<td>KRAFT WRAPPING AND PACKAGING</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.3.3.1</td>
<td>SACK KRAFT</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4.3.3.22</td>
<td>OTHER KRAFT WRAPPING AND PACKAGING</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.3.4</td>
<td>FOLDING BOXBOARD</td>
<td></td>
<td></td>
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</tr>
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<td>4.3.4.1</td>
<td>PULP BASED FOLDING BOXBOARD</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.3.4.11</td>
<td>BLEACHED CHEMICAL PULP FOLDING BOXBOARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.4.12</td>
<td>OTHER PULP BASED FOLDING BOXBOARD</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.3.4.2</td>
<td>RECOVERED PAPER BASED FOLDING BOXBOARD</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.3.5</td>
<td>OTHER PAPER AND PAPERBOARD N.E.S. TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.5.1</td>
<td>OTHER PAPER AND PAPERBOARD N.E.S. TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.5.2</td>
<td>OTHER PAPER AND PAPERBOARD N.E.S. TOTAL</td>
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</tr>
<tr>
<td>4.3.5.3</td>
<td>OTHER PAPER N.E.S.</td>
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<td></td>
</tr>
<tr>
<td>4.3.5.32</td>
<td>OTHER PAPER AND PAPERBOARD N.E.S. TOTAL</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**** Recovered Paper Pulp for Paper and Board
Appendix 4: Forest Product Prices

Model Data Sheet

For each series please provide the following information:

Name of the Country: __________________________ Office for Communication
Name of the Product: __________________________
Reference to publication: __________________________

Specification of the product: (See Annex I)
Type of Sale: __________________________
Location for price quoted: __________________________
Product Specification: __________________________
Current Unit: __________________________ Quantity Unit: __________________________
Price Series Frequency: (Annual, Monthly) __________________________

Please fill in the following price data sheet or attach a copy or a photocopy of the series specified. Please send your reply, before the 31st of August 1993, to the Forestry Dept. FAO-Rome.

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Prices</th>
<th>Year</th>
<th>Annual Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td></td>
<td>1983</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td></td>
<td>1984</td>
<td></td>
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<tr>
<td>1975</td>
<td></td>
<td>1985</td>
<td></td>
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<td>1976</td>
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<td>1986</td>
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<td>1977</td>
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<td>1987</td>
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<td>1978</td>
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<td>1988</td>
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<td>1979</td>
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<td>1989</td>
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<tr>
<td>1980</td>
<td></td>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td></td>
<td>1991</td>
<td></td>
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<tr>
<td>1982</td>
<td></td>
<td>1992</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1993 *)</td>
<td></td>
</tr>
</tbody>
</table>

*) If available
### FOREST PRODUCT PRICES

**Stumpage Fees/Royalties for Standing Timber**

In this data sheet please provide information on stumpage fees or royalties and any other forest taxes levied on the release of timber from the forest either for domestic processing or export. Indicate for the main tree species the value assessed by the Forest Authority and the year to which they refer. If the fees or royalties have changed during the years, please indicate the changes that have occurred, entering the values against the appropriate year shown.

If export taxes or duties are levied on exported logs, please indicate whether they are assessed as a percentage of the export value or at a fixed value per unit of volume providing us with a note of the detailed basis for such taxes.

<table>
<thead>
<tr>
<th>Name of the Country</th>
<th>Office for Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the Product</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Reference to publication</td>
<td>__________________________</td>
</tr>
</tbody>
</table>

**Specification of the product:** (See Annex I)

- **Type of Fee**: ________ (Royalty, Stumpage Fee, Export Tax etc.)
- **Location of Sale**: __________________________
- **Product Specification**: __________________________
- **Currency/Unit**: __________________________
- **Other relevant information**: __________________________

### Stumpage Fees/Royalties for Standing Timber

**Major Tree Species (To be indicated in the boxes below)**

<table>
<thead>
<tr>
<th>Species &gt;</th>
<th>For domestic processing</th>
<th></th>
<th>For export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1990</td>
<td></td>
<td></td>
<td></td>
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<td>1991</td>
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<td></td>
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<td>1992</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td></td>
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</tbody>
</table>

### Export Taxes Levied for Exported Logs

**Export Tax Values/m³**

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>
## FOREST PRODUCT PRICES - QUESTIONNAIRE
### SPECIFICATION OF SERIES

<table>
<thead>
<tr>
<th>PRODUCT GROUP</th>
<th>Possible differentiating characters for products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuelwood and charcoal</td>
<td>Coniferous, non-coniferous; major species or species group</td>
</tr>
<tr>
<td>Sawlogs and veneer logs</td>
<td>Coniferous, non-coniferous; major species or species group</td>
</tr>
<tr>
<td>Pulpwood</td>
<td>Roundwood, chips and particles, residues; coniferous, non-coniferous</td>
</tr>
<tr>
<td>Sawnwood</td>
<td>Coniferous, non-coniferous; major species or species group</td>
</tr>
<tr>
<td>Plywood</td>
<td>Regular, further processed</td>
</tr>
<tr>
<td>Particle board</td>
<td></td>
</tr>
<tr>
<td>Fibreboard</td>
<td>Hardboard, insulating board</td>
</tr>
<tr>
<td>Woodpulp</td>
<td>Mechanical, semi-chemical, chemical; sulphite, sulphate; bleached, unbleached, coniferous, non-coniferous</td>
</tr>
<tr>
<td>Paper and paperboard</td>
<td>Newsprint, other printing and writing; other paper and paperboard; wrapping and packaging; kraft liner, fluting, sack kraft, folding boxboard, household and sanitary</td>
</tr>
</tbody>
</table>

### SPECIFICATION

- **Type of sale**: Import, export, domestic; concession or stumpage sale for fee, royalty or duty, open market, regulated, annual contract
- **Location**: Standing, at stump, roadside, delivered to mill, at mill, wholesale, retail, f.o.b., c.i.f.
- **Product specification**: Dimensions, grade, species, degree of manufacture. For average prices the range of products included should be specified.
- **For price indices**: State base period. In the case of product price indices, state whether current. If a constant price index is given, indicate the series used in deflating.
- **Currency unit**: Name
- **Quantity unit**: If quantities are given in surface measure, please state average thickness. In the case of quantities reported by weight, please indicate converting factor to volume.
### Appendix 5: FAO World Survey of the Wood-based Panels Industries - Sample Questionnaire

<table>
<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Operating plants</th>
<th>Capacity</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. VENEER SHEETS</td>
<td></td>
<td>NO.</td>
<td>1000 CUM</td>
<td>1000 CUM</td>
</tr>
<tr>
<td>2. PLYWOOD</td>
<td></td>
<td>NO.</td>
<td>1000 CUM</td>
<td>1000 CUM</td>
</tr>
<tr>
<td>3. PARTICLE BOARD</td>
<td></td>
<td>NO.</td>
<td>1000 CUM</td>
<td>1000 CUM</td>
</tr>
<tr>
<td>4. FIBREBOARD</td>
<td></td>
<td>NO.</td>
<td>1000 CUM</td>
<td>1000 CUM</td>
</tr>
<tr>
<td>5. TOTAL WOOD-BASED PANELS</td>
<td></td>
<td>NO.</td>
<td>1000 CUM</td>
<td>1000 CUM</td>
</tr>
<tr>
<td>6. TYPICAL PLANT</td>
<td></td>
<td>NO.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Wood-based Panels**

- **Veneer Plywood Particle Fibreboard Sheets**

Return to: FAO, Forestry Department
Appendix 6: World Survey of the Wood-Based Panels Industries

\[\text{Veneer Sheets}\]
\[\text{Part. 6.1: Operating days/y}\]
\[\text{Part. 6.2: Shifts per day}\]

\[\text{Plywood}\]
\[\text{Part. 6.1: Operating days/y}\]
\[\text{Part. 6.2: Shifts per day}\]

\[\text{Total Wood-Based Panels}\]
\[\text{Part. 5.1: Operating days/y}\]
\[\text{Part. 5.2: Shifts per day}\]

\[\text{Particle Board}\]
\[\text{Part. 3.1: Operating days/y}\]
\[\text{Part. 3.2: Shifts per day}\]

\[\text{Fibreboard}\]
\[\text{Part. 4.1: Operating days/y}\]
\[\text{Part. 4.2: Shifts per day}\]

\[\text{Wood-Based}\]
\[\text{Part. 3.1: Operating days/y}\]
\[\text{Part. 3.2: Shifts per day}\]

\[\text{Non-Wood-Based}\]
\[\text{Part. 3.2: Operating days/y}\]
\[\text{Part. 3.3: Shifts per day}\]

\[\text{Hardboard and Medium Hardboard}\]
\[\text{Part. 6.1: Operating days/y}\]
\[\text{Part. 6.2: Shifts per day}\]

\[\text{Insulation Board (non-c.)}\]
\[\text{Part. 4.1: Operating days/y}\]
\[\text{Part. 4.2: Shifts per day}\]
\[\text{Part. 4.3: Shifts per day}\]
Appendix 7: List of FAO and ECE Forestry Outlook Studies, Economic and Statistical Publications

Production, Trade and Capacity Statistics

European Timber Statistics 1913-1950 (Geneva, 1952)

FAO Yearbook of Forest Products
  Annual 1945-present
  10-year supplements 1956, 1964
  Country tables 1975, 1982
  AGROSTAT, AGROSTAT PC covers data 1961-present in computer-readable form

FAO/ECE Timber Bulletin for Europe


Pulp and Paper Capacities (Annual) 1959 - present

World Production Capacities Plywood, Particleboard and Fibreboard, 1970 - present (Periodic)

Forest Products Prices 1960 - present (Periodic with country data)

FAO Quarterly Bulletin of Statistics - price series of international significance (Quarterly)


Forest Resource Statistics

World Forest Resources (FAO 1948)

World Forest Resources (FAO 1955)

World Forest Inventory 1958 (FAO 1960)

World Forest Inventory 1963 (FAO 1965)

Forest Resources in the European Region (FAO 1976)

Forest Resources in the Asia and Far East Region (FAO 1976)
Tropical Forest Resources (FAO 1982)

Forest Resources of the ECE Region (UN/FAO 1985)

Forest Resources 1980 (FAO 1985)

Forest Resources of the Temperate Zones (UN/ECE/FAO NY 1992)


Forest Resources Assessment 1990 - Non-tropical Developing Countries, Mediterranean Region (FAO 1994)

The Forest Resources of The Temperate Zones (Forest resources information of some newly constituted countries), Supplement to The UN-ECE/FAO 1990 Forest Resource Assessment (UN/ECE/FAO 1994)

Reviews

FAO State of Food and Agriculture
- Forestry (Annual)
- Special Chapters:
  1962 - The role of forest industries in the attack on economic underdevelopment
  1979 - Forestry and rural development
  1994 - Forest development and policy dilemmas

FAO Commodity Review
- Forest Products (Annual)

Outlook Studies - Regional and World

Forestry and Forest Products - World Situation, 1937-46

European Timber Trends and Prospects (UN/FAO 1953)

Timber Trends and Prospects in the Asia-Pacific Region (UN/FAO 1961)

Latin American Timber Trends and Prospects (UN/FAO 1963)

European Timber Trends and Prospects 1950-1975 (UN/FAO 1964)

Timber Trends and Prospects in Africa (UN/FAO 1967)

Wood World Trends and Prospects (FAO 1967)

Provisional Indicative World Plan for Agricultural Development (FAO 1970)

Trends in Production, Trade and Consumption of Forest Products in Latin America (FAO 1976)

Development and Forest Resources in the Asia and Far East Region (FAO 1976)


Projections of Consumption of Industrial Forest Products (FAO 1978)

Agriculture Towards 2000 (FAO 1981)

World Forest Products Demand and Supply (FAO 1982)

Forest Products World Outlook - Projections to 2000 (FAO 1986) FP 73

European Timber Trends and Prospects to the Year 2000 and Beyond, FAO/ECE, UN 1986

Forest Products World Outlook - Projections 1987-2000 (FAO 1988) FP 84 (with country data)

Agriculture Towards 2010 (FAO 1993)

**Sector Studies**

- **Pulp and Paper**
  
  World Pulp and Paper Resources and Prospects (UN/FAO 1954)
  
  World Demand for Paper to 1975 (FAO 1960)
  
  Outlook for Pulp and Paper Consumption and Trade (FAO 1960)
  
  World Pulp and Paper Demand and Supply (FAO 1977)
  
  The Outlook for Pulp and Paper to 1995 (FAO 1986)
  
  

- **Wood-Based Panels**
  
  Fibreboard and Particle Board (UN/FAO 1957)
  
  Plywood and Other Wood-Based Panels (FAO 1966)
World Consultation Wood-Based Panels (FAO/Miller Freeman 1976)

Reappraisal of the Outlook for Production, Consumption and Trade in Wood-Based Panels (FAO 1977)

World Outlook for Forest Products Consumption and Supply with Emphasis on Panel Products (FAO 1987)

**Standardization**

Classification and Definitions of Forest Products (FAO 1982)

Toward a Common Framework for World Forest Resource Assessment (FAO 1989)

**Special**

Forestry Statistics Today For Tomorrow (FAO 1991)

Forestry Statistics Today For Tomorrow (FAO 1993)

**Statistical Seminars**

Forestry Statistics - Asia-Pacific Region, December 1984 (FAO/RAPA, Bangkok 1985)


Seminario de estadísticas forestales para América Latina y el Caribe, April 1993 (FAO/RLAT, Santiago 1993)

**Miscellaneous**


FAO’s System for World Outlook Projections of Forest Products, B.Miche/P.Wardle/M.Martin (FAO 1991)


What does Fuelwood really cost, P.Wardle/M.Palmieri, UNASYLVA #131 (FAO 1981)
FAO REGIONAL SEMINARS ON FORESTRY STATISTICS

by Felice Padovani
Planning and Statistics Branch, FAO Forestry Policy and Planning Division

FAO has, in the past, organized the following regional seminars on forestry statistics, with focus on forest products: Asia Pacific Region, for English-speaking participants, Thailand, Bangkok, in 1984 and 1990; Africa, for English-speaking participants, Malawi, Blantyre, in 1989; Africa, for French-speaking participants, Senegal, Thiès, in 1991; and Latin America, for Spanish-speaking participants, Chile, Santiago, in 1993.

Attendance at the regional seminars is reported in Appendix 1.

OBJECTIVES AND SCOPE

The aim of the seminars was to examine the collection and dissemination of statistics on the forestry sector in the countries of each region, to exchange information on methods and standards, to identify problem areas and to discuss approaches to overcome these problems. The international exchange of information and consideration of the organizational arrangements for supporting forestry statistical work was an underlying theme.

The seminars considered the collection of forestry sector statistics, their role in planning and the organization to collect, process and disseminate relevant forestry statistical information. Each participating country presented a brief describing the state of forestry statistics in their countries. The discussion concentrated on four main aspects of forestry statistics, namely: fuelwood; non-wood forest products; production and trade in forest products; and role of computers.

MAIN RESULTS

Only extracts or conclusions and recommendations of the four most recent seminars are given (Appendix 2). Several points can be highlighted:

- The importance of a "national focal point" was recognized in relation to international forestry statistics exchange. Every year FAO/Forestry Department sends to the "national focal point" who participated in the seminars, questionnaires in computer-readable form of FAO enquiries (Yearbook of Forest Products, Forest Products Prices; Wood-Based Panels). FAO also sends to focal points forestry statistical data for the rest of the world, on magnetic tapes and/or floppy disks as well as on printed forms for use and dissemination within their countries.

- An important result of contacts made at the seminars is that subsequent data exchange in computer-readable form has improved greatly relative to countries which have not participated. For the Asia Pacific Region, an average of 10 countries out of 16 (62 percent) countries represented at the seminar send their reply. In Africa, the average is 7 countries out of 14 (50 percent) from the Malawi seminar and 13 countries out of 17 (76 percent) from the Senegal seminar. In Latin America, the average is 18 countries out of 19 (95 percent) from the Chile seminar.
Given this impact for the countries participating in the seminars, it is planned to hold similar events for the remaining countries of the above regions as well as for the Caribbean countries, Middle East and countries of the Pacific Islands.

Some countries have shown interest in developing national forestry statistics seminars.

CONCLUSION

The seminars held so far have been invaluable in providing an opportunity for contact between forestry statisticians. They have generated recommendations on strengthening the organization and staffing of national forestry statistics units and on the development of international networks to bring support to small national groups through contact from outside. They have also generated valuable discussion on many technical aspects of forestry statistics collection.
Appendix 1: Participation in the FAO Regional Forestry Statistics Seminars

AFRICA

(a) **Malawi, 12-25 November 1989** - (25 participants from 14 countries):

Botswana, Ghana, Kenya, Lesotho, Liberia, Malawi, Mozambique, Nigeria, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe, together with Representatives of the African Timber Organization (ATO), the Southern African Development Coordination Committee (SADCC), Forestry Secretariat and the World Bank.

(b) **Senegal, 11-22 November 1991** - (30 participants from 17 countries):


ASIA PACIFIC REGION

(a) **Thailand, 3-7 December 1984** - (11 participants from 11 countries):

Bangladesh, Fiji, India, Indonesia, Republic of Korea, Malaysia, Pakistan, Papua New Guinea, Philippines, Sri Lanka and Thailand.

(b) **Thailand, 29 October-2 November 1990** - (21 participants from 16 countries):

Bangladesh, China, Fiji, India, Indonesia, Republic of Korea, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka and Thailand.

LATIN AMERICA

**Chile, 19-30 April 1993** - (20 participants from 19 countries):

Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, Venezuela.
Appendix 2: Extracts from the Reports of the FAO Regional Seminars on Forestry Statistics

REPORT OF THE SEMINAR ON FORESTRY STATISTICS IN AFRICA
(Blantyre, Malawi, 12-25 November 1989)

The seminar adopted the following recommendations which are addressed to national governments and forest authorities, to FAO and the FAO African Forestry and Wildlife Commission, and to International and Intergovernmental Agencies concerned with the forestry sector in Africa for their careful consideration:

Institutions

Being aware of, and considering the important role that adequate and correct information and statistics play in sector and national planning and in facilitating international co-operation, the following recommendations are made:

It is advised and recommended to the national governments and national institutions concerned with assembly of forestry related information and statistical data to undertake measures to strengthen the country's capability in data collection, analysis, storage and dissemination through:

(i) establishment of a central forest products and resources statistical unit;
(ii) provision of the statistical unit with adequate tools for information and statistics gathering and analysis;
(iii) organization of training courses, seminars and workshops for forestry statistics personnel of all cadres.

It is recommended that the African forestry sector undertake the establishment of a regional forestry information and statistical expert Committee with mandate to hold periodic meetings to

(i) review and update information and statistics on forestry resources, industry, production, marketing and trade;
(ii) on the basis of such a review, assist national statistical units in the performance of their tasks;
(iii) formulate programmes and mechanisms for improving forest products classification and standardization in production, marketing, trade and pricing.

In the establishment and implementation of the statistical experts committee recommended above, technical and material assistance of the international community, and specifically FAO and other UN Agencies and existing regional organizations should be sought and enlisted.

An objective would be the development of a system to facilitate the periodic exchange of forestry related information and statistics between Member African Countries, through networks and periodic bulletins and newsletters.

To achieve coordination of national statistics on the sector, it is recommended that National Forestry Departments be responsible for forestry data collection, analysis and dissemination of data.
National forestry statistics should be published annually on a regular and timely basis.

To improve coverage and reliability, it is recommended that countries explore possibilities of legislation that would make Forestry Departments in the country a mandatory depository and to coordinate information from private and public entities, and empowering the department to deploy methods it deems necessary to acquire such information.

**Fuelwood**

In view of the major importance of fuelwood and charcoal in their economies, it is strongly recommended that Governments give adequate priority to the survey of fuelwood and charcoal essential to support their energy and forestry planning.

FAO should take an active role in the promotion of the capabilities of each participating country to carry out its own wood fuel surveys. This should be done by promoting technical and financial support for establishing appropriate statistical units within Forestry Departments and in the context of surveys.

Due to the complexity and many practical problems encountered in wood fuel surveys, the seminar recommends that FAO take the initiative to publish a very practical guide to designing and carrying out a wood fuel survey, with particular emphasis on sample design and measurement techniques.

**Use of computers**

In view of the immense value of computers in advancing capability in collecting, storing, processing and disseminating statistical data, countries are urged to give full consideration in the development of forestry statistical services to appropriate investment in computer hardware and software. The seminar recommended that FAO give priority to assistance in the design of computer facilities and the mobilization of financial and technical support.

The seminar emphasized the importance of training and recommended that FAO and other development agencies include support to training forestry statistics personnel in the use of computers for data processing and analysis.

The maintenance and expansion of direct communication using computer-readable media, between country experts and FAO and regional organizations involved in exchange of forestry statistics was strongly supported.

**Production and trade statistics**

To facilitate clarity and comparability in data classification, analysis, presentation and interpretation, it is recommended that further efforts be made at the international level to eliminate use of different definitions, classification and different units of measurement so that country information will be more easily comparable. Particular attention should be given to the clear definition of fuelwood and charcoal and other industrial round wood used in the unprocessed form.

It is recommended that countries give high priority in their statistical programmes to the collection and dissemination of price statistics, essential to national policy and planning relating to forest products as well as to sound management, and investment decision making in the forestry sector.
International exchange

The seminar strongly supported the FAO programme on the collection and dissemination of forestry statistics and all efforts to improve effective contact with national forestry statistics units to ensure timely exchange of the most accurate information on the sector. The seminar recommended the extension and strengthening of this exchange to include regional organizations such as ATO, SADCC and PTA and national forestry statistical organizations in the development of an active network for communication between statistical experts, in countries, regional organizations and FAO.
REPORT OF THE FAO SEMINAR ON FORESTRY STATISTICS IN ASIA AND PACIFIC
(Bangkok, Thailand, 29 October - 2 November 1990)

The aim of the seminar was to examine the collection and dissemination of statistics on the forestry sector in the countries of the Asia-Pacific Region, to exchange information on methods and standards, to identify problem areas and to discuss approaches to overcoming these problems. The seminar prepared recommendations on several aspects for consideration by FAO, the Asia-Pacific Forestry Commission and the Governments of countries of the region.

Fuelwood statistics

The seminar recommended that:

(i) The term fuelwood be defined to cover firewood and wood for charcoal. It should include fuelwood from main stem and branches and other tree biomass - tops, twigs, stumps, roots, bark and leaves used for fuel.

(ii) All fuelwood statistics should be expressed in "solid" volume of cubic metres, instead of number, weight and "stacked" volume. Each country should convert its estimates of fuelwood production to solid cubic metres, using the most accurate local conversion factors available. The specific country conversion factors used should also be mentioned by the reporters. Wood for charcoal should be reported in "solid" wood-equivalent form of cubic metres. Charcoal should be reported in weight units - metric tons.

(iii) Fuelwood statistics should be expressed in two lines - one for recorded (traded) production (mainly stem wood and branches from forest reserves) and the other for unrecorded (untraded) production, which will include estimates of all other tree biomass from reserved forest and all fuelwood from private trees.

(iv) Fuelwood demand (consumption) and supply surveys should be carried out in fuelwood-deficit countries. This is an area where collaboration with international organizations such as FAO is appropriate. In particular the seminar noted the relevance of the work of the Regional Wood Energy Development Programme - GCP/RAS/131/NET in consultation with FAO.

(v) FAO should also prepare a new manual on fuelwood consumption sample surveys, based upon past experience in various regions of the world. The surveys should be carried out periodically to monitor the surplus-deficit balance of fuelwood supply. These studies may be combined with census-survey teams or forestry extension service teams or other socio-economic survey teams so as to make the surveys time and cost-efficient within the required precision frame.

(vi) In order to obtain a comprehensive national coverage of all production and use of fuelwood, particularly outside reserve forests fuelwood must be integrated in the mainstream of energy statistics. Forestry organizations should initiate collaboration with other concerned agencies, such as energy planning, agricultural and rural development agencies, to conduct surveys and coordinate the assembly of comprehensive statistics.
Non-wood forest products

The seminar recommended adoption of the following broad definition "Non-wood forest products are the products other than timber, fuelwood, charcoal and wood used for handicrafts, derived from forests or trees or cultivated or existing forest land or derived from trees outside the forest. They include products such as root, bark, leaves, flowers, fruit, seeds, floss, extracts, gum, resin, lac, grass, wild honey, canes, bamboo, medicinal and aromatic plants, wildlife products, etc.". This definition excludes products mainly cultivated outside the forest which are normally included among agricultural products such as honey, rubber and oil palm. Nor does this definition attempt to embrace the very important production of grass and forage from trees for livestock while this may be a significant service function of the forest. The definition is confined to the direct non-wood products of the forest and, while recognising their importance, it does not include the indirect benefits from services of the forest such as soil and water conservation or recreation. Finally it excludes minerals extracted from forest land.

The need to protect and promote non-wood forest resources within the prevalent planning system, has to be supported by a strong data base, which is currently lacking. At present, only items in the commercial circuit are reflected in statistics, while non-wood forest products utilized outside this sphere are unaccounted for. Their contribution to national GNP should also find a place in our systems of accounting. The seminar recommends that surveys be carried out to assess the contribution of NWFP.

The seminar strongly urged FAO not only to be the agency for collection and compilation of data at the international level, but to be the focal point in generating interest in the member countries.

The seminar appreciated the value of the forests in soil and moisture conservation, mitigating the greenhouse effect, production of oxygen, promotion of tourism and other recreational values but, in the absence of methodologies for quantifying and evaluating their values, limit the recommendation only to tangible non-wood forest products.

The seminar further noted that, considering the great value of non-wood forest products, which should be highlighted, FAO has been organizing a seminar on this subject in the region in 1991. It recommended that survey and assessment of non-wood forest products should be a subject on the agenda of that meeting.

Forest products

The seminar emphasized the importance of collecting comprehensive statistics on the production and trade in forest products including both roundwood and primary manufactures. This data is essential for forestry or forest industry planning and monitoring for decision-making at many levels in the sector.

In this context, it was recommended that countries aim to ensure that comprehensive information is secured on production and trade in the following main areas:

- Roundwood (subdivided between industrial roundwood and fuelwood)
- Sawnwood
- Wood-based panels
- Pulp and paper
It was *recommended* that countries adopt standard structure and definition in collecting and reporting this data. The seminar examined the structure and definitions of data as reported by FAO in the yearbook of forest products and *recommended* that these should be followed in national production and trade statistics for the sector.

It was *recommended* that, in countries which record data on a fiscal year, data should be converted to the calendar year for international reporting or the fiscal year data will have to be taken as the best estimate of calendar year magnitude.

It was *recommended* that countries follow the example of several countries participating in the seminar and develop an annual publication forestry, forest industry and forest products trade statistics.

The seminar emphasised the need to assemble comprehensive coverage of forest production and trade statistics. This is an important need for national forest sector planning in order to ensure that a comprehensive picture of the activities of the sector is available. In many countries this requires that the statistics collected by the forestry ministry, by industry and by the trade ministry be brought together. It is considered that this should be done by the office responsible for national planning for the forestry sector in the Forestry Ministry and the necessary linkages should be established to ensure that this is achieved.

The seminar strongly supported the international collection and dissemination of forestry statistics by FAO. It was *recommended* that the linkage between the countries and FAO to achieve this should be strengthened. The seminar *recommended* the development of a network of correspondents made up of the offices responsible for forest sector statistics with direct communication of questionnaires and publications in parallel with communication through official channels.

Concerning units of measurement the seminar stressed the importance of clear designation of units and careful use of conversion factors in converting from local measurement units to standard volume and weight units. The international standard units are cubic metres and metric tons. Where quantities of panel products are stated in surface area units the, must he converted to volume in accordance with thickness. It they are not converted the thickness must be stated.

The seminar *recommended* that forest products price series should be collected on a regular basis maintaining consistent specifications and locations. The series should be selected to represent major species and grades produced. Series should also be included covering specialised species such as ebony, teak and sandalwood. It was desirable that international series show both national currency and US Dollar prices.

The seminar recognised that in many area of forestry statistics only partial coverage could be obtained from regularly maintained records. Important parts of the productive activity goes on in small enterprises and households which may not keep regular records and which do not report on a regular basis. It is important that coverage of this part of production is included in national statistics. As far as possible non-recorded production should be measured by periodic sample surveys and estimates should be maintained. It is *recommended* that in national statistics separate data should be shown as follows:

<table>
<thead>
<tr>
<th>Recorded production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated production</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Computers

Data Collection, Exchange and Reporting

The seminar requested that the FAO Forestry Statistics Questionnaires should be addressed to the national focal point well in advance of the deadline. The distribution of questionnaires with a floppy diskette was supported.

The seminar also recognized the importance of exchanges of data between member countries. Exchanges in computer-readable form may greatly facilitate this process. In this connection, the Group encouraged FAO to take the lead in adopting widely available software in a standard format in order to achieve effective exchange among participating countries.

In distributing questionnaires, surveys and statistics, the seminar recommended FAO to bear in mind the following strategies:

- Framework and definitions should be clear, concise and unambiguous.
- Data should be provided for the users' needs.
- Issuance of yearbooks should be timely and disseminated widely.

Other Recommendations to FAO

In order to facilitate the development and improve the effectiveness of national forestry statistics units, FAO should assist countries in installing appropriate computer hardware and software.

The seminar emphasized the importance of training of staff at all levels. In many countries, training of operators can be achieved by their own effort on the job. It is, however, recognized that training of programmers is a much more difficult task. In this regard, FAO should give priority to supporting the training of programmers.

The participants particularly expressed their appreciation of the opportunity to review progress and exchange experience and ideas provided by the seminar. The seminar recommended that this kind of exchange should be fostered through the maintenance of regular communications between member countries and that meetings with this purpose should be held on a regular basis.
REPORT OF THE FAO SEMINAR ON FORESTRY STATISTICS IN AFRICA
(Thies, Senegal, 11-22 November 1991)

Recommendations

The following recommendations, adopted on the basis of country reports, discussion during the seminar and the conclusions of the Working Parties, are addressed to national governments and forestry authorities, FAO and FAO’s African Forestry Commission, and international and intergovernmental agencies working in the African forestry sector.

It is recommended that governments act to reinforce the national capability for statistical data collection, analysis, storage and dissemination in the following ways:

(i) establish a statistical clearing-house for forest products and resources;

(ii) equip this service with the resources to collect and analyze statistical data, and to do efficient and well-organized work. High priority should be given to baseline data on production and marketing in the informal sector.

(iii) training qualified staff in the design and implementation of a forestry statistics system should also be a priority. This would call for specific projects to reinforce national capabilities: training courses; seminars and workshops on forestry statistics for all levels of staff.

It is recommended that the African forestry sector form a regional committee of experts on forestry statistics and data. Its mandate would be to hold regular meetings to:

(i) review and update statistical data on forest resources, forest industries, production, marketing and world trade;

(ii) based on this review, assist national statistical services in the performance of their duties;

(iii) devise programmes and mechanisms to improve the classification and standardization of forest products from the standpoint of production, marketing, world trade and pricing.

To establish the experts’ committee and implement the above recommendation, material and technical assistance should be sought from the international community, and more specifically from FAO and other UN organizations, as from existing regional organizations.

One objective would be to come up with a system for the periodic exchange of forestry statistics and data through the establishment of networks and the publication of periodicals (bulletins and information circulars).

It is recommended that national forestry departments be given the responsibility of data collection, analysis and dissemination so as to ensure coordination in national forestry statistics. Close linkage should be set up between the national department and the planning services responsible for coordinating statistical data from public and private organizations, so that the national department can act to retrieve the necessary data.
To facilitate horizontal cooperation and for better circulation and utilization of national forestry statistics, it is recommended that representatives of the government services and of private organizations working in the sector meet regularly.

National forestry statistics should be published on schedule once a year.

**Fuelwood**

Fuelwood and charcoal are highly important to national economies, and so it is strongly recommended that governments give priority to surveys covering these commodities which are essential to energy and forestry planning. FAO should take an active role in reinforcing individual participating country capability to conduct national fuelwood surveys. This should include ensuring that technical and financial support is provided for the establishment of workable statistical services in the forestry department, and support for surveys.

The problems of fuelwood surveys are complex and the practical difficulties many: it is recommended that FAO take the initiative of publishing a down-to-earth guide on how to design and conduct a fuelwood survey, stressing sample design and measurement techniques.

**Non-wood forest products**

Despite the importance and contribution of non-wood forest products to African economies, the relevant data is still incomplete or even non-existent in most countries. Stress was laid on the important role of forestry statistical officers in the countries in systematically collecting and disseminating reliable data on the supply and demand for non-wood forest products.

**Use of computers**

The seminar recommended that FAO give priority to computer systems and financial and technical support for them, given the immense potential of such systems to expand statistical data collection, storage, processing and dissemination capacity. Countries endeavouring to develop their forestry statistics services are urgently requested to give all due consideration to possibly investing in the necessary hardware and software.

The seminar strongly encouraged the use of computers to maintain and reinforce direct communication among national experts, FAO, and the regional organizations participating in the exchange of forestry statistics.

**World trade and production statistics**

For greater clarity and ease of data classification, analysis, presentation and interpretation, it is recommended that international efforts be redoubled to harmonize the definitions, classifications and units of measure, thus making it easier to compare data from the different countries. The definition of fuelwood and charcoal should be particularly clear, as should other types of unprocessed industrial roundwood.

It would be advisable for each country to standardize statistical data collection and compilation methods. FAO could support the standardization process by extending standard classifications and definitions, and preparing clear guidelines for the collection of forestry statistics.
It is recommended that national statistical programmes give high priority to the collection and dissemination of price statistics, which are vital to national policy and planning on forest products and to rational management and investment decisions in the forestry sector.

**International exchange of statistical data**

The seminar strongly supported FAO’s forestry statistics collection and dissemination programme and all efforts to enhance contact with the national forestry statistics services, thus ensuring the timely exchange of the most accurate possible data on the forestry sector. It recommended the expansion and intensification of such exchanges, calling upon regional organizations such as the African Timber Organization (ATO), the Southern African Development Coordination Conference (SADCC) and the Preferential Trade Area for Eastern and Southern African States (PTA), and national organizations working in forestry statistics, so as to create an active communication network among country forestry statistics experts and those in the regional organizations and in FAO.
REPORT OF THE FAO SEMINAR ON FORESTRY STATISTICS IN LATIN AMERICA AND THE CARIBBEAN
Santiago, Chile, 19 - 30 April 1993

The aim of the seminar was to examine the collection and dissemination of statistics on the forestry sector in the countries of Latin America, to exchange information on methods and standards, to identify problem areas and to discuss approaches to overcoming these problems. The seminar prepared *recommendations* on specific aspects for consideration by FAO and the Governments of countries of the Region.

**Recommendations on fuelwood and charcoal statistics**

**Addressed to FAO**

Promote campaigns to enhance government awareness of the importance of data on new and renewable sources of energy, particularly fuelwood and charcoal.

Present a separate breakdown of data for fuelwood and charcoal production, trade and consumption.

Strengthen and promote the region's forestry and statistical systems, integrating them with the Regional Technical Cooperation Network on Dendroenergy, so as to provide bibliographic data, analytical methodologies and support material.

Promote the designation of the National Forestry Service in each country as the agency responsible for forestry statistical data collection and processing and, where no such service exists, promote its establishment.

Disseminate bibliographic data and information on fuelwood and charcoal to seminar participants.

Include data on charcoal prices in statistical publications.

**Addressed to countries**

Quantify the growth rate of the various fuelwood-producing vegetation types.

Seek mechanisms to integrate the forestry and statistical systems with the Latin American Organization for Dendroenergy (OLADE), both to request information on completed work and progress, and to offer support for both fuelwood and charcoal data.

 Undertake studies on fuelwood consumption methods, and on systems to improve fuelwood efficiency.

For both existing and future statistical systems, define parameters for the future prospects for and systematic review of these energy sources.

Analyze the potential use for wastes generated by forest industries, from harvesting to finished product.

Integrate data on charcoal and fuelwood into country planning, particularly in the energy sector.
Recommendations on non-wood products statistics

General

Define and identify non-wood forest products; classify these products by raw material and intended use; define measurement systems for non-wood forest products; standardize data collection for comparison of regional data; and identify the most promising national-level data collection areas.

Addressed to FAO

Promote campaigns to raise awareness of the importance and value to countries of data on non-wood forest products.

Establish a Latin American network for non-wood forest products to supply bibliographic data, support material and research methodologies for countries in the region.

Promote the official designation of the National Forestry Service in each country as the agency responsible for collection, processing and dissemination of statistical data on non-wood forest products, and, where no such service exists, promote its establishment.

Prepare a triennial survey on non-wood forest products for all countries similar to the annual survey for wood products.

Addressed to seminar participants

Prior to the official establishment of a Latin American Network on Non-wood Forest Products, act as promoters and liaison agents for the exchange of information on non-wood forest products in the region.

Review the desirable periodicity of the collection, analysis and dissemination of data on these products, and promote standardization of same throughout the region.

Conclusions and recommendations - the modern sector

Most countries are requesting national and international support for the implementation of systems and methodologies for forestry statistical data collection, processing and publication. The countries are generally requesting support from Chambers of Commerce and private forestry sector institutions for the development of their programmes. There is also a major demand for technical training, financial support and computer facilities to guarantee a continuous flow of information-requests are now being addressed to international agencies for this.

The amount of available information on production and trade is high at 90 percent, but the data quality is considered unsatisfactory.

Price data more reliable than the production and trade data mentioned above exist in over half the countries.

Total installed capacity is recorded for most countries and consistency is, in general, acceptable.
Generally speaking, there is demand for information in all countries, but also for integrated and internationally comparable, country-specific data with standard definitions, concepts and criteria for classification and methodology, clearly specifying all variables utilized.

It is recommended that measurement units and conversion factors be standardized through adoption of the metric system.

It is fundamentally important for official statistics to be planned, coordinated and executed in cooperation with Chambers of Commerce, business and industry. The private sector should participate in both work and cooperation so as to enhance data collection.

Where countries so wish, specialized data collection centres might be established.

There was general agreement on the need for cooperation from the international agencies, as from countries having already implemented integrated data systems, and thus in a position to share their experience and technology.

It is generally recommended that data quality be enhanced through control mechanisms based on guidelines to validate data and backed by staff trained in field work and data analysis.

It is suggested that foresters work with the statistical services for an interdisciplinary approach.

To achieve the proposed objectives will require training of technical staff, additional investment for hardware and software, higher operating budgets and perhaps office equipment. This will require bilateral or multilateral financial assistance.

International and regional exchanges of industrial information should be promoted in Latin America and the Caribbean.

Lastly, it is considered essential to utilize the appropriate strategic planning mechanisms to ensure continuous feedback from the information system. This is basic for development, and for the supply of timely, accurate information for decision-making in the sector.

Conclusions and recommendations - computers

Some interesting hardware and software packages for developing forestry statistical systems are currently under-utilized (Lotus 1-2-3, WP, DBASE). Most countries in the area have some kind of IBM or IBM-compatible computers. Forestry information networks are few, but access to other networks in other sectors, particularly agriculture and associated natural resources, is possible.

The software used in the Region is considered sufficient for the implementation of forestry databases. With the proper training, standardization and official recognition of the importance of forestry statistics, forestry sector data systems in the region can certainly be improved.

There is a lack of specifically trained staff to develop specific forestry data processing systems, even at the user level.

It is suggested that FAO and other international and/or national organizations implement a specialized training programme in forestry data management for professional foresters and similar staff in order to equalize capacities and generate a human resource base for national forestry statistics.
The countries in the region must boost the material, financial and human resources earmarked for forestry statistics.

There must be tighter linkage between the institutions generating forestry statistics, to ensure more coherent, credible, accessible and readable data for all possible users.

The countries in the region should each take steps to establish a national centre for forestry statistics.

It is recommended that countries work towards integration within an international telecommunications network to allow the exchange of forestry statistics and data.

**General recommendations**

It is recommended that the national focal point be located within an organization; the focal point should be someone active who can ensure full coverage of forestry sector statistics. This "home" organization of the focal point should be one that the national development agencies give priority to forestry statistics and to supporting country development through the Tropical Forestry Action Plan (TFAP), national projects, regional networks and the regional and international work of FAO.
THE ITTO STATISTICAL SYSTEM - THE COLLECTION, ANALYSIS AND DISSEMINATION OF TROPICAL FORESTRY STATISTICS

by Steven Johnson
International Tropical Timber Organization, Japan

ITTO is charged, under Articles 27 and 28 of the 1983 International Tropical Timber Agreement (ITTA), with compiling, collating and publishing statistical information on production, supply, trade, stocks, consumption and market prices of tropical timber. The primary ITTO publication arising from this process is the Annual Review and Assessment of the World Tropical Timber Situation, which also takes into account ecological and environmental concerns in keeping with the objectives of the ITTA. The Annual Review contains the most comprehensive and timely statistics available for ITTO member states, together with trend analyses and discussion. The distribution of the Annual Review has increased dramatically over the past five years, as have ad hoc requests for data from members and other interested parties. This brief paper outlines the inputs, outputs and functions of the ITTO statistical system and its role in achieving the information sharing objective of the new ITTA.

DATA SOURCES

Figure 1 shows a schematic outline of the ITTO statistical system. The system consists of several data sources which, after analysis and filtering, are collated to produce the three main ITTO databases on tropical timber prices, forest resources and industrial production/trade. These in turn combine to facilitate production of the Annual Review and the other media by the FAO/ECE questionnaire and update its databases is the Annual Forecasting and Statistical Enquiry, which is now sent to official statistical correspondents in almost all member countries. The Enquiry was originally based on the standard FAO/ECE questionnaires and included reference to several product categories outside the mandate of ITTO (e.g. pulpwood and temperate hardwood species). The Enquiry was substantially revised in 1990, the same year that the system of statistical correspondents was introduced. The revisions included provision for detailed direction of trade statistics, forest area and removal statistics and industrial structure statistics, including employment. All statistics were requested for a base year plus short-term forecasts for the succeeding two years.

Figure 2 shows the percentage of responses to the Enquiry over the life of the Organization to date. Note that the year of the Enquiry shown refers to the base year for which data were collected. Prior to 1991, data for most consumers was provided directly by FAO/ECE, which covers countries in Europe, the ex-USSR and North America, as well as Japan. This accounts for the high response levels for consumer members up until 1990. Consumer responses have since dropped by almost 15 percent, reflecting the more demanding nature of the revised Enquiry and the difficulties some consumer members have in providing tropical timber statistics.

Responses by producer members have increased dramatically since 1988 when only 20 percent of ITTO's tropical countries responded to the old questionnaire. This is due to a number of factors. The revised questionnaire focuses specifically on tropical timbers and was therefore perceived to be less confusing in tropical countries than the earlier FAO/ECE based questionnaire. The system of nominating statistical correspondents was particularly successful in producer member countries, leading to enhanced response rates. A parallel development was the implementation of ITTO project PD 118/90 (M), developed in collaboration with FAO, under which a series of training workshops were held in each of the three producing regions of Africa, Latin America and Asia. These workshops gave participants, in many cases their country's nominated statistical correspondent, hands-on
experience in the collection, analysis and dissemination of forestry statistics, including sessions on completing the ITTO Enquiry. This work is proceeding under follow-up projects [PD 27/93 Rev.1 (M); PD 25/95 Rev.1 (M)], with on-going improvements in the quantity and quality of responses from participants expected.

Figure 2 shows only the quantity of responses received from members; response quality is much harder to portray graphically. It is safe to say, however, that few returns can be considered accurate and complete in all aspects, with many suffering from serious deficiencies or inconsistencies in one or more aspects. For this reason, a number of supplementary data sources are used, in addition to follow-up correspondence, to check suspect data and to fill in blanks.

An obvious source of supplementary data is ITTO’s now substantial project catalogue. Data from the Market News Service project [PD 7c/87 Rev.1 (M), PD 173/91 Rev.1 (M) and PD 16/93 Rev.4 (M)] has been input to ITTO’s price database on a bi-weekly basis since the MNS newsletters began in 1990. Studies of the major markets for tropical timber such as Europe [PD 7b/87 (M), PD 14/87 (M), PD 158/91 Rev.1 (M) and PD 9/93 Rev.1 (M)], China [PD 42/88 Rev.1 (M)], Japan [PD 61/89 (M)], North America [PD 66/89] and Asia [PD 182/91 Rev.1 (M) and PD 28/93 Rev. 3 (M)] have provided and in some cases continue to provide valuable secondary information for ITTO’s databases.

Projects for the development of producer country statistical systems also play a role in the development and strengthening of ITTO’s statistical system. Such projects are currently underway in several countries throughout the three producing regions. The statistical training workshops referred to above have given rise to several of these. In an attempt to standardize the quality and content of such project proposals, and to assist members to obtain the maximum benefits from them, the Permanent Committee on Economic Information and Market Intelligence recently approved specific guidelines for the preparation of statistical development proposals.

Trade journals (both national and regional) and data from other national and international organizations are also used extensively to supplement the ITTO databases. Statistical publications are regularly received from FAO, FAO/ECE, ITC, USDA and the World Bank, amongst others. All of these data are input regularly to the ITTO databases.

DATA PROCESSING

Data processing and analysis is largely computerized. Data provided in non-standard units (e.g. weight/area versus volume; local currency versus US$) are converted using standard conversion factors. Automatic checks verify the internal consistency of responses to the Enquiry (e.g. exports < production + imports ± stocks) and flag major inconsistencies between the various data sources. Statistical correspondents are requested to clarify apparent inconsistencies. If such clarification is not provided, or is inadequate, the decision on which data to use is based on a careful review of all available data sources and the data provided in previous years. The tables which appear in the appendices of the Annual Review are the result of this analysis, with all data identified as to its source. An extract from the trade database is shown in Table 1.

DISSEMINATION

The Annual Review is ITTO’s primary mode of disseminating data. This document is initially presented to Council during the Annual Market Discussions. Members have an opportunity to comment on and correct the statistics and analysis in the Review, which is subsequently amended and published. Until 1993, the Annual Market Discussions were held in May, requiring production of the Annual Review by the end of March. This led to difficulties in obtaining data for the year under
review from members, many of whom only release calendar year statistics well into the following year. In an attempt to overcome this problem, the Permanent Committee decided that beginning in 1994, the Annual Review would be considered during the November session of the ITTC.

ITTO is also being increasingly called on to provide data to its own projects, as well as to other agencies. Statistical summaries are now included in ITTO's quarterly Tropical Forest Update. Prices and direction of trade data are requested frequently. The databases are used extensively in the preparation of the vote allocation for ITTO members, which is based on trade and (in the case of producers) forest area. An increasing number of ad hoc requests for data on tropical forest resources and timber trade are being received. These range from requests for data for CITES submissions to students seeking data for theses.

RECENT DEVELOPMENTS

The newly adopted International Tropical Timber Agreement (1994) contains the following objective: "To encourage information-sharing on the international timber market." The means of attaining this objective are laid out in Chapter IX of the new agreement, which states that "the Council shall annually review and assess . . . the international timber situation" and that it should promote an exchange of views amongst members regarding "the status of sustainable management of timber producing forests" and "resource flows and requirements in relation to ITTO's objectives, criteria and guidelines." The extension of the Annual Review to all timber and the facilitation of the exchange of views on the sustainable management of all forests will require a substantial expansion of the ITTO statistical system. Some data (particularly trade and production figures) for temperate and boreal forests will be readily available from other organizations, while other information will need to be collected directly (e.g. status of sustainable management). The Annual Forecasting and Statistical Enquiry will need to be revised to take some of these factors into account. A recent decision of the ITTC on information sharing is appended, showing the scope of the data expected from members.

The changes in the ITTO statistical system occasioned by the adoption of the ITTA (1994) provide an excellent opportunity for members and others (including FAO) who use the outputs from the system to contribute to its evolution. ITTO will undertake a review of its statistical work in light of the new agreement and other developments early next year. FAO and other relevant organizations will be invited to participate in this review. With increasing calls from all quarters for more reliable and timely data on all timber species, the need for continuing collaboration and mutual support has never been greater.

REFERENCES


DECISION 4(XIV)

INFORMATION SHARING

The International Tropical Timber Council,

Recalling Articles 27 and 28 in Chapter IX of the ITTA, 1983, which provide for Members to furnish statistics, studies and other information relevant to trade in tropical timber;

Further recalling Decision 3(X) which adopted a strategy by which, through international collaboration and national policies and programmes, ITTO Members will progress towards achieving sustainable management of tropical forests and trade in tropical timber from sustainably managed resources by the Year 2000, and invited Members to confer annually on the progress towards the Year 2000 Target;

Noting other relevant decisions which have been undertaken by the ITTC on this matter, in particular Decision 4(XII), and other work which has been undertaken, including the criteria for measurement of sustainable tropical forest management;

Noting also Decision 5(XIII) which commended a draft format to Members for their consideration and for decision at ITTC(XIV);

Reiterating the benefits to be gained from information sharing to individual Members, in promoting the activities of the Organization and in assisting the achievement of the objectives of the ITTA;

Mindful of the desirability of rationalising the provision of information by Members;

Decides to adopt the format as outlined in the Appendix for the preparation of information to be provided to the Organization;

Requests the Executive Director to modify the present format in which information is sought from Members to reflect the contents of the Appendix and to introduce this format as soon as practicable.
Appendix

INFORMATION SHARING

The following format has been agreed by the Council to assist Members in the preparation of information as required under Articles 27 and 28 and for informing the Council of progress towards meeting the Year 2000 Target.

In agreeing to this format, Council sought to rationalise the various statistical and other returns which are requested by the Organization into one which would be completed annually. However, Members would continue to be encouraged to provide updated data to the Organization as soon as possible.

The Council would expect Members to provide information only on those aspects relevant to their own specific circumstances and which are within the scope of the Agreement. At the same time Council recognised the benefits to be gained from information sharing for individual Members, in promoting the activities of the Organization and objectives of the ITTA and encouraged Members to provide as comprehensive information as possible.

Council recognises that the availability of data is presently limited for some Members and that this will affect their ability to prepare this information.

FORMAT

1. INTRODUCTION/SUMMARY

2. INSTITUTIONAL AND POLICY FRAMEWORK
   - Legal and institutional framework for relevant national forest policy and implementation of relevant forest management plans.
   - Relationship of ITTO Decisions, the Year 2000 Target and ITTO Guidelines to national forest policy.
   - Relevant legislation and other measures affecting trade in timber.
   - Measures to increase the efficiency of relevant timber utilization and promote production of value added timber products.

3. FOREST RESOURCE BASE
   - Areas and distribution of relevant protection forests, production forests and plantations and their relation to national goals and targets.
   - Plantation establishment targets and annual planting regimes.

4. PRODUCTION AND TRADE OF LOGS, SAWNWOOD, VENEER, PLYWOOD
   (where possible, trade data should be based on the internationally agreed harmonised tariff schedule)
- Production level, capacity and efficiency by major products by species groups (where possible) and estimates of future production.

- Export and import values and volumes.

- Prices for major products by species groups.

- Stocks.

- Share of tropical timber in total timber trade.

- Annual trends in timber production from the forest, consumption and international trade.

5. INTERNATIONAL CO-OPERATION

- Relevant international financial and technical co-operation.

- Relevant Research and Development in forest resource conservation, management and development.

- Measures to increase production and utilization efficiency including measures to increase value adding in producer countries.

- Measures to promote international trade in tropical timber derived from sustainably managed forests.

6. RELEVANT ENVIRONMENTAL MEASURES

- Environmental legislation and policies as related to timber: environmental assessments, regulations for forest operations, and other measures.

7. RELEVANT SOCIO-ECONOMIC EFFECTS

- Economic flows associated with production and/or use of timber.

- Employment.

- Provisions for involvement of local communities.

- General economic conditions which affect supply and demand of wood products.
Figure 1: The ITTO statistical system

```
ITTO Enquiry  ITTO Projects  Trade Journals  Others

ITTO Statistical Unit
(assess, filter and collate)

Prices
Industry, Production and Trade
Resources

Annual Review

ITTO projects, votes and papers
Ad-hoc requests
```
Figure 2. Responses to the ITTO Enquiry (%)
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>PRODUC</th>
<th>YEAR</th>
<th>ITEM</th>
<th>95 Review ?</th>
<th>95 Enquiry</th>
<th>94 Review Mon.-Bull.-M</th>
<th>FAO/ECE</th>
<th>USDA-*</th>
<th>YEARBOOK</th>
<th>OTHER/RWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>Logs</td>
<td>1993</td>
<td>Prod.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Sawn</td>
<td>1993</td>
<td>Prod.</td>
<td>231</td>
<td>231</td>
<td>445</td>
<td>350</td>
<td>350</td>
<td>3100</td>
<td>350sbh</td>
</tr>
<tr>
<td>France</td>
<td>Ven</td>
<td>1993</td>
<td>Prod.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>58</td>
<td>80sbh</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Ply</td>
<td>1993</td>
<td>Prod.</td>
<td>190 I</td>
<td>0</td>
<td>0</td>
<td>49</td>
<td>480</td>
<td>300 sbh</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Logs</td>
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<td>Imports</td>
<td>395 *</td>
<td>475.5</td>
<td>895</td>
<td>713.08</td>
<td>920</td>
<td>920</td>
<td>644</td>
</tr>
<tr>
<td>France</td>
<td>Sawn</td>
<td>1993</td>
<td>Imports</td>
<td>360 *</td>
<td>180.6</td>
<td>360</td>
<td>258.08</td>
<td>162</td>
<td>393</td>
<td>490</td>
</tr>
<tr>
<td>France</td>
<td>Ven</td>
<td>1993</td>
<td>Imports</td>
<td>18 M</td>
<td>20</td>
<td>17.49</td>
<td>65</td>
<td>18</td>
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<td>Ply</td>
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<td>Imports</td>
<td>180 M</td>
<td>250</td>
<td>180.08</td>
<td>267</td>
<td>164</td>
<td>257</td>
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<td>15</td>
<td>25</td>
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<td>Exports</td>
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<td>Ply</td>
<td>1993</td>
<td>Exports</td>
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<td>44</td>
<td>192</td>
<td>137sbh</td>
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</tr>
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<td>1993</td>
<td>Cons.</td>
<td>865</td>
<td>880</td>
<td></td>
<td>395</td>
<td></td>
<td>857.4</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Sawn</td>
<td>1993</td>
<td>Cons.</td>
<td>581</td>
<td>795</td>
<td></td>
<td>728</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Ven</td>
<td>1993</td>
<td>Cons.</td>
<td>13</td>
<td>17</td>
<td></td>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Ply</td>
<td>1993</td>
<td>Cons.</td>
<td>328</td>
<td>210</td>
<td></td>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Logs</td>
<td>1993</td>
<td>Stock.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>France</td>
<td>Sawn</td>
<td>1993</td>
<td>Stock.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>France</td>
<td>Ven</td>
<td>1993</td>
<td>Stock.</td>
<td></td>
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</tr>
<tr>
<td>France</td>
<td>Ply</td>
<td>1993</td>
<td>Stock.</td>
<td></td>
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</tr>
</tbody>
</table>
INTRODUCTION

Forests are an important factor in regional economic development and environmental protection. Forestry statistics are essential for the execution of plans and projects and for the planning and appraisal of investment projects.

The Latin American region comprises well over 20 countries with forestry sectors of different economic and social importance. As is true of most developing countries, the forest products statistics of the Latin American and Caribbean region (with certain exceptions: namely Chile and, to some extent, Argentina) have several deficiencies:

- they are of low reliability, because of a high degree of subjective estimations;
- they are usually not available on time or may be in forms that do not fit the needs of the different user groups;
- they can be insufficient in quantity.

The problems of forestry statistics and their relevance differ from country to country. In some of the countries the statistical organization may be small and not yet well established, whereas in countries such as Chile the organization seems to be working properly. In some countries forestry data result from estimations and surveys are not treated statistically so the results are of low quality, there is no coordination and statistics on a particular subject are produced by different organizations (with different figures). Private firms may give distorted and inappropriate information.

It is necessary to redress this situation because proper statistical information plays a key role in planning (at both sectoral and national levels), in policy design and in adequate resource allocation. Better statistical information also enables better technical cooperation at national or international level. Accurate statistics in forestry are important in reducing risks and wastage.

This paper relies heavily on the Seminar on Forestry Statistics in Latin America and the Caribbean held in Santiago, Chile, in April 1993, and on personal experiences in the region. It uses a twofold approach: a description of the general framework and a description of particular aspects of the situation in individual countries.

DATA CONTENT OF NATIONAL YEARBOOKS OF FOREST PRODUCTS

Data content in yearbooks varies from country to country according to the characteristics of the forestry sector. Argentina, Chile and Honduras are presented to illustrate the range of situations.

Argentina

The forest sector in Argentina represents 2-2.9 percent of GDP. Basic statistics cover information on raw materials, production, employment, total capacity, power and energy. Forestry statistics are incomplete at national level. There are no long series of other types of information valuable for planning, such as prices, value of production and marketing of forest products. The departments
responsible for forestry statistics (there are two at national level) are trying to obtain such series, the
department in the Directorate of Forestry Production (DPF) since 1994 (see “The Price Bulletin”).

The processed permanent statistics are included in the Forest Statistics Yearbook, which used to
be published by the former National Forestry Institute. The yearbook is composed of different
chapters:

I. Extraction of forestry products: this refers to the primary production that is extracted
   from the forests
II. Manufactured products
III. Imports and exports of forestry products
IV. Argentinian forest products.

At provincial level data include information on logs, firewood, charcoal, sleepers and other
products (including poles, sticks, props). This information is obtained through the Provincial Forest
Services and through national organizations (National Parks). Calculations are based on the “Guías
Forestales” (licensing of timber removals). There are divergences between the values that are
registered in the licensing of timber removals and the actual fellings, so data are modified based on
wood consumption declared by the industry.

Information is presented at provincial and national levels according to products and forestry
species.

Information managed and published in a comprehensive way covers up to 1988. After some
institutional problems, the Statistics Department of the Directorate of Natural Forests Resources
within the Secretariat of Natural Resources and Human Environment (SRNAH) began a series of
studies for updating the main areas:

- Primary forestry production
- Industrial sector: Evolution 1970-88
- Forest products - Commerce: Exports-Imports 1980-93

With information from the private sector, it was possible to obtain updated information up to
1993 for industries such as veneer, plywood, particle board, fibreboard, pulp and paper. The
department is trying to develop a permanent system of forestry information (which includes several
actions apart from the basic statistics for planning) and the carrying out of sawmill and box mill
censuses. Sawnwood is calculated as the difference between roundwood extracted and wood
consumed by the industry. In a second phase the basic information will be updated through samples.

Additionally, some special studies on fuelwood and charcoal are to be carried out to correct
underestimations. Marketing studies of forest products and plantation and transport costs are also
planned.

Non-permanent statistics on prices include:
- Foresty product prices: 1956-64
- Foresty product prices: 1965-66
- Prices of primary products: roundwood for sawnwood, roundwood for particle board and
  fibreboard, roundwood for pulp, poles, firewood, charcoal
- Prices of manufactured products
Prices at different levels in the market chain of sawnwood, plywood, particle board, hardboard, poles without impregnation
- Prices of forestry products (quarterly information).

The under-Secretariat of Agricultural Production and Markets and the National Institute of Agricultural Technology (INTA) (in the Secretariat of Agriculture and Fisheries), has been publishing since 1994 a Bulletin on Forestry Prices (non-periodical), Trends, Returns and Commerce; the last one was published in August 1995. This bulletin is published by the secretariat for another department which collects and processes statistics on planted forests. The units of measure adopted since January 1992 are shown in Table 1.

Table 1. Units of measure for Argentina’s forest product statistics.

<table>
<thead>
<tr>
<th>Products</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuelwood and charcoal</td>
<td>tonne</td>
</tr>
<tr>
<td>Pulpwood</td>
<td>tonne</td>
</tr>
<tr>
<td>Paper</td>
<td>tonne</td>
</tr>
<tr>
<td>Plywood</td>
<td>m³</td>
</tr>
<tr>
<td>Particle board</td>
<td>tonne</td>
</tr>
<tr>
<td>Sawnwood</td>
<td>m³</td>
</tr>
<tr>
<td>Sleepers</td>
<td>tonne</td>
</tr>
<tr>
<td>Veneer</td>
<td>m³</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>tonne</td>
</tr>
<tr>
<td>Posts</td>
<td>tonne</td>
</tr>
</tbody>
</table>

Chile

Chile offers a good example of data content of national yearbooks of forest products. It is a country with an extensive information programme in the forestry sector set up more than 30 years ago. The forestry sector represents more than 3 percent of gross domestic product (GDP), 11 percent of the value of total exports and employs more than 100,000 people.

The Chilean forestry information system is carried out by the Institute of Forestry (INFOR) which collects relevant data from different sources, processes them and distributes the results.

The statistical information refers to: prices of the main products, inputs, freight, outputs of the main industries and technological and commercial aspects of production processes; and measures of the forestry resources in terms of land use, areas of natural forests and plantations, future availability of resources and environmental impact assessments. The objective of all this information is the support of both private and public forestry activities in the development of the forest potential in the short, medium and long run.
A database with information relating to forestry resources, the processing industries (primary and secondary) and product marketing has been kept since the establishment of INFOR. Periodically, this database needs to be updated, enlarged and completed. In addition, it is necessary to have adequate mechanisms to make all the information available to the relevant sectors: this is attained by means of periodical publications, floppy disks, telecommunications, networks, etc.

The sub-systems of the primary and secondary industries are composed of:

- sawmilling industry
- wood-based panels and veneer, plywood
- chip industry
- wood pulp, pulp, paper and newspaper
- timber warehouses
- system of forestry exports and imports
- system of forestry prices
- other systems of non-periodic information (mainly from secondary sources, i.e. produced in other units within INFOR or elsewhere) from organizations of the sector.

Export and import information is generated by the Central Bank and Customs Office.

In addition to these data on the forestry industry, statistical information on fuelwood and charcoal is recorded. This information is obtained through samples and censuses. Information on crafts and non-wood forest products that are exported is also registered: seeds, mushrooms, essential oils, resins.

For the major forest products, product definitions are those employed by FAO. For other products, additional definitions are employed. These originated in the System of Classification of Forestry Economic Activities (CAEF, “Sistema de Clasificación de Actividades Económicas Forestales”) based on the Harmonized System (HS). Export and import product definitions are also based on the Harmonized System.

As in most countries, Chile’s sawmilling industry, because of its large number of units of production - more than 1300 units - presents problems in the collection of data. There are also problems in areas of the informal sector - firewood, furniture, crafts, secondary products - where it is very difficult to obtain information or the information undervalues or overvalues the true figures.

Other aspects of Chile’s forestry statistics are related to timeliness of information and the integration of statistical, economic, textual and geographical information systems.

Statistics on forestry products and input prices are collected by INFOR every two months. For official purposes, units of measure are metric (see Table 2).
Table 2. Units of measure for Chile’s forest product statistics

<table>
<thead>
<tr>
<th>Products</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundwood for sawmills and pulp mills</td>
<td>m³</td>
</tr>
<tr>
<td>Chips</td>
<td>tonne</td>
</tr>
<tr>
<td>Sawnwood</td>
<td>m³</td>
</tr>
<tr>
<td>Plywood</td>
<td>m³</td>
</tr>
<tr>
<td>Pulpwood</td>
<td>tonne</td>
</tr>
<tr>
<td>Paper</td>
<td>tonne</td>
</tr>
</tbody>
</table>

The yearbook on forestry statistics covers:

- Forestry product prices:
  * six papers per year (one every two months)
  * two papers (one per semester)
- Census of the primary and secondary wood industries
- Employment
- Forestry exports (monthly):
  * statistical bulletins
  * information on diskettes
- Fuelwood consumption
- Forestry atlas
- Marketing studies
- Costs of forestry activities
- Economic analysis of the forestry sector.

Honduras

In Honduras, the content of the 1993 yearbook published by the Forestry Statistics Section (within the Planning Department) was:

- Forestry resources (soil use, forestry areas, forest fires)
- Production (extraction of roundwood, different uses, resins, sawnwood by species and by department, sawmills, plywood production)
- Exports: sawnwood and other exports, by volume and value
- Prices, etc.
(The period is usually 1989-93 for the different items.)

Data for some products are unreliable because information is withheld or inaccurate reports are provided. It is thought that records cover, in some instances, only about a half of the total activity. Despite having one of the best designed forestry information systems in Latin America, Honduras has not updated the information recently because of problems that are discussed later in this paper.

As happens throughout the region, data for fuelwood and charcoal, sawnwood and forestry products other than wood (when they are collected) are the least reliable.
Useful information

A very useful checklist that is becoming employed in some countries is shown below in Tables 3 to 5. It is based on the article “Objetivo y Funciones de la informacion economica y estadistica para el sector forestal” by P. Wardle.

Table 3. Summary checklist of forestry sector information: types of information for central policy purposes

<table>
<thead>
<tr>
<th>FORESTRY SECTOR AND NATIONAL INCOME</th>
<th>Value of production - Value added (subdivided by forestry and individual industry¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Income from employment</td>
</tr>
<tr>
<td></td>
<td>Value of exports</td>
</tr>
<tr>
<td></td>
<td>Value of imports</td>
</tr>
<tr>
<td></td>
<td>Investment (subdivided by forestry and individual industry¹)</td>
</tr>
<tr>
<td>FOREST PRODUCTS IN ENERGY SUPPLY</td>
<td>Employment (subdivided by industry and including self-employed and work of family members)</td>
</tr>
<tr>
<td>POPULATION IN INVOLVEMENT IN FORESTRY</td>
<td>People with forestry holdings (living from forest areas, shifting cultivators, forest graziers, hunters, collectors)</td>
</tr>
<tr>
<td></td>
<td>People living in forests</td>
</tr>
<tr>
<td>LAND USE</td>
<td>Land under forest (shifting cultivation, grazing)</td>
</tr>
<tr>
<td></td>
<td>Forest area with environmental or protective role</td>
</tr>
<tr>
<td></td>
<td>Forest area with major pressure of other use</td>
</tr>
</tbody>
</table>

¹ Including imputed value of production within households or in unrecorded rural sector activity.
Table 4. Summary checklist of forestry sector information: land utilization and forest resources

| 1. TOTAL AREA                      | Inland water  |
|                                   | Land area     |
|                                   | Agricultural land |
|                                   | Forest and other wooded land |
|                                   | Other land |

| 2. FOREST AND TREE RESOURCES       | Forest and other wooded land, further subdivided data are collected on area, volume of timber and biomass: |
|                                   | - by species: coniferous, broadleaved, bamboos |
|                                   | - by availability for productive use: production, protection |
|                                   | Forest falls |
|                                   | Trees outside the forest |

| 3. FUNCTIONS OF FOREST AND OTHER WOODED LAND | Information is collected on the importance of specific functions of forests: |
|                                           | - Wood production |
|                                           | - Environmental protection |
|                                           | - Water |
|                                           | - Grazing (range) |
|                                           | - Hunting |
|                                           | - Nature conservation |
|                                           | - Recreation |
|                                           | - Products other than wood |

Adapted from “Towards a common framework for world forest resource assessment”, FAO 1989.
### Table 5. Summary checklist for forestry sector information: production, trade, prices and employment

1. **FOREST PRODUCTION** *(Units: thousand m³, t)*
   - Roundwood
     - Fuelwood
     - Charcoal (t)
     - Industrial roundwood: Sawlogs and veneer logs;
     - Pulpwood
     - Other roundwood

2. **PROCESSING INDUSTRY PRODUCTION** *(Units: thousand m³, t)*
   - Sawmills
   - Panel products: veneer, plywood, particle board (including non-wood based), fibreboard
   - Pulp: wood pulp, pulp (non-wood based)
   - Paper and paperboard

3. **FOREST PRODUCTS OTHER THAN WOOD**
   - Examples: resins, gums, cork, tannin, honey, nuts, hunting users and yield, fodder, recreational user numbers.

4. **FOREST INDUSTRY CAPACITY** *(Units: thousand m³, t)*
   - *Number of mills Annual production capacity*
   - Sawmills
   - Panel product mills
   - Pulp mills
   - Paper mills
   - Other

5. **TRADE IN FOREST PRODUCTS** *(Units: quantity; thousand m³, t; Value: Local currency)*;
   - both quantity and value of imports and exports are reported for:
   - Roundwood: sawlogs and veneer logs, pulpwood, other industrial roundwood, fuelwood, charcoal
   - Processed wood products: sawnwood, veneer, plywood, particle board, fibreboard
   - Pulp and paper: pulp, paper, paperboard
   - Forest products other than wood

6. **PRICES**

7. **EMPLOYMENT** *(Brokendown into professional, technical, vocational, labourers)*
   - Public forest administration
   - Private forests
   - Forest industries and logging
   - University and research
METHODOLOGIES USED FOR COLLECTING DATA

In most countries of the region forestry sector statistics are usually collected by Forestry Departments within the Ministries of Agriculture.

Estimates of fuelwood and charcoal (production and consumption) are collected by special surveys of different types: national surveys from time to time; more frequently, they are limited to either urban households or rural households. When the survey is restricted to rural areas they can consider only a particular area or region. These surveys may be carried out by Forestry Departments (within the Ministries of Agriculture), Energy Departments (Ministries of Energy or Industry) or central statistics offices. In several Latin American countries surveys and censuses on fuelwood and charcoal are based on methodologies provided by the Latin American Dendroenergy Organization (OLADE).

In the modern processing sector, industries usually keep records and are able to report. Information (inputs, outputs, prices) on panel products, veneer, plywood, particle board and fibreboard, wood pulp, non-wood pulp and paper is collected by Ministries of Industry. Information on small mills and pit sawing is difficult to obtain. In Honduras, for instance, where recording systems exist (licensing systems) for pit sawyers, records are inaccurate because of unauthorized or illegal operations.

In most Latin American countries, with the possible exception of Chile, there is a resistance to disclosure and distorted reporting by companies. Seminars should be organized that are specially directed to the private sector to explain the advantages for the whole forestry sector of clearer, more detailed and accurate information.

Modern processing sector statistics are relatively easily collected and usually obtained through censuses (because of the small number of productive units) or by surveys. The collection of data from dispersed and numerous small-scale sawmills is more difficult. For the informal sector, production is even more difficult to estimate. In Chile, data on sawnwood are obtained from the production units through questionnaires. The information is obtained by censuses of the permanent sawmills (where most of the output is concentrated) and samples of the smaller mobile sawmills. The census is carried out every five years.

Data for plywood, particle board and fibreboard are obtained through an annual census of these industries. In general, output in Chile is determined by direct consultation with the industries and checked by using technical coefficients. Estimations are made every year for industrial consumption and monthly for exports and imports.

As an example in Argentina in 1992-93 the number of questionnaires for the wood and paper industries were: wood pulp and paper, 93; plywood, 23; particle board, 8; fibreboard, 2; veneer, 20; impregnation plants, 18; tannin, 4; others, 17; total, 185.

Trade statistics are carried out by the Ministries of Trade, Customs Offices or central banks. In some instances problems with physical volumes are found because of the use of different units. This problem happens less frequently with the monetary amounts. Collection of price data presents particular difficulties because of resistance to disclosure by the production units.
**EXISTING INSTITUTIONAL INFRASTRUCTURE INVOLVED IN DATA COLLECTION**

The most important institutional infrastructures for data collection of forestry statistics are in the public sector; private sector institutions are usually much less relevant. The structure varies from country to country, but is usually divided into regional or local offices and central offices.

Information is derived from computing the licensing of timber removals or formal control systems relating to removals from private forests or a requirement for the return of records of delivery to mill. However, considerable volumes of production have no formal records. In the case of fuelwood, a major component is production and consumption by families for their own use; this is rarely recorded.

Surveys for the industrial sector usually cover the whole sector. In Argentina, the degree of 'no response' is generally low; it is higher in the veneer sheet sector and in the paper mills whose raw material is recycled paper. Data requested are capacity, employment, raw material, production, power, energy consumption, machinery and value of production. Since 1992, average prices per industry, product type and species have also been requested.

Organizations with responsibility for the collection and processing of forest sector statistics are:

- Forest Departments (usually in the Ministries of Agriculture)
- Ministries of Agriculture, Energy, Trade, Planning, Industries
- Central banks
- Central statistics offices
- Regional authorities
- Timber export authorities
- Industry organizations.

Sometimes coordination is difficult when different organizations collect and process forest data.

**Argentina**

In Argentina action occurs at two levels: provincial and central government.

At provincial level there is usually one person (part- or full-time) who collects the data and primarily processes them. This situation is not always the same for all the provinces where the forestry sector is important. The provinces usually have one microcomputer (PC) for processing the data. In some instances there is no such facility. Training is needed to build up technical capabilities in forest statistics through seminars, short courses, workshops, etc. The role of the provincial administrations in collecting forest data is essential. Basic sources of information are the licences for extraction and transport of timber. The type of information processed includes production, uses, prices and forest areas. There are no precise data on provincial wood consumption.

At central government level, since the dissolution of the National Forestry Institute (IFONA), the information has been collected by two departments (one of statistics and the other of economics). The former is within the Directorate of Native Forestry Resources (DRFN) under the Secretariat of Natural Resources and Human Environment (SRNAH). The staff is two statisticians. This department collects and processes data on native forests and national parks. The economics department is placed in the Secretariat of Agriculture, Livestock and Fisheries (SAGyP) within the Directorate of Forestry Production. The staff members are three agronomists and one secretary. The Department of
Economics in this secretariat collects statistical information on planted forests and related activities of manufacturing and marketing.

Other aspects of the industry (sawnwood, pulp, nurseries, forest fires) are collected partially by both directorates so there exists some duplication and overlapping in these activities.

The division of activities that happened after the dissolution of the former IFONA has not been good for the overall process of collection of forestry statistics. A great deal of duplication of effort exists (census, samplings on some subjects). Use of the same methodologies by both departments is essential to obtain comparable results. Coordination at federal and provincial levels is needed.

Chile

The office responsible for collecting and processing the forestry information at central level is the Division of Economic Studies of INFOR. The staff is composed of seven agronomists, foresters and economists; three technicians, one programmer and one systems analyst.

The information is collected from the regions (Chile’s administrative divisions) in which forestry activities are relevant. Regional inventories are done by the Inventories and Management Division of INFOR. The Forestry National Corporation (CONAF) produces information on annual plantations, fires, etc. Primary industry information is processed by INFOR from data collected by CONAF and the private sector through its organization, the Chilean Timber Corporation (CORMA, “Corporación Chilena de la Madera”). Pulp and paper information is provided by CORMA. Macroeconomic information, commerce, input-output ratios and balance of payments data are obtained from the Central Bank of Chile.

INFOR coordinates all the phases of the Chilean forestry statistics programme.

Honduras

The organization responsible for forestry statistics, data collection and processing is the Honduran Forestry Development Corporation (AFE/COHDEFOR) which collects the forestry data at national level. COHDEFOR is facing a major reorganizational process. Its funds and financial resources have been reduced within the framework of the Modernization and Agricultural Sector Development Act.

The Forestry Statistics Information System (SIEF), a very interesting and complete system for the collection, analysis and distribution of data, was created with the cooperation of FAO in 1989. It has not worked since 1993-94. Low salaries induced qualified technicians to resign and no one was capable of operating it. The government is endeavouring to put it into operation again. During 1995 COHDEFOR was trying to produce the information for 1994 by a contract with a consultant. The operative capacity of COHDEFOR has decreased and this is reflected in data collection and processing results.

DATA VALIDATION METHODOLOGIES FOR DATA FROM DIFFERENT SOURCES

Validation methodologies differ throughout the Latin American and Caribbean region. Some countries do not undertake validation of the data which are entered (volumes exported or imported, for instance) and then huge discrepancies can appear. Other countries make some checks on the data
entered (for instance, comparison between inputs and outputs of an industry taking into account the efficiency of the processes).

Chile’s INFOR does not now usually carry out data validation because its sources are, in general, precise and reliable. Argentina’s Department of Statistics within SRNAH employs some checks. Despite the question of the validity of the data, other countries do not make precise checks.

It is very important that validation of data is undertaken both in space and time, in advance of processing and in the course of processing. The validation routine provided by FAO is an important step and is an approach that is being adopted by several Latin American countries.

This subject is worth further study, because it is a key factor in improving data quality and the results obtained.

**INFORMATION TECHNOLOGY AVAILABLE TO ORGANIZATIONS**

Different countries of the region have different types of hardware and software according to their financial resources and specific needs. Software in common use in most countries includes WordPerfect, WordStar, Quattro Pro, DataBase III plus, Fox, Excel and Lotus 1-2-3. Since the 1993 Seminar on Forestry Statistics for Latin America and the Caribbean, an increased number of countries are employing the FAO’s Agrostat PC.

Delivery of the results varies. Publication of yearbooks is the most common way to deliver information, but diskettes (floppy disks) are common and CD-ROMs (compact disk read-only memory) are coming into use. Networks and E-mail are also used.

The process of collection, processing and diffusion of forestry statistics can be summarized as in Figure 1.

**Argentina**

At federal level, the two departments that carry out forestry statistics each has one microcomputer (PC 486) with corresponding printer, plus software (Lotus 1-2-3, Data Base III plus, Stat Graph, SPSand, Microstat). In the provinces the microcomputers are PCs 386 rather than 486. In some provinces PCs 486 should be bought, because of the amount of data collected.

**Chile**

At the central level INFOR has as hardware a central computer, a Data General model AVIION with two disks, capacity 1324 MB. It has 12 terminals and is connected to a network of PCs through Ethernet (more than 20 users are connected). Software is Unix for terminals and MS-DOS for the PCs, Oracle, Clipper 5.01, etc.
Figure 1

Sources of information:
- Public sector offices
- Studies
- Scientific studies
- Magazines
- Publications
- Technological innovation
- Databases
- Expert opinions
- Forestry institutions
- Libraries
- Private organizations
- Censuses
- Samples

Central Forestry Statistics Office:
- Focal point
- Database
- Software
- Models

Forestry Statistics

CD-ROM  Yearbooks  Periodic bulletins  Other

Honduras

The Department of Statistics is responsible for forestry statistics. It has two microcomputers (386 type) and two technicians who collect and process the data. Software includes Lotus 1-2-3, Data Base III plus.

DISSEMINATION

For dissemination of information, Latin American countries employ in general: yearbook publications (this type of information can be also biannual); facsimile; diskettes are usually employed; CD-ROMs are coming to be used extensively. The same applies to networks and electronic mail. E-mail is perhaps one of the best instruments for distribution of discussion material and is cheaper than fax.

Argentina

Until 1983 a yearbook was the most common way to distribute statistical information. It had an annual edition of about 1000 copies, of which 400 were distributed to subscribers such as international organizations, state organizations, state enterprises, provincial organizations and private associations and federations. Bulletins covering part of the forestry statistics information are also printed now. Argentina is using facsimiles, networks and electronic mail.
Chile

INFOR produces a yearbook. Several other publications on specific forestry topics are published. Facsimiles, networks and E-mail are also employed to distribute information.

Honduras

Honduras last published a forestry statistics yearbook in 1993. Some leaflets are published. Because COHDEFOR had no capacity to produce the information for the 1994 yearbook, a private consultant was paid to do it.

USERS AND USES OF NATIONAL FORESTRY STATISTICS

The Forestry Statistics Information System has several impacts on the planning and appraisal of investment projects at both private and public levels.

Users of forestry sector national statistics are in both the private and public sectors. Within the private sector, forestry information is used to assess the economic situation and to improve resource allocation: areas and species to plant, technology employed, selling strategies, etc. Information used includes planted areas, age, species, costs (production and exploitation), actual quantities supplied and demanded and their projections, prices and qualities. Also important are exports and imports (volumes, values, prices, tariffs, port costs, freight).

The public sector needs basic information for the design of forestry policies that set the framework for public and private investment. Data give information on the contribution of the forestry sector to GDP, employment, etc. Statistical information gives a better understanding of the situation and makes possible a better resource allocation.

As an example, listed below are the main users of the forestry statistics system in Chile:

State offices:
Ministries of Planning, Agriculture, Economy
Technical Cooperation Service (SERCOTEC)
Export Promotion Directorate (PROCHILE)
Technology Research Institute (INTEC)
Information Centre of Natural Resources (CIREN)
Central bank
Banks and financial institutions
National and foreign organizations:
Chilean Wood Corporation (CORMA)
International organizations: FAO, World Bank, etc.
Corporation on Economic Research for Latin American (CIEPLAN)
Economic Commission for Latin America (CEPAL)
Embassies and foreign enterprises
Private sector:
Paper and Paperboard Manufacturing Company (CMPC)
Cellulose Arauco and Constitución
Andinos S.A.
Forestal Mininco
Tasman Chile S.A.
Forestal Cholguán
Sawmill Copihue
Timber Consortium
Other enterprises:
  Medium and small businesses (since 1992, INFOR has given information to small and
  medium entrepreneurs on statistics and commercial aspects in order to support their
  activities).

In addition to its use in the allocation of resources or in forestry policy planning, information
provided by forestry information systems is employed in the following ways:

- Search for marketing opportunities, coordination of marketing systems
- Availability of raw materials, private industrial investment requirements, need for
  investment in infrastructure
- Business opportunities in both internal and external markets
- Studies on impact assessment of investment projects
- Basis of information for interdisciplinary relationships between sectors, relationships
  between countries and enhancing research
- Efficient use of adequate technologies
- Better estimations for different woods, of expected supplies and demands for species
  by area or region, prices of inputs and products
- In general, good forest information systems are useful to investors, researchers,
  managers, governments.

**IMPROVEMENTS OR EXPANSION OF EXISTING DATA COLLECTION AND DATA ANALYSIS**

There are several measures needed to improve the existing data collection, data analysis and
dissemination of the information. These measures are, in general, common to the different countries
of the region.

It is necessary to standardize the collection systems of forestry information of the countries,
to train technicians and to provide users with forestry information that is complete, reliable and
timely. Training should be given through short courses, seminars and workshops. Rural development
depends upon the quality of projects carried out (those that provide the greatest private and social
profitability) rather than the number of projects.

In most countries forestry statistics may be incomplete, unavailable, not timely or unreliable,
making production difficult and making it impossible to take safe decisions. Different countries in
the region have different development levels on statistics and have different sectoral information.

**Networks**

A network of forest statistics in Latin America seems to be necessary. It could be a central
point of permanent information diffusion. Nevertheless, initially the most important thing is to
develop and implement the information systems within the countries. If countries are not able to
develop adequate systems and generate correct information, a network will exchange almost useless
information.

When it is decided to set up a regional network for forestry information, it will be necessary
to establish the main database; first to set up microcomputers in selected countries with CD-ROM
systems and after that to cover the total region. A first step will be the making of one or two CD-
ROMs with the basic database. A special emphasis should be put on an efficient but inexpensive design for the network. A survey of the existing infrastructures (microcomputers, software and personnel) is recommended for a better design of, and investment in, the network.

Workshops are essential (regional and in each country) on collection of data and processing of information. The exchange of regional experiences and technological information will be of the utmost importance. Because of the cost of collection of statistical information and because resources are scarce, it is important to concentrate on priority topics; accuracy should be in accordance with the needs of the relevant areas. It is essential to develop proper definition of products and units of measure.

**Fuelwood, charcoal and products of the informal sector**

It is necessary to have a clear definition of fuelwood and charcoal; different results occur because of different definitions. In the particular case of fuelwood, there must be a clear distinction between it and the biomass originating in the forests. In several countries it is necessary to determine the areas of greater consumption and production at national level, sources and uses of fuelwood and charcoal in each country, marketing channels, etc.

Forest products from the informal sector are relevant to the local economies. The economic importance of non-wood forest products is variable; in countries where these products are relevant, special emphasis should be put on them.

**Training**

To meet present and future needs and build up capability in forest sector statistics, the organization of training is required (regular forums, short courses, seminars, workshops, conferences) on collection of data, processing, storage and dissemination of statistics and the significance of statistics. Staff (personnel of all cadres: statistics staff and field staff) should have access to standard guidelines on statistical organization, collection mechanisms and survey methods; some of them will require courses in microcomputers.

**Prices**

Price statistics is a priority area. Forestry prices are collected by few countries and are usually unrealistic. Standardization of statistical methods, definitions and units of measure with a view to harmonizing marketing and export prices is necessary. For sawnwood exports, some countries of the region need to develop uniformity in systems of grading and specification of wood products.

**Information from the private sector**

In general there is a lack of access to information obtainable from private entities dealing with the forestry sector. Information is incomplete, or in some instances withheld or reported inaccurately. One activity that can change attitudes in the forestry private sector is to carry out seminars and workshops. It is essential that the private sector understands that true information benefits the whole sector.
Role of FAO

The cooperation of multilateral or bilateral agencies is very important. The involvement of FAO with regional ideas and initiatives is essential. Technical and material assistance from the international community, and specifically FAO and existing regional organizations, is necessary. FAO has a key role in several aspects: it should provide support to member countries in the training of personnel and in the use of computers and computer applications such as data processing and analysis. The employment as consultants of former specialists of the Forestry Department could be of help.

FAO has been the main organization that has developed at world level a complete and complex system of collection, processing and diffusion of forestry statistics information. Its yearbook has been published regularly. FAO could assist countries in setting up appropriate statistics units in the relevant departments.

Investments in infrastructure

There is a consensus that microcomputers and software are needed in Latin American countries as part of the action needed to improve forestry statistics. The availability of computers will greatly advance the capability of the countries in collecting, storing, processing and disseminating statistical data. Additionally there should be available funds for the development of networks and for the acquisition of vehicles when needed. FAO could cooperate in some justified cases with provision of part of the required funds.

The final objective of all these actions is to formulate programmes and mechanisms for improving forest product classification, standardization, marketing, trade and pricing. In other words, the objective is the development of a system to facilitate the periodic exchange of forestry related information and statistics between countries through networks and periodic bulletins, newsletters or yearbooks. Investments in networks are very important.

Definitions and measures

There still exists a great deal of confusion in terms, definitions, classification and units of measure for forest resources, products and trade. Efforts should be made to eliminate the use of different definitions, classification and units of measurement so that information provided by different countries will be comparable. Framework and definitions should be clear, concise and unambiguous. It is necessary to make the definition of minor forest products more clear to remove confusion in such terms as poles, posts, props. The correct definition of wooded areas and of exports and imports will also help. The metric system should be used for all products. For wood panels a common measure should be used with some indication of dimensional thickness: currently countries are using m³, m² or even m.

Standard format should be adopted for data collection and data should be analysed and results disseminated on a regular basis.

PRIORITIES FOR IMPROVING CAPACITY BUILDING

In most Latin American countries, government forestry institutions are undergoing transformation as a result of macroeconomic reforms induced by structural adjustment programmes and the increased social demands on the forestry sector. In addition, changes in national development policies and the greater importance accorded to private initiatives have contributed to
a modification of the role of forestry administrations. These new frameworks should be taken into account. In general, measures recommended above tend to strengthen the institutions. This is a crucial point in the development of forestry statistics information systems in Latin America and the Caribbean. A better information system at both regional and country level will be enhanced by funds directed to the acquisition of microcomputers, software, vehicles. In some cases better remuneration of the staff will be necessary as a performance incentive. At federal or regional levels funds are needed for oil, vehicles and per diems in some countries.

When different institutions collect and process different data, coordination among them is essential. The development or enhancement of focal points will help the development and coordination of the whole system. Short courses, seminars and workshops (regional and in the countries) will also help. Institutional specialists will be of great value in several countries to detect bottlenecks and obstacles to the functioning of the systems. They can produce institutional guidelines for the information systems tailored to the conditions of each country.

**Improvement of institutional aspects**

There is a general need to strengthen the capability and organization for collection, assembly, analysis and dissemination of forestry statistics. Several countries have different forestry data but most of them result from estimations and surveys are not treated statistically, so the results are of low quality, there is no coordination and statistics on a subject may be produced by several organizations. Better information can allow a better orientation of policies, strategies, planning of specific projects or introduction of new technologies. Emphasis should be put on having an organization able to collect, assemble, analyse and report national forestry statistics so that the reports are fully available to forest sector planners.

**Coordination**

Some countries lack coordination between the different institutions that are part of the forestry statistics system. In other countries central authorities coordinate or bring together national statistics on the sector. Central statistics offices provide information in a usually incomplete and summarized form. There is a good example of national coordination attempted by the central government in Argentina: the National Institute of Statistics and Censuses has the legal responsibility for coordination at national level and the activities of each unit are described in Decree no. 1831/93.

**Focal points**

Central statistics offices are considered very important as focal points. They can coordinate the processes, gather all the information on forestry statistics, process and diffuse it more speedily. A unit within each Forest Department should be transformed into a formal body, institutional arrangements established to ensure adequate linkages to other bodies involved in forest sector statistics and responsibility designated for national coordination of forestry sector statistics (as with Argentina’s decree, mentioned above). The statistical unit should be provided with adequate tools for information and statistics gathering analysis. The momentum and interest in developing forestry statistics should come from within each country.

**Institutional experts**

Institutional experts can help in devising a programme of institutional reinforcement. Sometimes it is important to devote efforts to the solution of institutional problems that often arise;
for example, coordination of two institutions that are trying to collect the same data (or almost the same data) without using comparable criteria. Another common problem is a lack of involvement of people working in the collection, processing and distribution of the information. Sometimes this stems from low salaries, and this is a difficult obstacle to overcome when there are widespread policies of reducing state expenditures. Adequate staffing, equipment and salaries are important. Experts on these institutional aspects could be provided by multilateral organizations.

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BRAZIL - CASE STUDY ON FORESTRY STATISTICS: STATISTICS ON PRODUCTION FROM NATURAL FORESTS AND PLANTATIONS

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HISTORY

Brazil’s forests are unparalleled in their diversity of species and, hence, of forest products. Although an important industrial sector is based on managed forests producing roundwood, sawnwood, pulp and panel products in a manner comparable to many other nations, Brazil also possesses an exceptional forestry production from natural forests (known as vegetal extraction production) based on a wide variety of specialized products harvested in diverse ways from natural forests.

An information survey on the vegetal extraction sector started in 1938 with the Ministry of Agriculture responsible for the elaboration of the questionnaire and criticism, checking and diffusion of the results. The Brazilian Institute of Geography and Statistics (IBGE) participated together with its network of municipal statistical agents who gathered the data. On 17 January 1974, Decree No. 73 483 made IBGE responsible for all the research phases of the whole series. Data for the years 1971 and 1972 are not available.

The research on silviculture was started in 1974 by IBGE, because of the sector’s increasing importance through the introduction of industrial projects in paper, cellulose and steel industries and the granting of tax incentives for reforestation. In 1986, the two independent surveys (“Vegetal Extraction Production” and “Silviculture”) were merged into one under the name of “Production of the Vegetal Extraction and of the Silviculture”¹. There was a substantial reduction in the number of products in the first survey and a small one in the second.

The research on vegetal extraction production investigated every natural forest in the municipality growing without cultivation or human labour. The silviculture research investigated every forest formation that had been cultivated and managed until harvest by human labour.

There are some native forest species in Brazil found in natural settlements (i.e. formations without human intervention that give rise to the country’s natural forests) that are also technically and systematically cultivated by man to achieve better economic results. For statistical investigation purposes, these species are assigned to the different surveys according to the native or cultivated states in which they are found. Examples may be found in both states; for example, the Brazilian pine tree, mate, rubber-tree and palms. The black acacia, eucalypt and American pine tree are exotic species, i.e. originate in other countries and are not found in a native state in Brazil.

¹ Thus in Brazilian terminology, “vegetal extraction” would refer to production from natural forests; production from “silviculture” would cover output from plantations.
NATURAL FOREST UTILIZATION (VEGETAL EXTRACTION)

Objective

The research on the production of vegetal extraction has as its objective the supply of statistical information on the quantity and value of the production done by exploitation of natural forest resources, named "vegetal extractive activity".

Period and scope of investigation

The investigation is limited to the geographical area of the national territory, being the information surveyed at a municipal level. The research is carried out on an annual basis. For all products under survey, the quantities and the average unit prices are those of the survey year.

Researchers products

The products under survey in this research are grouped according to their forms of utilization, with the purpose of giving greater efficiency to collection and checking of data and facilitating its use.

The botanical names for the plant species involved may be found in Appendix 2.

Group I. Rubbers

Gumtree (coagulated latex)
Hevea (coagulated latex)
Hevea (liquid latex)
"Mangabeira" (coagulated latex)
"Maniçoba" (liquid latex) was also investigated Until 1980.

Group II. Non-elastic gums

Balata (gum)
"Maçaranduba" (gum)
"Sorvá" (gum)
Until 1980 the following were also investigated: Chicle (gum), "Rosadinha" (gum) and "Ucuquirana" or "Coquirana" (gum).

Group III. Waxes

"Carnaúba" (wax)
"Carnaúba" (powder), investigated from 1981
Until 1985 "Licuri" or "Ouricuri" (wax) were investigated separately.

Group IV. Fibres (raw fibre)

"Buriti"
"Carnaúba"
"Caroá"
"Piaçava"
Group VI. Oleaginous plants

“Babaçu” (almond)
“Copaiba” (oil)
“Cumaru” (almond)
“Licuri” (copra)
“Oiticica” (seed)
“Pequi” (almond)
“Tucum” (almond)

Until 1985 “Andiroba” (almond), “Indaiá” (almond), “Macauba” (almond), “Murumuru” (seed) and “Ucuuba” (almond) were investigated.

Group VII. Food products

“Açai” (fruit)
Cashew nut (nut)
Brazilian nut (nut)
Mate (crumbled)
“Mangaba” (fruit)
Palm (heart of palm)
“Pinhão” (Araucária tree fruit) (fruit)
“Umbu” (fruit)

Group VIII. Aromatic, medicinal, toxic and colouring plants

“Ipecacuanha” or “Poáia” (root)
“Jaborandi” (leaf)
“Urucú” (seed)

Until 1985 “Jatobá” or “Jutaicica” (resin), “Quina” (bark) and “Timbó” (root) were investigated separately.

Group IX. Wood

Charcoal (fuel)
Firewood (trunks and/or branches)
Log (log)
Pine node (trunk joints)
Brazilian pine tree (Araucária)

The total amount of felled trees (number) and the production of wood (cubic metres) were investigated. Until 1977 these data were included in the statistical inquiry on silviculture.

Basic concepts

General

Quantity - The total quantity of each native product harvested in the municipality during the research reference year.
Measurement unit - The quantity of firewood, logs and pine node is given in cubic metres (m³), while the other products are given in kilograms (kg).

Average unit price - The average of the prices received by producers, weighted by the quantities traded in the research reference year. This concept is applied to all products under survey, changing only the measurement unit of the information (that is, price unit/m³ for firewood, logs and pine node and price unit/kg for the remaining products).

Vegetal extraction activity

This is the process by which man harvests the products from the native forest resources, promoting its continuing exploitation. Products include fruits, oils, leaves, seeds, resins, latex, roots and wood, as described below:

Rubbers - Elastic gums resulting from the gathering of latex from certain forest species.

Hevea: coagulated and liquid latex - Only the production from the native rubber trees is considered; the production of planted trees is a subject of research for the agricultural production data. Coagulated latex includes all sorts of commercial types of coagulated latex from rubber trees; for example, raw "cernambi", "cernambi cocho", pressed virgin "cernambi", "pêla" and others.

Non-elastic gums - Vegetable gums without elasticity resulting from coagulation of latex extracted from certain forest constituents.

Waxes - These are substances that cover the leaves of certain native palm trees, in a thin layer whose physical and chemical properties allow varied industrial utilization. Classification as wax powder production occurs only when the product is traded in this state with other municipalities. When wax powder is transformed into wax in the same municipality, only the production of wax is recorded.

Oleaginous products - Products rich in oil, or the oil itself, originating from the exploitation of forest constituents and used for industrial purposes.

Tanning products - Plant products rich in tannin, originating from the exploitation of forest constituents and used for industrial purposes.

Food products - Products originating from the exploitation of forest constituents for direct human consumption or as raw material for the food industries. As regards crumbled mate, production can be obtained from cultivation or from the mere picking of native plants. The production coming from cultivation is a subject of research for the municipal agricultural production data and only the picking of native plants is considered for the production of vegetal extraction.

Aromatic products - Plant products with scent (leaves, roots, bark, etc.) for domestic and industrial use without any processing or, when manufactured, as essential oils.

Medicinal products - Products (barks, roots, resins, etc.) from natural vegetation and used in medicine for their therapeutic properties.

Toxic products - Plant products with poisonous properties, exploited for industrial purposes.
Colouring products - Plant products with colouring or dyeing properties.

Fibres - Textile filaments obtained by the shredding of leaves, roots or stalks of plant species.

Wood products

The ligneous part of the trunk of forest species used on a large scale by the building and paper industries, for the manufacture of railroad crossties, poles, charcoal, furniture, cellulose, etc.

Charcoal - Charcoal is characterized as fuel resulting from the partial burning of ligneous material in closed places (such as ovens or kilns) with a controlled air supply. Only the production from native vegetation "cerrado", "cerradôes", "capôes", "capoeiras", "caatingas" and natural forests are considered for this survey. Charcoal production originating from large-scale plantations is included in silviculture data.

Firewood - The ligneous material obtained from the extensions of branches and trunks of trees in adequate sizes (as billets or chippings) to be used as fuel for stoves, boilers, ovens, fireplaces, etc. As with charcoal, firewood production is surveyed only in native vegetation in the municipality.

Logs - The trunk of a tree cut in the round, still with its bark, sawn at both ends and used for the production of railroad crossties, poles, furniture, carpentry works, etc. The survey includes production of wood from all native species, including the native Araucária pine tree.

Pine node - Ligneous material formed in the intersection of the branches of pine trees and used, mainly as fuel for heating or raw material for handicraft works, besides serving as raw material for the production of activated charcoal.

Data collection methodology

Basic procedures

The collection of information is carried out in each municipality of the country. The questionnaires are sent to state agencies which distribute them to the collection agencies which conduct the information survey.

The agent collects the information consulting, informally, agricultural and cattle-raising companies and individuals, industries and other business in this sector.

The collection of information consists of periodical researches in the information sources by product, so as to enable the systematic follow-up of the exploitation of natural resources and the report of any phenomena that may have affected production during the year.

Collection instrument

Only one model of questionnaire is used, pre-codified for all municipalities, and composed of the following blocks:

Block 1 - Description of the municipality: the name of the municipality, homogeneous microregion and the state.
Block 2 - Data control entry: it indicates the number of tables and the type of information.

Block 3 - Researched products: the total quantity collected and average unit price for all products under survey. This block is divided into nine tables which are the product groups.

Block 4 - Information on silviculture production (until 1984 it was used for information on the native Brazilian pine tree - now incorporated in block 3).

Block 5 - Notes: Justifications and explanations of presented data to clarify doubts or to obtain more details, thereby possibly avoiding the return of the questionnaire (during the checking phase of the research) to the agent responsible for the data collection.

Block 6 - Authentication: the date of filling in and the name of the person in charge of the data collection.

There is also a block of instructions printed in the questionnaire identifying the basic characteristics of the research, general instructions and filling-in procedures.

**Checking procedures**

**Reception, codification and typing**

As soon as the questionnaires have returned to the state agencies (the DEGEs), they are sent to the Agriculture and Cattle Raising Statistics Department (DEAGRO) where there is a first verification of the data. This verification is for detecting omissions in which there is no information in the basis year for a product that has been recorded in previous years. These cases need consultation with the corresponding DEGEs, using the Complementary Information Bulletins (BICs). Afterwards, the questionnaires are codified and put in pasteboards.

The codification prepares all the questionnaires for typing and verifies the control totals calculated by the agents.

From 1981, some modifications were introduced, such as the creation of codes to indicate the number of lines recorded, followed by the table with information.

After typing, data go through a two-phase criticism process: quantitative criticism and qualitative criticism.

**Quantitative criticism**

Quantitative criticism has, as its main objective, data control, i.e. to ensure the correct codification of information, through the verification of control totals and the presence of information for all the variables of the recorded products.

Errors are listed by state and corrected in the report or in the Alteration Bulletins. When the corrections are completed, they are typed and submitted to a criticism programme creating a new
list. This list is checked and, if necessary, corrected, restarting the whole process that is repeated until all the errors are eliminated.

Qualitative criticism

After finishing the quantitative criticism, the next step is the qualitative criticism that tries to ensure the consistency of the recorded data. In this phase, all the information coming from the DEGEs in the BICs is transcribed in criticism lists. There are three models of qualitative criticism report:

- The first report has data of the collected quantity and the percentage of the variation that compares values of the previous year and the basis year of the research. This comparison, noting the percentages, discovers any extreme discrepancies between the two years. In these cases, the observation blocks of the questionnaires are checked to look for clarification, and then the DEGEs are consulted to confirm or rectify the data;

- The second report is issued for the analysis of the production of the native Brazilian pine tree. This report has information on the number of felled trees, from the production of wood (the previous year, the basis year and the percentage variation) and also the ratio of the wood production to the number of felled trees;

- The third report enables the analysis of average unit prices according to the product and the state. For such purpose it presents figures referring to the set of prices such as their central trend measurements (average, mode, median), loose points, extreme points and percentages. “Price acceptance intervals” are created based on this analysis. In a subsequent stage (called “automatic correction”), the prices are corrected whenever they are outside the acceptance interval, being automatically replaced by the lowest limit when they are lower or by the highest limit when they are higher.

Schedule

Collection: from January to May.
Codification and filing: from February to June.
Typing: from April to July
Quantitative criticism: from May to June.
Qualitative criticism: from August to November.
Checking and editing of tables: November.
Analysis of results: December

Diffusion of results

The data is presented in the form of a set of tables containing information on the quantity and value of production for all surveyed products within the nine groups. The collected data refer to Brazil, great regions and states, mesoregions, homogeneous microregions and municipalities.
FORESTRY PLANTATIONS

Objective

The research on silviculture aims to supply statistical information on the quantity and value of the main products originating from the exploitation of large areas of planted forests.

Period and scope of investigation

The inquiry is carried out annually involving the whole national territory, supplying information referring to the municipality, homogenous microregion, mesoregion, state, great region and Brazil.

Researched species

Twenty-four planted species are researched. A forest inventory is carried out annually for all these species, gathering information on the existing planted area and on the numbers of trees from all age groups, the new planted area and the number of planted seedlings, the harvested area and the number of felled trees.

As regards the species black acacia, “bracatinga”, “gmelina”, eucalypt, Brazilian pine tree, American pine tree, “quiri” and “sabiá”, information on the production and average unit price of logs for pulp and paper, as well as for other purposes (such as firewood and charcoal), is also gathered.

Furthermore, for black acacia, the quantity of dried bark in tonnes (t) and the average unit price per tonne are surveyed. For the eucalypt, the quantity of leaves in tonnes and the average unit price per tonne are researched.

Until 1980, this inquiry included the effective number of trees of mate, palm and hevea in addition to the production quantities and average unit prices of crumbled mate, palm tree and coagulated and liquid latex.

From 1986, the investigation has recorded the production quantity and average price of the following products: charcoal; black acacia dried bark (for tannin production); eucalypt leaves (for essential oil production); firewood; logs for pulp and paper as well as logs for other purposes; resin.

Basic concepts

The unit of area measurement used in the research is the hectare (ha, 10,000 m²). This research takes into account only the forest species within a minimum area of 1 ha in the municipality.

For each forest species investigated, its existing planted area is considered to be its total area in the municipality on 31 December (of the reference year or of the preceding year) including trees of any age, provided that they were planted in a defined place. The existing planted area includes

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1 Referred to generally as "silviculture".
the areas harvested in the reference year which remain for regeneration (resprouting), as well as those which have undergone thinning out.

The new planted area corresponds to the total area used for new cultivation in the municipality during the reference year of the research. The harvested area which remains for resprouting in the form of tree stumps or thickets is not considered as new planted area.

Harvested area corresponds to a part of the total existing planted area destined for the production of forest products during the reference year of the research. When the forest exploitation results from thinning-out operations, the harvested area is calculated on the basis of the effective number of felled trees and on the average stand density of the plantation.

Trees are all the species of any age, size or development of the forest species existing in the municipality, provided that they are planted in defined places.

Existing trees include all existing tree stumps or living thickets resulting from the felling of trees of species such as the eucalypt, which regenerate naturally without requiring to be replanted. For each species investigated, the existing trees category is considered to be the total quantity of trees existing in the municipality on 31 December (of the basis year or of the preceding year).

Felled trees include the total number of trees felled in the municipality during the year for the production of forest products such as wood, firewood, charcoal and bark of black acacia.

Planted seedlings include the total number of forest species seedlings planted during the reference year of the research in defined places. As regards those forest species which require direct planting into the defined place as seeds, seedlings or cuttings (of branches or roots) for vegetative propagation, the planted seedlings category is considered to be the number of planted holes. The following are not considered as planted seedlings: (a) seedlings under development in nurseries which have not yet been transplanted into defined places; and (b) tree stumps or thickets (i.e. coppice) resulting from felled trees of some species, such as eucalypt, which remain for natural regeneration without requiring to be planted again.

Resprouting is characterized by the regeneration of an adult tree which has been felled. Eucalypt can be mentioned as an example.

Thinning out is an operation in which selected trees are felled for industrial purposes or to allow better conditions for development of the remaining trees. These operations are usually carried out from the second year of life of the plant in the cultivated forests, so that the product obtained is generally used as raw material for the manufacture of pulp.

Logs are defined as felled tree trunks, sawn at the ends, which are used as fuel or turned into charcoal. Until 1980, data on wood production were collected without specifying the purpose of the production. Since 1981, the survey began to take this aspect into account, as follows: (a) pulp and paper wood: destined for the production of mechanical pulp used in the manufacture of paper, cardboard and cellulose; and (b) wood for other purposes: used in naval constructions, furniture industries and in the manufacture of items such as railroad crossties, beams, stays for mines, planks, scantlings, poles, stakes for foundations and fence pickets.

Firewood material obtained from the extensions of branches and trunks of trees in adequate sizes (as billets or chippings) to be used for burning or direct combustion in ovens, boilers, stoves, fireplaces, etc. Firewood production for transformation into charcoal is not included in this category.
Charcoal is a fuel resulting from the transformation of wood or firewood partially burned, in a closed place with a controlled air supply. The research includes all charcoal produced in the municipality obtained from firewood or wood from planted forests.

Black acacia dried bark is extracted from black acacia trunk soon after the tree is felled which, after being sun dried, is destined for the production of tannin. The research considers the production of dried bark in the municipality during the reference year.

From 1981, the research introduced the survey of production eucalypt leaves in the municipality during the reference year destined for industrial extraction of eucalypt essential oil (eucalyptol).

Average unit price is the weighted average of the prices received by the producers of the municipality during the basis year of the research. The average price paid to the producers is calculated by the weighted averages of quantity and price checked monthly, three-monthly or six-monthly according to the periods of the crop and commercialization of each product.

Data collection methodology

Basic procedures

The collection of information is carried out annually by IBGE’s collection agent in each municipality of the country.

First, the agent tries to be aware of the values assumed by the species already surveyed in the most recent agricultural and cattle-raising census, in order to establish parameters that will later be compared with the other information obtained. To prepare an estimate, the agent tries to gather the greatest amount of data from different sources of information. Generally, the Brazilian Institute for the Environment and the Renewable Natural Resources (IBAMA) agencies are consulted, as well as major producers, timber industries, paper and pulp industries and some banks granting production financing.

Collection instrument

Until 1984, only one model of questionnaire was used, pre-codified for all municipalities, composed of six blocks. From 1986 onwards, the information on silviculture became an integral part of the questionnaire referred to as “Production of Vegetable Extraction and of the Silviculture”. The blocks of the questionnaire used until 1984 are described below:

Block 1 - Description of the municipality: the state, homogeneous microregion and name of the municipality.

Block 2 - Data entry control: the number and content of tables.

Block 3 - Collection of forest production data. This is subdivided into two tables: the first presented information on the quantity and average unit price of the production of wood, firewood and charcoal from black acacia, “bracatinga”, eucalypt, “gmelina”, Brazilian pine tree, American pine tree, “quiri” and “sabiá”; the second referred to information on the quantity and average unit price for production of dried bark of black acacia and eucalypt leaves.
Block 4 - Forest inventory data: information on the status on 31 December (of the basis year and of the preceding year), indicating what occurred during the basis year for the surveyed planted species.

Block 5 - Notes: justifications and explanations of the presented data to clarify doubts or obtain more details, thus possibly avoiding a return of the questionnaire to the agent in charge of the data collection.

Block 6 - Authentication: information the data and name of the person in charge of the data collection. Instructions: printed in the questionnaire, containing the basic characteristics of the research, basic concepts, general instructions and rules for the filling in of the forms.

Checking procedures

Reception, codification and typing procedures are the same as those used for vegetal extraction production, because currently there is only one questionnaire. The process of criticism (quantitative and qualitative) is also the same.

Until 1984, data on the silviculture questionnaire were also submitted to a criticism programme relating to the reliability of the information for each species and the crosschecking of the information between the species and the products, as follows:

- analysis of the densities (number of trees/area) of the 24 species surveyed on Block 4 and the recorded average unit prices;
- analysis of the production of the surveyed species;
- analysis of the production of eucalypt leaves;
- analysis of the information on the area and number of trees (occurrences on the basis year and status on 31 December of the previous year and of the basis year);
- comparative analysis of two assessments of the existing planted area on 31 December of the year preceding the basis year (i.e. as recorded on the questionnaire of that year as well as on that of the subsequent reference year). The same analysis is carried out for the number of existing trees.

Schedule

The schedule is the same as that described above.

Diffusion of results

Data is published as a set of tables containing: planted area and number of existing trees of all ages (on 31 December of the reference year); new planted area and number of planted seedlings; harvested area and number of felled trees; quantity and value of the production of logs, firewood and charcoal for eucalypt, Brazilian pine tree, American pine tree, “bracatinga”, “gmelina”, “jacaré” or “pau-jacaré”, “quiri” and “sabiá”; and the quantity and value of production of dried bark, firewood and charcoal of black acacia. Until 1980, the presentation also included the quantity and value of production of crumbled mate, palms and rubber tree latex (coagulated and liquid).

Tables 1 - 5 present selected data on Brazil’s production of vegetal extraction and silviculture, as well as import and export information. The Appendix gives botanical names of species which yield various forest products.
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PRODUCTION OF NATURAL FORESTS AND PLANTATIONS, BRAZIL, 1989-93
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Source: IBGE

(1) Quantity in cubic metres
(2) Quantity in '000 of trees
### Table 2: Import of forestry products, 1993-94

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Source: IBAMA/Dtic
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Source: IBAMA/DTIC
Table 4. Evolution of export of forestry products, 1990-94, by value (thousand US$ FOB)

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Source: IBAMA/DTIC
Table 5. Evolution of forestry products exports, 1990-94, by quantity (tonnes).

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</tr>
<tr>
<td><strong>B.2. Manufactured products</strong></td>
<td>1557637</td>
<td>1687719</td>
<td>2088320</td>
<td>2696871</td>
<td>2874430</td>
</tr>
<tr>
<td>1. Dressed wood</td>
<td>103622</td>
<td>126021</td>
<td>171893</td>
<td>259418</td>
<td>289803</td>
</tr>
<tr>
<td>2. Fibreboard</td>
<td>239233</td>
<td>239780</td>
<td>259459</td>
<td>295192</td>
<td>301259</td>
</tr>
<tr>
<td>3. Veneer</td>
<td>39751</td>
<td>38306</td>
<td>46401</td>
<td>144099</td>
<td>89285</td>
</tr>
<tr>
<td>3.1. Coniferous trees</td>
<td>691</td>
<td>763</td>
<td>1103</td>
<td>3028</td>
<td>14615</td>
</tr>
<tr>
<td>3.2. Non-coniferous trees</td>
<td>39060</td>
<td>37543</td>
<td>45298</td>
<td>141071</td>
<td>74670</td>
</tr>
<tr>
<td>4. Plywood</td>
<td>196821</td>
<td>185705</td>
<td>264606</td>
<td>425606</td>
<td>471638</td>
</tr>
<tr>
<td>5. Chipboard</td>
<td>5338</td>
<td>6031</td>
<td>15637</td>
<td>28877</td>
<td>42075</td>
</tr>
<tr>
<td>6. Paper</td>
<td>15652</td>
<td>20652</td>
<td>95393</td>
<td>107043</td>
<td>150642</td>
</tr>
<tr>
<td>7. Furniture</td>
<td>957220</td>
<td>1071224</td>
<td>1234931</td>
<td>1436636</td>
<td>1529728</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>2936529</td>
<td>3322373</td>
<td>4424239</td>
<td>5880963</td>
<td>6511280</td>
</tr>
</tbody>
</table>

Source: IBAMA/DTIC
Appendix - Botanical names of species involved

Group I: Rubbers
Hevea: Hevea spp.
Mangabeira: Hancornia speciosa
Maniçoba: Manihot spp.

Group II: Non-elastic gums
Balata: Ecchinusa balata
Maçaranduba: Manilkara huberi
Sorva: Couma utilis
Coquirana: Ecchinusa sanguinolenta

Group III: Waxes
Carnaúba: Copernicia prunifera
Licuri: Syagrus coronata

Group IV: Fibres
Buriti: Maurita flexuosa
Carnaúba: Copernicia prunifera
Caroa: Neoglossovia variegate
Piaçava: Leopoldina piassava
Cipo-imbém: Philodendron imbe
Crina: Sida rhombifolia
Malva: Urena lobata
Paine: Pseudobombax longiflorum
Taboa: Rptha sp.
Tucum: Astrocarum tucuma

Group V: Tinning products
Angico: Anadenathera sp.
Barbatimão: Stryphnodendron adstringens
Mangue: Rhizophora mangle
Quebracho: Aspiroperma quebracho-blanco

Group VI: Oleaginous plants
Babaçu: Orbignya speciosa
Copaiba: Copaifera spp.
Cumaru: Diperix odorata
Licuri: Syagrus coronata
Oiticica: Licania rigida
Pequi: Caryocar brasiliense
Tucum: Astrocarum tucuma
Andiroba: Caraoa guianensis
Indaiá: Attaelea spp.
Macauiba: Acrocomia intumescentis
Muru Muru: Astrocarum murumuru
Ucuuba: Vnla supinamensis
Group VII: Food products
Açai: Euterpe oleracea
Cashew nut: Anacardium occidentale
Brazilian nut: Bertholelia excelsa
Mate: Ilex paraguaiensis
Mangaba: Hancornia speciosa
Palm: Euterpe oleracea
Pinhão: Araucaria angustifolia
Umbu: Spondias purpurea

Group VIII: Aromatic, Medicinal, Toxic and Coloring Plants
Ipecacuanha: Cephaelis ipecacuanha
Jaborandi: Pilocarpus sp.
Uruçu: Bixa orellana
Jatobá: Hymenaea courbaril
Jutaí: Hymenaea stignocarpa
Quina: Geissospermum sericeum
Timbó: Derris urucu

Group IX: Woods
Charcoal
Firewood
Log
Pine node
Brazilian pine tree Araucaria angustifolia
CHINA - CASE STUDY ON FORESTRY STATISTICS

by Dai Guangci
China National Forestry Economics and Development Research Centre, Beijing,
People's Republic of China

INTRODUCTION

In recent years, the Chinese Government has paid great attention to the problems of resource shortage and environmental damage as well as rapid population growth. Forestry is recognized as playing an important role in the improvement of the environment and in sustainable development.

Forestry in China has developed very fast, especially the growth of the resource. Since 1991 a former resource deficit has changed to the situation where forest growth exceeds consumption. According to the Fourth National Inventory of Forest Resources conducted between 1989 and 1993, China now has 133.7 million hectares of forest lands with a forest cover of 13.92 percent. Since 1989, the area of land in forest has been growing at a rate of 1.82 percent each year. Forest timber reserves make up 10,137 million m³ of the total volume of standing timber of 11,785 million m³, a volume which has been increasing at a rate of 6.68 percent each year. The average annual growth is 419 million m³ and average annual consumption is 320 million m³.

CONTENT OF NATIONAL FORESTRY STATISTICS

Forestry statistics in China has developed considerably over the past 40 years. The aim is to collect, process and analyze information relating to forest resources, exploitation, management and development, and to illustrate the scale of activities in the sector, so as to identify development trends.

Major objects of forestry statistics

- To quantify the resources and materials involved in production of silviculture and forest industries, such as labour, equipment (including tools, machines, roads and buildings) and objects (including land, seeds, seedling, timber).

- To illustrate the systems of forest enterprises and institutes, organization of forestry management, trade and distribution of forest products, and wages and welfare distribution.

- To illustrate the investments in fundamental instruction dedicated to forest and forest industries production.

The ten key items of the National Forestry Statistics Yearbook

Statistics on silviculture

- providing information on forest management by forestry enterprises, institutions, rural collectives, organizations and individuals. The activities covered include seed collection, nurseries, site preparation, replanting and tending in terms of quantity and quality. The statistics also give information on the value and volume of output of forest products, on forest protection and on disease and pest control.
Statistics on forest industries

including information on the output of the logging, wood processing and forest chemical industries. Data are provided on type, specification, quality of roundwood, sawn timber, plywood, fibreboard, particle board, tannin extract and rosin. Forest industry statistics also give the output value of commodities and total and net output values from the forest industry and the operation of major forest enterprises as well as the product structure of the industry. Taking 1993 as an example, the main data are shown as in Tables 1 and 2.

Table 1. Output of the logging and wood processing industries

<table>
<thead>
<tr>
<th>Products</th>
<th>Output (million m³)</th>
<th>Change in output in 1993 as against 1989 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1989</td>
<td>1993</td>
</tr>
<tr>
<td>Roundwood</td>
<td>58.02</td>
<td>63.92</td>
</tr>
<tr>
<td>Sawnwood</td>
<td>13.93</td>
<td>14.01</td>
</tr>
<tr>
<td>Plywood</td>
<td>0.73</td>
<td>2.12</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>1.44</td>
<td>1.81</td>
</tr>
<tr>
<td>Particle board</td>
<td>0.44</td>
<td>1.57</td>
</tr>
</tbody>
</table>

Table 2. Output of the forest chemical industries

<table>
<thead>
<tr>
<th>Products</th>
<th>Output (tonnes)</th>
<th>Change in output in 1993 as against 1989 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1989</td>
<td>1993</td>
</tr>
<tr>
<td>Rosin</td>
<td>409000</td>
<td>503700</td>
</tr>
<tr>
<td>Shellac</td>
<td>800</td>
<td>900</td>
</tr>
<tr>
<td>Tannin extract</td>
<td>26400</td>
<td>26200</td>
</tr>
<tr>
<td>Pulp</td>
<td>8685600</td>
<td>8849300</td>
</tr>
<tr>
<td>Paper and paper board</td>
<td>13330000</td>
<td>19140000</td>
</tr>
<tr>
<td>Turpentine</td>
<td>58100</td>
<td>61600</td>
</tr>
<tr>
<td>Active carbon</td>
<td>12300</td>
<td>25000</td>
</tr>
</tbody>
</table>

Statistics on forestry machinery and capacity

indicating the quantity, performance and technical parameters of all kinds of forestry machinery as well as machine maintenance and repair, and the degree of mechanization in the forestry sector.
- information on changes in the production capacities for major forest products, such as timber, sawn timber, plywood, fibreboard, particle board, tannin extract and rosin. Table 3 shows the production capacities for these products in 1993.

Table 3. Production capacities for major forest products, 1993

<table>
<thead>
<tr>
<th>Products</th>
<th>Capacity</th>
<th>Capacity increase in the year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tones</td>
<td>million m³</td>
</tr>
<tr>
<td>Timber</td>
<td>26.20</td>
<td></td>
</tr>
<tr>
<td>Sawnwood</td>
<td>7.46</td>
<td></td>
</tr>
<tr>
<td>Plywood</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Particle board</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Fibreboard</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>Rosin</td>
<td>474053</td>
<td>-</td>
</tr>
<tr>
<td>Tannin extract</td>
<td>29698</td>
<td>-</td>
</tr>
<tr>
<td>Shellac</td>
<td>5758</td>
<td>-</td>
</tr>
</tbody>
</table>

Statistics on wages

- covering changes in the wages of people working in the forestry sector, wages structure, productivity, labour insurance, welfare and safety, as well as the total and average number of forestry workers.

Statistics on forestry fixed assets

- covering information on capital construction in silviculture and the forest industry. In each classification within the sector data are given on total investment from various sources of funds, additional fixed assets and productive capacities, economic benefits resulting from the investment and progress and quality of operations.

Statistics on forestry finance and cost

- indicating the sources of funds and their uses in forestry production, the costs of various products and profits gained, including changes in fixed and circulating funds, payments to the state and the efficiency of use of funds.

Statistics on gross social output from the forestry sector

- indicating the output value produced by various activities carried out within the forestry sector, such as agriculture, processing industries, building, transportation, commerce and catering.
Statistics on major forestry projects

- covering the data of the production, investments and investment sources involved in seven major forestry projects, namely the “Three North Shelterbelt Systems”, the middle and upper reaches of the Yangtze River shelterbelt system, the shelterbelt system along the coastal areas, the afforestation project in the Taihang Mountains, the afforestation project in plains areas, the prevention and harness project for the desert areas, and the fast-growing and high-yield plantation project.

Statistics on agriculture and sideline production by forestry enterprises and institutions

- providing information on the area under cultivation and the output of various crops in forest areas together with data on animal husbandry and by-products.

Statistics on forestry education

- illustrating the scope, structure and trends in forestry education, including information on the number of teachers, courses and students in institutions of higher learning and in secondary schools.

DATA COLLECTION

Forestry statistical data are currently collected through overall surveys in China. Sampling and specific surveys are usually auxiliary means. Overall collection and compilation are conducted at four levels: county, prefectural, provincial and national levels. Taking comprehensive statistics as an example, the Statistical Division in the Ministry of Forestry is in charge of formulating unified reporting forms and circulating them to forestry statistical organizations in provinces as legal documents. Each province can make adjustments to allow for local conditions and then set up a reporting system. This reporting system using unified forms runs through the counties and local statistical organizations (county forestry bureaus or state-owned forest farms and forest industry enterprises). However, statistical forms for reporting must be completed in accordance with regulations and cannot be changed or altered. Reporting must be done verbatim starting from county to prefecture, then province and finally to the Ministry of Forestry. Before reporting, the completed forms should be approved by the local administrative head. Information and data in the forms cannot be revised without convincing reasons and the necessary approval procedures.

As far as silviculture statistics from rural areas are concerned, the Ministry of Forestry together with the State Statistical Bureau creates forms and distributes them to the forestry working stations in townships and to local-level statistical organizations for data collection.

ORGANIZATIONS RESPONSIBLE FOR FORESTRY STATISTICS

Responsibilities of organizations

The organizations responsible for forest statistics at various levels are components of forestry administrative departments and enterprises of different types in China. The Statistical Division of the Ministry of Forestry is in charge of statistical work in the forestry sector in the country. The responsibilities of the Statistical Division include the collection, processing and analysis of comprehensive statistical information concerning silviculture, forest industries, productive capacities, equipment, wages, investment on fixed assets and total output value from forestry. The division receives direct guidance from the State Statistical Bureau. Within the Ministry of Forestry,
departments are responsible for statistics on their specialist subjects but they receive guidance from the Statistical Division. Table 4 shows the detail of statistical responsibilities.

### Table 4. Responsibilities for statistics within the forestry sector

<table>
<thead>
<tr>
<th>Administrative unit in Ministry of Forestry</th>
<th>Specialized statistical subject area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Division, Dept. of Planning</td>
<td>Comprehensive statistics</td>
</tr>
<tr>
<td>Dept. of Forest Industries</td>
<td>Forest industry, agriculture and sideline production, timber supply and marketing</td>
</tr>
<tr>
<td>Dept. of Finance</td>
<td>Financing and costs of forestry</td>
</tr>
<tr>
<td>Dept. of Personnel and Education</td>
<td>Labour, wages and forestry education</td>
</tr>
<tr>
<td>Dept. of Forest Resource</td>
<td>Changes in forest resources and their structure</td>
</tr>
<tr>
<td>Dept. of Science and Technology</td>
<td>Scientific researches and extensions</td>
</tr>
<tr>
<td>Dept. of Forestry Machinery Company</td>
<td>Manufacturing, marketing and storage of Machinery Company forestry machinery</td>
</tr>
<tr>
<td>Dept. of Forest Products Industry Company</td>
<td>Wood processing, supply and marketing and forest chemical products</td>
</tr>
<tr>
<td>China Forest Seed Company</td>
<td>Supply, marketing and trade of tree seeds and seedlings</td>
</tr>
</tbody>
</table>

**Statistics on forest products trade**

Under the current statistical system in China, the State General Administration of Customs is in charge of import and export trade statistics. Each customs office classifies the actual import and export trade amount (with reference to the classified standard of commodities) and presents an itemized report to the State General Administration of Customs. This body is responsible for national data compilation, printing, publication of the Yearbook of China Customs Statistics and dissemination to government organizations, particular departments concerned and to the public.

Currently, China has more than 20 countries as major trading partners for forest products, including Japan, Indonesia, the United States of America, Canada, Sweden, Brazil and Russia. The major forest products traded are roundwood, sawnwood, bamboo, plywood and pulp and paper. Imports and exports of these products in 1993 are shown in Table 5.

**Statistics on pulp and paper and chemical products**

Pulp and paper industries in China belong mainly to the Ministry of Light Industry which collects and compiles the Yearbook of Paper Statistics. Some paper and forest chemical enterprises belong to the Ministry of Forestry or to other sectors such as the Ministry of Chemistry. The Statistics Division in the Ministry of Forestry collects only the data for the enterprises within its sectors.
Personnel involved in statistics

The forestry department in each province, autonomous region or municipality has its own forestry statistical organization with specialized staff in charge of statistical work. The statistical organizations at prefecture and county levels are classified into two categories. In major forest-growing areas, full-time staff members are assigned to statistical work, whereas in non-forested areas, especially at county level, most statistical work is done by part-time staff. At the forestry working stations at township level, staff members are responsible for collecting, classifying and reporting forestry statistical data in addition to their other duties. China does not have private organizations for forestry statistics.

Table 5. Imports and exports of forest products (million US$), 1993

<table>
<thead>
<tr>
<th>Products</th>
<th>Unit</th>
<th>Import</th>
<th></th>
<th>Export</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Volume</td>
<td>Value</td>
<td>Volume</td>
<td>Value</td>
</tr>
<tr>
<td>Roundwood</td>
<td>m³</td>
<td>4997409</td>
<td>686.10</td>
<td>-</td>
<td>432.46</td>
</tr>
<tr>
<td>Plywood</td>
<td>m³</td>
<td>19901</td>
<td>762.16</td>
<td>19993</td>
<td>5.79</td>
</tr>
<tr>
<td>Bamboo</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>103.38</td>
</tr>
<tr>
<td>Pulp</td>
<td>t</td>
<td>516358</td>
<td>219.29</td>
<td>4565</td>
<td>1.43</td>
</tr>
<tr>
<td>Paper and paper board</td>
<td>t</td>
<td>2934795</td>
<td>1686.43</td>
<td>469677</td>
<td>542.36</td>
</tr>
<tr>
<td>Rosin</td>
<td>t</td>
<td>-</td>
<td>-</td>
<td>224241</td>
<td>127.39</td>
</tr>
</tbody>
</table>

INFORMATION TECHNOLOGY APPLICATION

Since 1985, microcomputers have been used to process forestry statistical data. Their use has reduced the time for processing statistical statements and improved efficiency and quality. All provincial forestry statistical organizations have now become computerized as well as some prefectures and counties where forestry is the main industry. In addition, some forestry enterprises and institutions use computers for data collection and processing. Since 1989, the provincial yearly statistical reports have been delivered on floppy diskette. However, the network between the Statistics Division and provincial statistical organizations has not yet been built up because of economic conditions, so the data delivery has to go through four levels from the local organization to the Statistics Division. This takes much time and resources and many people are involved in the work. A computer communication network system is soon to be set up between central and provincial levels for statistical calculations, data sorting, compilation, publication and dissemination.

USERS AND USES OF FORESTRY STATISTICS

Users and uses of national forestry statistics in China can be classified as follows:

- Decision makers in each level of forestry administration. The statistics provide a reference for them to analyze the operational state of forestry economy and policies, and to make decisions.

- Researchers. The data allow study of the current industrial structures and policies of forestry, the forest products market and trade, etc. For example, researchers can analyze
the demand and supply of forest products according to the time series statistics of production and consumption so as to provide a reference for the decision makers.

- Forestry enterprises and individuals use forestry statistics for their management decision making.
- Decision makers and researchers in other sectors related to the forestry sectors, such as the light industry, pulp and paper, coal and building sectors, use forestry statistics for analyses of the raw material supply and their products market.

PROBLEMS

Traditional forestry statistics in China primarily serves the planned economy: the statistical indicators, methodology for collecting data and the data collecting, processing, compiling and disseminating are all suitable for production statistics. A centralized and unified statistical system in accordance with the product economy system, the production statistics aims to examine the performance of the plan. This statistical system has developed over many years and its indicators are now sufficient for the basic operation of forestry economics. However, it cannot meet the requirements of the current system of a socialist market economy. The problems in this respect can be described as follows:

Indicator system

- The current indicators of forestry statistics focus on the statistics of material production enterprises and do not illustrate the social labour and services provided by institutions involved in the production of intangibles. Therefore they do not satisfy the new system of national accounting. For example, gross social output from the forestry sector reveals only the output value from agriculture, building construction, transportation and commerce within the forestry sector; it does not include non-market goods, such as the output value from forest tourism and other services from forests. Hence, it does not present the total output value from the activities involved in forest production.
- Some indicators, such as statistics on silviculture, do not reveal the total production of forestry. According to the rules made by the State Statistical Bureau, statistics on silviculture do not include products such as tea, mulberry and fruits, which are produced mainly by the forestry sector.
- Calculation of some statistical indicators may be called into question. For example, the output value of silviculture is calculated from the inputs (including labour and materials) instead of from the outputs, so it cannot exactly represent the total outputs resulting from silviculture.

Methodology and technology used in the statistics

Currently the overall survey and report are the main forestry statistical methods used in China for collecting data. The main shortcomings are:

- The overall survey takes a long time. Forestry statistical data are collected and compiled at four levels: county prefecture, province and the central Statistics Division. The overall investigation includes devising forms for the different levels, circulating and collecting the forms, and the final assembly. The process takes more than six months. Thus it does not provide the time effectiveness required for statistical data.
The overall survey could not ensure the quality of data. Because a large number of forms and many people are involved, it is not easy to make the data accurate.

The data collected by the overall survey could not meet all the needs of provincial and local forestry administrations. Local statistical organizations could not change the statistical indicators or the forms, so the data served mainly to support macro-level management decisions.

There is a lack of means for processing and assembling data. Because the network between the central and the provincial statistical organizations has not been set up, data assembly involves much work and takes a long time.

**IMPROVEMENTS**

In recent years, the leaders and authorities in various levels of statistical organizations have been trying to improve the current statistics system to reduce its problems and drawbacks and to make it better suited to the new socialist market economy. The main changes can be described as follows:

- To reflect the implementation of ecological and economic forestry projects, the National Forestry Statistical Yearbook has included, since 1991, the statistics on major forestry projects. These cover data of the production, investments and investment sources involved in seven major forestry projects, namely the "Three North Shelterbelt Systems", the middle and upper reaches of the Yangtze River shelterbelt system, the shelterbelt system along the coastal areas, the afforestation project in the Taihang Mountains, the afforestation project in plains areas, the prevention and harness project for the desert areas, and the fast-growing and high-yield plantation project.

- The reform of administration accompanying China’s transition from the planned economic system to a market economic system led to the Ministry of Materials Supply being cancelled in 1993. Correspondingly, the Department of Forestry Materials Supply within the Ministry of Forestry was also cancelled. Thus the statistics on supply and storage of forestry materials were withdrawn from the National Forestry Statistical Yearbook.

- Since 1993, statistics on gross social output from the forestry sector have been added to the National Forestry Statistical Yearbook. The items indicate the output value produced by various activities which belong to the forestry sector, such as agriculture, processing industries, building, transportation, commerce and catering.

**DIRECTION OF DEVELOPMENTS**

**To improve the current methods for collecting data**

Experts in forestry statistics have proposed improving the current methods for collecting data by creating a system of data collecting methods that includes general surveys, sampling surveys and specific and typical surveys.

The main characteristics of the proposed system are as follows:
To be based on periodic general surveys. The main items include the basic statistics derived from state-run forest farms, forest nurseries and state-run forestry enterprises. These statistics can cover each ten-year period. During the general survey, the sampling survey can be used for annual statistics. It is necessary to ensure a high quality of general survey in the formal documents, including content of the data collected, time of survey, organization of performance and financial support.

- To make wide use of sampling surveys in the statistics on silviculture, forest industry production and fixed assets investments to obtain such items as afforestation areas and yield of timber.

- To simplify the statistical forms and to use sampling or typical survey methods instead of the traditional overall statistical forms. This would reduce the amount of work and save time.

**To improve the forestry statistical system and set up an information system supported by a computer network**

The system consists of four aspects:

- To set up a statistical analysis model with special software. The functions of the software should satisfy the requirements of various levels of statistical organization and process and compile the data in the central system. To provide advanced statistical consulting services, it is also necessary to create a monitor and forecast model for macro forestry economic management by means of modern econometric methodology.

- To set up a computerized communication network of forestry statistical information. The network consists of two parts: "horizontal" and "vertical". The horizontal network connects the forestry statistics system with the statistical systems in sectors other than forestry. This should ensure immediate access to the forest economic information involved in other sectors, prevent double accounting and reduce the amount of work for local institutions. The vertical network connects the different levels of statistical units inside the forestry sector and delivers and processes the data. According to China's current situation, the first step is to set up the network connecting the Central Forestry Statistics Division with the provincial forestry statistics sections to enable point-to-point data communication and finally to set up a completed network covering all forestry statistical units.

- To create a specific database of forestry statistics. First, to set up a database containing the historical data of forestry statistics; second, to extend the database with new information; finally, to aim for provision of an ideal statistical service system.

- To publish and disseminate information on forestry by means of various media. To develop forestry statistics in accordance with commercial, industrial and international trends and to reach the level of paid consulting services.

**To improve the statistical indicators**

To meet the requirements for the ecological and economic forestry construction proposed by the Chinese Government and the requirements for forestry sustainable development, officers in the Statistics Division, in cooperation with some specialists, are researching how to improve the current statistical indicators and calculation methods. They think that the new indicators should reflect
objectively the process and results of forestry economic activities as well as reflect sustainable development. The main efforts made include the following:

- To improve the calculation of the output value of silviculture by using the volume of forest resource product multiplied by its price instead of using working time for silviculture production multiplied by wages. Forest resource products consist of timber products and forest environmental products, and the scope of statistics includes both plantation and natural forest. Statistical indicators are the total output value, the products output value and the added value of silviculture. This improved concept has been accepted by the State Statistical Bureau and is under further research; it will be put into use in the near future.

- To add indicators that reflect the changes of forest resources and environment so as to illustrate the costs to forest resources and environment resulting from economic activities. Research is under way on establishing the accounting system of forest and environment and integrating it with the system of national accounting. This research work has aroused the Chinese Government's attention and it has been taken into the Forestry Action Plan of China Agenda 21. It is hoped to create a national scheme for a forest resource and environmental accounting system before the end of this century.
CASE STUDY ON FINNISH STATISTICAL YEARBOOK OF FORESTRY

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The Finnish Forest Research Institute, Helsinki, Finland

INTRODUCTION

Finland is a country situated within the boreal coniferous zone. Two-thirds of the total land area of Finland is covered by productive, closed forests. Three major tree species dominate: Scots pine (Pinus sylvestris), Norway spruce (Picea abies) and Birch (Betula sp.), and they constitute 46, 37 and 15 percent of the total growing stock, respectively. Erosion is not a problem for forest soils. In addition, natural regeneration is usually successful in boreal forests.

Finland's forest resources amount to over four hectares of forests per capita; this is more than anywhere else in Europe. Good harvesting conditions and infrastructure, easily workable, valuable tree species, combined with good accessibility to major European markets, have made the forests to our real source of welfare. During the past few years, forest industry products have accounted for almost 40 percent of Finland's total exports. Thirty-four percent of Finland's net foreign-exchange earnings derives from forest industry products. The share of the forestry sector in the gross domestic product in basic values in 1994 was 8 percent. Because of the importance of forestry and forest industries there is demand of consistent, reliable and up-to-date information about the forest sector in Finland.

Since the mid-1960s, it has been the responsibility of the Finnish Forest Research Institute (abbr. METLA) to compile, publish and develop official forest statistics in Finland. As part of this endeavour, METLA continuously carries out national forest inventories. At METLA, the compilation of other forest statistics is organised as a separate project (Forest Statistics Information Service, acronym FSIS), consisting of eight full-time researchers and three secretaries. In general, official statistics in Finland are produced by the central statistical office, Statistics Finland. In this respect, the forestry sector is an exception.

For more than two decades, the Statistical Yearbook of Forestry has constituted the backbone of forest statistics in Finland. The first yearbook was launched in 1969, and just a few days ago FSIS published the 25th volume. During the 1970s, there were only two publications regularly presenting forest statistics; the yearbook and a separate annual report on wood consumption and total drain. Since then, the product range has gradually become more versatile. First, forest statistical bulletins, mainly published on a monthly basis, were introduced to monitor seasonal fluctuations in the forestry sector. The statistical bulletins cover the following topics mainly on a monthly basis: roundwood sales, prices, removals, forestry labour, foreign trade in roundwood, exports of forest industry products (approx. 70 issues in 1995, in Finnish only). The statistical data contained in the bulletins are also presented in aggregated form in the yearbook. Second, a computer-based forest statistics information system was established in 1994 to deliver on-line information.

This diversification has changed the role of the yearbook and, to some extent, reduced its importance. The present yearbook delivers background information, extensive time-series, etc. When monthly or weekly data are required, the customers most often resort to statistical bulletins or information extracted from the database.

The objective of this paper is to describe the overall process of producing the Statistical Yearbook of Forestry of Finland.
THE DATA CONTENT OF THE YEARBOOK

Initially, the yearbook greatly focused on two main subjects; i.e. forest inventory information and statistics on silviculture and forest improvement work. These have remained as the key topics. However, the coverage of the book gradually has been enlarged. Consequently, the objective of the present yearbook is to offer a statistical overview of the whole Finnish forestry sector (i.e. forestry and the forest industries). The idea is that when this goal is reached, the essential forest statistical data are available in a single publication. The scope of the yearbook ranges from forest assessment data to foreign trade in forest-related products.

Detailed regional data are presented for the last two years. In addition, the book comprises time series, most of which originate from the 1950s. The book is bilingual (Finnish, English), including also a Swedish summary. The statistical material is grouped under thirteen main chapters, each consisting of text, figures and tables. The text section of each chapter includes a short summary of the topic and principles applied in the statistics. The data sources and the coverage of the statistics are also mentioned. In recent years, the share of figures has increased. By using figures, it is possible to illustrate the essential information of the chapter in easy-to-understand and compact form. The book contains approx. 200 tables and 60 figures. The main chapters and their relative importance are presented below:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>% of pages</th>
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<tbody>
<tr>
<td>1</td>
<td>14</td>
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<td>12</td>
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<tr>
<td>13</td>
<td>7</td>
</tr>
</tbody>
</table>

Statistics connected with forestry alone dominate the yearbook. Their proportion amounts to approx. 80 percent of the total contents, leaving less than 20 percent to forest industry-related statistics. Three major statistical areas (Chapters 1, 4 and 5) cover more than 40 percent of the overall contents of the book.

THE EXISTING INSTITUTIONAL INFRASTRUCTURES INVOLVED IN DATA COLLECTION

This chapter introduces the most important forest statistical data providers in Finland. The others are listed in chapter 4. In the following, the data providers are classified according to the sector of forestry they represent.

Forest Research

The responsibility of the Finnish Forest Research Institute (METLA) is solve problems in forestry through research work. The activities of METLA are funded through the national budget. One of the important tasks for METLA is to produce national forest statistics. The research projects
mostly involved with statistical work are the national forest inventory and forest statistics information service.

Organizations in non-industrial, private forestry

Essential features of non-industrial, private forestry

Over 60 percent of the forest land in Finland belongs to private non-industrial forest owners. Their share of the timber resources and growth is even more, about 70 percent. The non-industrial, private forest area (12 million hectares) is divided among 439,000 owners and the average woodlot size is only 27 hectares. The data on operations in these forests are not collected from among the huge number forest owners but through their organizations. The four organization levels for non-industrial, private forestry are presented below.

Local forest management associations

Forest owners are organized through local forest management associations (312 in number in 1994). One association usually covers the area of one or several municipalities. The aim of local forest management associations is to promote forestry knowledge and skills among the forest owners in their area, to provide professional assistance in silvicultural work, and to assist in the sales of roundwood, etc. The associations finance their activities through receiving statutory "forestry fees" collected from all forest owners and by providing professional assistance. The primary data on stands marked for felling and the amounts and costs of silvicultural work are largely provided by these associations.

Federations of forest management associations

Federations of local forest management associations (19 in number) represent the associations at the regional level. They are active in looking after the interests of forest owners - especially in matters concerning the roundwood trade and forest taxation. The activities of the federations are guided by the Central Federation of Agricultural and Forestry Producers. Local forest management associations and federations are well acquainted with the roundwood trade in their area. Their help has been used in obtaining complete regional lists of local timber procurement organizations. FSIS uses these lists as sampling frames in sample surveys.

Regional forestry boards

Regional forestry boards (19 in number) are authorities promoting non-industrial, private forestry: e.g. through guidance aimed at forest owners, district and individual forest management plans, construction of forest roads, and cleaning of ditches on drained sites. Forestry boards oversee the Private Forestry Act, Forest Improvement Law and other forestry legislation. Local forest management associations are also guided and supervised by the regional forestry board.

Forestry boards control and edit the data produced by associations. They add to the collected data information about drainage and forest roads. Also, State subsidies given to the private forest owners for silvicultural and forest improvement work are registered there. Forestry boards are information nodes where one should be able to find spatial information on the special features of regional forest nature, e.g. threatened species, old forests.
Forestry centres

The forestry centres (one for Finnish-speaking Finns and another for Swedish-speaking Finns) steer regional forestry boards. The centres oversee the application of the Private Forestry Act and promote cooperation in the field of forestry. Forestry centres also produce nationwide statistics on non-industrial private forestry, and these are also used by FSIS. Both forestry boards and forestry centres receive most of their funding from the national budget.

Organizations entrusted with stewardship of state-owned forests

There are 4.9 million hectares of state-owned forest land in Finland and the Finnish Forest and Park Service (FFPS) is entrusted with the management of most of it. Besides forestry, FFPS’s tasks include the management of conservation areas on state land and the providing of recreation possibilities. FFPS operates as a state-owned business enterprise and part of its activities are funded from the government budget. Other authorities caring for state-owned forests are the Finnish Forest Research Institute (METLA), the Board of Education, and the Ministry of Defence. These authorities use forests for their own special needs, e.g. METLA as research fields. Each State authority produces primary data for silvicultural statistics. The primary data on roundwood fellings of state-owned forests is collected only by FFPS.

Organizations within forest industries

Companies, mostly forest industry companies, own 9 percent (1.7 million hectares) of the forest land in Finland. Large and most medium-sized forest industry companies are members of the Finnish Forest Industries Federation. The object of the Federation is to promote the economical and industrial operating conditions and safeguard industrial labour relations within the forest industry sector. The Federation collects primary statistical data from among its member-companies and from other statistical sources, and produces summary statistics, which are largely used by FSIS. These statistics cover matters such as roundwood stocks, purchases and prices, wood harvesting and transportation, wood products and foreign trade.

Foreign trade

The Board of Customs collects the primary information on Finland’s foreign trade. All statistics on the export and import of roundwood and forest industry products are based on summary information produced and published by the Board of Customs.

THE METHODS USED IN COLLECTING DATA

Introduction

The data of the Finnish Statistical Yearbook of Forestry originate from FSIS’s own statistical enquiries and METLA’s research projects, as well as from external statistical authorities and other organizations in the forest sector. The following the statistics produced by METLA are demonstrated in more detail and statistics collected from external statistical sources are listed. Forest statistics information service and the national forest inventory produce 28 and 15 percent of the Tables of the yearbook, respectively.

The primary statistical data that METLA and FSIS collects are normally based on either measurements or enquiries. The secondary data that FSIS collects are usually obtained from organizations involved in producing statistics or from other statistical publications. There is no statutory obligation to supply statistical data to FSIS (except data needed for forest taxation). The
whole system is based on good cooperation with the interest groups of FSIS. Mutual understanding of the necessity to deliver valid information is required to provide a firm basis for producing statistics.

One of the most important aims in producing forest statistics in Finland is rationality in data collecting. The same primary statistical information must not be collected twice. The collected information should be relevant and the statistical classifications used should be generally accepted. FSIS has an active expert role in the discussion of the needs and classifications of forest statistics.

Statistics produced at the Finnish Forest Research Institute

National forest inventory

The statistics concerning Finland’s forest resources are mainly based on national forest inventories. The Finnish National Forest Inventory (NFI) has produced measurement-based time series, statistics, maps, and publications on forest resources, forest conditions and forest ecosystem on regional and national level for over 70 years. Examples of these statistics are: area distribution of land-use classes, area distribution of forestry land, area distribution by stand characteristics such as site fertility, age, species, development class and silvicultural state, all by region and by ownership category. Information on forest health conditions is included as well. Some inventories have produced detailed information on the distribution of ground vegetation and fauna. The main results of the national forest inventories are published in the Statistical Yearbook of Forestry.

The field measurement data for inventories is nowadays collected from L-shaped clusters. The distance between two clusters varies from south to north, with the density and variableness of forests and is 7 kilometres both in north-south and east-west directions in the northern part of Central Finland. One cluster has 15 sample plots, of which three are permanent and the other twelve temporary. Bitterlich sample plots are applied. The results for large areas (200 000 hectares or over), involving reliability assessments, are computed by means of field measurements. Volume estimates of the growing stock and increment are based on detailed measurements of sample trees, taper-curve models and generalization of sample tree results to tallied trees.

The results for small areas (about 10 000 hectares) are computed by means of multi-source data. The Finnish multi-source national forest inventory utilizes field measurements, satellite imagery and digital map data.

The statistics on forest health are also mostly based on national forest inventory results. Inventory teams collect data concerning the symptoms (dead trees, injuries, defoliation etc.) and degree of forest damage and occurrence of damaging agents (climate, damages of human activities, insects etc.). In addition to the national forest inventory, forest damage is monitored separately in the course of the research programme on forest vitality. One useful indicator of tree vitality is the degree of defoliation, which reflects the combined effect of several stress factors on forest trees. Information on changes in forest vitality is gathered from permanent inventory sample plots.

Duties of the Forest Statistics Information Service

Statistics on silvicultural and forest improvement work are based on the data collected by METLA from government departments, establishments and other organizations. The main data sources are Forestry Centres. Forestry Centres collect statistical data from regional forestry boards and local forestry management associations. The Finnish Forest Industries Federation collects data from the forests owned by forest industries. The statistical data on public forests comes mainly from
the Finnish Forest and Park Service. FSIS is in charge of merging, controlling and processing the statistical data originating from different sources.

Statistics on commercial roundwood fellings are based on repetitive sample surveys done by FSIS. FSIS uses stratified systematic sampling for the population of the forest industries wood procurement organizations. Because of the monthly basis of the questionnaires, it is possible to follow short-term variation in commercial roundwood fellings. For regional estimates, FSIS collects every six months more exhaustive samples of roundwood fellings. Statistics on commercial roundwood fellings published in the Yearbook of Forestry are mainly based on the latter sample.

Statistics on wood consumption in Finland are largely based on the statistics of wood consumption produced by the Finnish Forest Industries Federation. The wood consumption of small sawmills (consumption < 10000 m³/year) and dwellings are excluded from the statistics concerning the forest industries. Therefore, FSIS undertakes additional sample surveys to establish the missing information. The wood consumption of small sawmills and dwellings is approximately 10 percent of the total roundwood consumption in Finland.

The area-based forest taxation in Finland is based on the assessed average value of the annual yield of the growing stock. The Forest Research Institute's statutory responsibility is to annually calculate the municipal values of this yield. Therefore FSIS collects data about roundwood prices and purchased volumes from all wood procurement organizations for computing the values of the yield.

The primary statistics on Finnish foreign trade are produced by the Finnish Board of Customs. The data on Finland's foreign trade is available from an on-line database maintained by the Finnish Board of Customs. In the database the data are classified according to the Harmonized Commodity Description and Coding System (Since 1994, data are classified according to the Combined Nomenclature System used by the European Union). FSIS gathers the values and volumes of foreign trade in roundwood and forest industry products directly from the on-line database according to the classification of customs nomenclature. FSIS aggregates the data and produces the statistics on foreign trade in roundwood. (The Finnish Forest Industries Federation collects and processes the data on the foreign trade of forest industry products.)

**Other statistical data sources at METLA**

Information about the production of improved seed and forest tree breeding material is based on the forest genetic register maintained by METLA.

**Summary statistics collected by external sources**

(* column indicates share of tables in the yearbook, percent)

<table>
<thead>
<tr>
<th>Source</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>13% Statistics Finland</td>
<td>The labour force in the forestry sector</td>
</tr>
<tr>
<td>12% The Board of Customs</td>
<td>Forest sector in national economy</td>
</tr>
<tr>
<td>10% The Finnish Forest Industries Federation</td>
<td>Foreign trade</td>
</tr>
<tr>
<td></td>
<td>Roundwood purchases and prices in private forests</td>
</tr>
<tr>
<td></td>
<td>Roundwood stocks of the forest industries</td>
</tr>
<tr>
<td></td>
<td>Logging and transportation volumes and costs of</td>
</tr>
<tr>
<td></td>
<td>roundwood</td>
</tr>
<tr>
<td></td>
<td>Production of the forest industries</td>
</tr>
<tr>
<td></td>
<td>Foreign trade of forest industry products</td>
</tr>
<tr>
<td></td>
<td>International forest statistics</td>
</tr>
<tr>
<td>7% FAO</td>
<td>Roundwood volumes marked for felling in private forests</td>
</tr>
<tr>
<td>1% Forestry Centres</td>
<td></td>
</tr>
</tbody>
</table>
DATA VALIDATION

In most cases (e.g. silvicultural and forest improvement work, roundwood sales and fellings, wood consumption, forest industries production and foreign trade) the data are, in principle, based on complete or nearly complete enumeration and are provided to FSIS by the pertinent institutions and/or companies. They usually employ some checking procedures of their own, prior to data delivery to FSIS, which further checks all doubtful cases, mostly by telephone.

In all cases, the coverage of the statistics is not one hundred percent, and this is indicated in the text adjacent to the statistical tables. In some cases, e.g. roundwood consumption of small sawmills or fuelwood consumption of private houses and farms, FSIS undertakes sample-based surveys, say, every 10th year. Estimates of the statistical reliability of results are, naturally, calculated in such cases.

The data provided by the forestry institutions are constantly compared with the corresponding data of previous years and cross-compared with other information. FSIS tries to clarify unexpected variation and unlogical features in these statistics. If there is irrelevancy, FSIS contacts the producer of the statistics in order to find out the reason.

It is worthy noting that the Statistical Bulletins published by FSIS include what may be called quality assessments attached to them. These consist introduction, concepts, methods, reliability and comparability of the statistics referred to.

INFORMATION TECHNOLOGY

In Finland, most statistical organizations use quite modern information technology. All of them use at least microcomputers to process statistical data. Whenever possible, METLA willingly gathers statistical information in electronic format. METLA has a highly versatile selection of ADP applications. Therefore, nearly all kinds of electronic data can be processed. METLA uses both mainframe systems (UNIX and VAX/VMS operating systems) and PCs. At METLA all computers...
are connected together via a local area network. Thus it is easy to move and share data between computers. The statistical data are mainly stored in databases in mainframe computers.

All researchers at METLA also have direct access to the Internet. Via the Internet connection it is possible to use electronic mail, world wide web, ftp connections (file transfer protocol) and news servers. Also, terminal connections to other computers are available.

In sample surveys and enquiries the primary data are often collected manually using questionnaire forms. If an organization delivers a large amount of primary data to METLA, the normal method is to use either magnetic tape or floppy disks. In a few cases data is gathered via electronic mail.

FSIS has established an electronic statistical information system (acronym METINFO), which covers the main statistics concerning forestry. The METINFO system makes it possible for customers to have 24-hour on-line access to forest statistics. The system is accessed via modem and/or the Internet. It is up to the users to transfer the information needed into their own computers and process it accordingly. Regarding its contents, the present system comprises the same information as is regularly reported in the Forest Statistical Bulletins. In the future, the coverage of the system will be expanded to include most of the contents of the Statistical Yearbook of Forestry.

**USERS OF NATIONAL FORESTRY STATISTICS**

Since 1.6.1993, the Yearbook has been a chargeable publication. Even though the price of the yearbook is quite reasonable (FIM 150), this has eliminated those who are not regular users of the Yearbook. Now there are 500 subscribers and they buy about 2000 Yearbooks. The books are also given out free of charge to important interest groups and to the main data sources. Those who are willing to buy the Yearbook, are regular users of statistical data and also interested in the contents of the book and its development. FSIS tries to collect feedback from the customers with a special form. Besides the reliability of the statistics, the main goal of the Forest Statistics Information Service is customer satisfaction.

The users of forests statistics are mainly from the forest sector. The most important users of forest statistics are: 1) organizations involved in non-industrial private forestry (Forest Centres, Forestry Boards, Local Forest Management Associations, Federation of Agricultural and Forestry Producers and Federations of Local Forest Management Associations), 2) forest industries and 3) research and education. The subscribers of the yearbook and statistical bulletins are listed below

<table>
<thead>
<tr>
<th></th>
<th>Yearbook</th>
<th>Statistical bulletins</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Media</td>
<td>5</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>Forestry sector companies</td>
<td>13</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Other corporations (e.g. banks)</td>
<td>5</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Research and education</td>
<td>18</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Government departments</td>
<td>8</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Non-industrial, private forestry</td>
<td>29</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>Other (e.g. associations, customers abroad)</td>
<td>23</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

About 20 percent of clients are not directly connected with the forest sector. These include government departments, research institutes and financial institutions. A typical user of forest statistics
is a person working as a middle-level manager in some forest organization. He/she has a university degree and has quite a long working experience.

Forest statistics are utilised: (a) mostly in following-up what is happening in forest sector, (b) as a basis for planning, (c) as an aid in decision making, and (d) for research and specialist work and education.

One important client group is other statistical institutes; e.g. Statistics Finland uses forest statistics for computing price indexes, national income and in making statistics of national resources. Forest statistics form the base for economical analyses and prognoses. METLA itself publishes annually a survey of the forest sector, forecasting the forest sector’s fluctuations and development.

Most of our clients want to have statistics with a brief text summary and graphics and maybe including a prognosis. Those who process the information further (researchers, analysts) also want to have numerical data. Most of our clients use forest statistics monthly but some even daily. Daily users are often from research or education institutes or from government departments. Yearbook is not a tool providing the latest statistical data quickly, but it is a well known reference book with long time series.

**FUTURE PERSPECTIVES**

In the future, the role of the Statistical Yearbook of Forestry has to be reviewed in a broader context. No doubt, the future product range by FSIS will consist of both written publications (Yearbook and Forest Statistical Bulletins) and on-line forest statistics service.

The Statistical Yearbook of Forestry is subject to a process of continuous evaluation and revision. It is a customer-product, meaning that the requirements and views of readers play a decisive role in the development of the book. The recent development of Finnish Statistical Yearbook of Forestry is mainly based on two questionnaires made to the customers during the 1990s. There has also been a scientific evaluation of the whole Forest Statistics Information Service project in 1994. In 1991, the most important interest groups of FSIS were interviewed. This procedure was repeated in 1993, now as a mailed questionnaire which was sent to approx. 300 data suppliers or users of forest statistics. The objectives of these efforts were to receive ideas on how to develop the Yearbook and other FSIS publications.

Based on the responses to these surveys, the contents of the Yearbook were revised a few years ago. More emphasis is now placed on international forest statistics, as well as on statistics on forest health, multiple-use forestry and the forest industries. Statistical areas, now getting less attention than before, are, inter alia, silvicultural and forest improvement works and wood consumption. Market orientation and customer surveys are now routine procedures, which FSIS now performs at regular intervals.

The need to improve the contents of statistics varies according to the subject. The statistics of forest resources have a long tradition and quite permanent form. On the other hand, the indicators of forest health may alter in the future if researchers manage to formulate more advanced methods to measure the condition of forests. Attention should be also paid to statistics including indicators of sustainable forestry.

**PRIORITIES FOR IMPROVING CAPACITY**

The efficient producing of reliable, up-to-date statistics is extremely difficult without modern information technology and professional skills. The use of information technology is increasing
continuously. Computers enable handle huge amounts of statistical data fast and easily. The use of state-of-the-art technology also presupposes one to continuous upgrading of personnel.

In Finland, the modern electronic information network technology can be used both in data collecting and dissemination of statistics. Nowadays, technological possibilities are not utilised maximally. This is partly because many organizations have not yet invested enough in modern information technology.

However, most important are the people working with statistics. Well-trained staff with sound motivation can achieve miracles.

A BRIEF SUMMARY OF FINNISH FOREST STATISTICS

A concise description of Finnish forestry and forest industries is given in the Appendix. The statistics in the Appendix strive to illustrate the significance of forestry and forest industries to the Finnish economy. In 1995, the Forest Statistics Information Service published a pocket statistics of Finnish forestry in English called "Forest Finland in Brief". It contains a brief description of Finnish forest statistics. Its contents are based on the Statistical Yearbook of Forestry.
### Appendix: Summary of Finnish Forestry Statistics

<table>
<thead>
<tr>
<th>Vegetation zone</th>
<th>boreal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of growing season</td>
<td>less than 180 days per year</td>
</tr>
<tr>
<td>Total land area of Finland</td>
<td>30.5 mil. ha</td>
</tr>
<tr>
<td>Area of forest and other wooded land</td>
<td>23.0 mil. ha</td>
</tr>
<tr>
<td>State-owned nature protection areas</td>
<td>2.6 mil. ha</td>
</tr>
<tr>
<td>Ownership of forestry land</td>
<td></td>
</tr>
<tr>
<td>Non-industrial, private</td>
<td>54 %</td>
</tr>
<tr>
<td>Companies</td>
<td>8 %</td>
</tr>
<tr>
<td>State</td>
<td>33 %</td>
</tr>
<tr>
<td>Others</td>
<td>5 %</td>
</tr>
<tr>
<td>Forest area treated with fellings (1.7 % of total forest area)</td>
<td></td>
</tr>
<tr>
<td>Thinnings</td>
<td>0.14 mil. ha</td>
</tr>
<tr>
<td>Clear fellings</td>
<td>0.11 mil. ha</td>
</tr>
<tr>
<td>Other fellings</td>
<td>0.09 mil. ha</td>
</tr>
<tr>
<td>Growing stock</td>
<td>1 887 mil. m3 (has increased continuously since 1960s)</td>
</tr>
<tr>
<td>by tree species</td>
<td></td>
</tr>
<tr>
<td>Scots Pine</td>
<td>46 %</td>
</tr>
<tr>
<td>Spruce</td>
<td>37 %</td>
</tr>
<tr>
<td>Birch</td>
<td>15 %</td>
</tr>
<tr>
<td>Other species</td>
<td>3 %</td>
</tr>
<tr>
<td>Mean growing stock volume</td>
<td>92 m3/ha</td>
</tr>
<tr>
<td>Mean increment of growing stock</td>
<td>3.8 m3/ha/year</td>
</tr>
<tr>
<td>Annual increment of the growing stock</td>
<td>77 mil. m3</td>
</tr>
<tr>
<td>Annual drain out of the growing stock</td>
<td>62 mil. m3</td>
</tr>
<tr>
<td>Commercial roundwood fellings</td>
<td>49 mil. m3</td>
</tr>
<tr>
<td>by assortment</td>
<td></td>
</tr>
<tr>
<td>Sawlogs</td>
<td>25 mil. m3</td>
</tr>
<tr>
<td>Pulpwood &amp; other</td>
<td>24 mil. m3</td>
</tr>
<tr>
<td>by forest ownership category</td>
<td></td>
</tr>
<tr>
<td>Non industrial, private</td>
<td>41 mil. m3</td>
</tr>
<tr>
<td>Companies</td>
<td>4 mil. m3</td>
</tr>
<tr>
<td>State</td>
<td>4 mil. m3</td>
</tr>
<tr>
<td>Imported wood</td>
<td>9 mil. m3</td>
</tr>
<tr>
<td>Roundwood consumption</td>
<td>65.0 mil. m3</td>
</tr>
<tr>
<td>Wood-products industry</td>
<td>26 mil. m3</td>
</tr>
<tr>
<td>Pulp industry</td>
<td>32 mil. m3</td>
</tr>
<tr>
<td>Fuelwood</td>
<td>5 mil. m3</td>
</tr>
<tr>
<td>Exports of roundwood</td>
<td>2 mil. m3</td>
</tr>
<tr>
<td>Production of the Finnish forest industries</td>
<td></td>
</tr>
<tr>
<td>Sawnwood</td>
<td>9.7 mil. m3</td>
</tr>
<tr>
<td>Plywood</td>
<td>0.7 mil. m3</td>
</tr>
<tr>
<td>Particle board</td>
<td>0.5 mil. m3</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>0.1 m.t.</td>
</tr>
</tbody>
</table>

---

1 The data are based on the most recent issue of the Statistical Yearbook of Forestry. The data mainly refer to the year 1994. Roundwood volumes are expressed as stemwood overbark.
<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp</td>
<td>10.0 m.t.</td>
</tr>
<tr>
<td>Paper and paperboard</td>
<td>10.9 m.t.</td>
</tr>
<tr>
<td>Exports of forest industry</td>
<td></td>
</tr>
<tr>
<td>Sawnwood</td>
<td>7.1 mill. m3</td>
</tr>
<tr>
<td>Plywood and veneers</td>
<td>0.7 mill. m3</td>
</tr>
<tr>
<td>Particle board</td>
<td>0.2 mill. m3</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>0.1 m.t.</td>
</tr>
<tr>
<td>Pulp</td>
<td>1.5 m.t.</td>
</tr>
<tr>
<td>Paper and paperboard</td>
<td>10.1 m.t.</td>
</tr>
<tr>
<td>Employment in forest sector</td>
<td>99 000 persons</td>
</tr>
</tbody>
</table>
JAPAN - USE OF FORESTRY STATISTICS IN PLANNING; CURRENT SITUATION AND FUTURE DIRECTIONS

by Masahiro Amano
Forestry & Forest Products Research Institute, Tsukuba, Ibaraki, Japan

HISTORICAL EVOLUTION AND LEGAL BASIS

Japan has a long history of wood use, which has produced a unique living style referred as the "culture of wood". Our reforestation dates back to about 400 years, but the nation-wide reforestation commenced in the Meiji era (1868-1911) during which Japan made a rapid progress in the national economy. The Forest Law, the oldest forest-related law in Japan, came into effect in 1897 with a view to promoting the preservation, cultivation and utilization of forest resources. Through the basic system of forest policy was established in the 1930's, the China War (1937) and World War II seriously damaged our forest resources through breaking down the sustained yield principle and reducing reforestation practices. It required about ten years (1945-1956) to reproduce our forestry and forest policy through several forestation programmes and then we were reached the most active stage (1957-1970) of afforestation and forest production along with the accelerated growth of Japanese economy. In 1964, the industry-oriented law referred as the Forestry Basic Law was enacted to satisfy the following requirements from the economic point of view: 1) to stabilize the demand-supply situation of forest products, 2) to rationalize forest management through the efficient implementation of the forest planning system and the improvement of forestry technology, 3) to improve the working situations and the social footing of forest workers etc.

The environment potential of forests can be captured through appropriate silvicultural intervention. But the former forest planning system was strongly oriented towards timber production. So the appropriate operational scheme for the non-timber use of forests was not clear to either the public or to foresters. As the public demand has changed from timber to non-timber uses for forests for the last decade. Also, the timber supply situation indicates that whole areas of productive forests were not required for timber production. It was sufficient to use only some parts of the man-made forests for timber use. Then the forest planning system was changed in the 1990 Forest Law to meet forest usage for public needs.

PRESENT STATE OF THE FOREST

Japan was a timber exporting country until 1920. Then, as a result of the Tokyo earthquake in 1923, Japan began to import timber from North America. Several years later the Government placed a duty on imported timber because of oversupply in the timber market (Handa, 1988). After that the Japanese timber market was almost totally supplied by domestic timber. However, the domestic timber supply was not sufficient to satisfy the growth in the timber market after World War II. Therefore, in 1959, the Government decided to open the timber market to foreign countries. As shown in Figure 1, domestic suppliers have seen their share of the market decline since 1960. Imported timber accounted for a little more than 70 percent of the market in 1993. The recent Forest Agency (Japanese Forest Agency 1995) report tells that imported timber has shared 76.4 percent of the Japanese market.

The forest area covers 67 percent of the country. About 31 percent (7.94 million ha) of the forest is the national forest, 2.5 million ha is publicly owned and 14.8 million ha is privately owned. Most of the national forest is administered by the Forestry Agency. One of the major characteristics in our forest resource is a large amount of plantations (10 million ha) which has been established
through the nation-wide afforestation since 1950. Though most of the plantations are younger than 40 years old, it will provide a promising basis for the development of our future forestry and forest industry in terms of sustained yield and wood utilization.

**FORESTRY DATA POLICY**

90 percent of the privately-owned forests is owned by individual forests owners, with most of them being less than 5 ha and being related to agriculture. Because of such small scale ownership, low profitability and long rotation of forest management, the government is required to provide the appropriate administrative encouragement and guidance with a view to increasing productivity and promoting forestry co-operatives. On the other hand, the management activities of the Forest Agency are directed towards protecting, conserving, cultivating and utilizing the national forest resources. To attain these objectives, it is very important to assure that forest management will be conducted in a rational way based on an established plan. It requires that the government should establish a comprehensive database for forest management and provide the necessary information covering not only timber management but also environment management in the forested area.

**MANAGEMENT PLANS AND ORGANIZATION**

The Forest Planning System, established under the provisions of the Forest Law, was instituted to achieve the highly integrated performance of both national and private forest management. Figure 1 shows an operational flow of the system which is briefly described.

**Basic Plan for Forest Resources**

The plan specifies a number of forest management methods best suited to its purpose and the forest area to be allotted to each management method. It also sets forth the targets of forest consolidation and measures for their attainment.

**Long Range Prospects for Demand and Supply of Important Products**

This provides a forecast of the demand-supply situation of the important forest products including sawntimber, pulpwood and plywood.

**Nation-wide Forest Plan**

The role of this plan is to define the long-term, integrated national conception of forest policy and indices from the viewpoint of synthesized forest resource management. The planning horizon is fifteen years, and covers all forests in the whole nation in accordance with The Basic Plan for Forest Resources and The Long Range Prospects for Demand and Supply of Important Products, which determine the national fundamental, long-term policy towards forest resources and demand and supply of forest products.

Above three plans require the database of the nationwide forest resources and timber demand and supply data as well as public considerations about forest resources. Usually a tentative working team is organized to prepare data to support the above plans.

Under this national plan in accordance with the preceding Basic Plans, the entire country is divided into 44 blocks basically by river basins, with also a consideration given to geographical features and other conditions. For each block, the forest consolidation is conducted to fulfil the specific forest functions such as timber production, headwaters conservation, mountain disaster prevention, and maintenance of the people's health and welfare. This provides a fundamental
approach to the promotion of the forest policy, and also prepares the criteria for formulating the Regional Forest Plan through various specifications, for example standard cutting age for each block.

**Figure: Forest Planning System**

```
Basic Plan Regarding Forest Resources
Long Range Prospect Regarding demand and supply of forest products
(for 50 years)

Nationwide Forest Plan (for 15 years) (Formulated by Minister of Agriculture and Forestry every 5 years)

Large Regional Watershed and Forest Plan

National forests

Regional Forest Plan (for 10 years)
(Formulated by Director of Regional Forestry Office-157 units-every 5 years)

Forest Management Plan (for 5 years)
Drawn up by Director of Regional Forestry Office - 157 units)

Private and public forest

Regional Forest Plan(for 10 years)
(Formulated by a Government for each forest plan unit -158 units-every 5 years)

Forest Management Plan (for 5 years)
Voluntarily drawn up by the forest owner

**Regional Forest Plan (private forests)**

This plan is required to be formulated according to the objectives and standards stipulated in the Nation-wide Forest Plan, and to be applied to private forests in the different areas, having a variety of patterns and scale of ownership, to enhance their preservation, cultivation and production functions. It is required that close contact should be maintained with each individual forest manager. The major concerns of this plan are to show the future timber harvesting volume from a planning unit and to assign suitable operational constraints to protection forests.
**Forest Operational Plan (private forests)**

The forest operational planning system was instituted in 1968 by the reversion of the Forest Law. The forest operational plan is mapped out by the forest owners themselves, and they are required to submit it to the governor of the prefecture where the forest land area covered is located to obtain the approval of the validity of the plan. To encourage each forest owner to conduct the rational forest management, some preferential treatments and incentive measures are given to those forest owners who have obtained the approval for their forest operational plan, which are exemplified in taxation system (special exemption for forest management, etc.), loans (reforestation funds, etc.), and subsidies (preferential construction of forest roads, subsidy for reforestation, etc.).

**Regional Forest Plan (national forests)**

Generally, forests has been managed to provide multiple uses and sustained yield. But many foresters have recently recognized the difficulties associated with multi-purpose forest management. If both timber and non-timber uses are expected from a given stand, the timber use is apt to become the primary purpose. This is because the primary indicator of the forest plan is timber supply. There are many discussions on more promising techniques which can enable the guaranteeing of the utilization of the forest for non-timber purposes. Specifically, the present Forest Planning System avoids assigning multiple uses to a given stand except in areas of watershed conservation. According to this plan, the careful planning of management programmes and activities will be carried out in order to assure the sufficient utilization of the non-timber value of the forest. Thus, the concept of the National Forest Planning System is one of single use rather than multiple use at the stand level.

**BASIC WORKS FOR A FOREST INVENTORY**

**Site Index**

Site index is shown by tree heights of 2m intervals at 40 years age. Also site index (curves are prepared by the data of stem analysis of sample plots which involve representative species. Two kinds of site index data are utilized, one is the form of figure and another is a guide curve. A guide curve is an exponential curve, \( Y_t = K \cdot a^b \cdot t \), where \( Y_t \): tree height at the \( t \) age class, \( t \): age class and \( a, b, K \): constants.

This curve approximates a real site curve. Each stand has site indices which are calculated from soil conditions and environmental factors by using the quantification method in the multi-variable analysis. This site index is used to determine the species or species mixture which would be most desirable to re-establish as well as to predict future growing stock.

**Stand Density Control Chart**

It is important for a forest manager to control each density of even-aged stands at each stage. It has become possible to determine quantitatively the relationships among stand density, stand volume and tree diameter for any given mean height. These relationships are expressed graphically on what is known as a "stand density control chart". The standard thinning age and final cutting age are decided on this chart. An example of such a chart is shown in the figure below.
Examples of stand density control chart for sugi (Japanese Forest Agency, 1981. Forestry Technology in Japan)

This chart can be interpreted as follows:

Equivalent mean height line: Each line running from the lower left to the upper right expresses the relationship between stand density and stem volume per hectare according to the mean height of the dominant trees.

Full-density line and self-thinning line: The oblique line at the upper right is the full density curve (expressed as a straight line on a log-graph). Each line running from the base upward with a slight incarnation is a self-thinning curve.

Equivalent mean diameter line: Each dotted line running from the full-density curve to the lower left portion of the chart expresses mean diameter in connection with mean heights and stand density.

Yield index line: Each line running parallel to the full-density curve expresses the yield index (Ry), which corresponds to the ratio of the stem volume of a stand at a given density to that of one at full density where the mean tree heights of the respective stands are identical.

Aerial photographs

The standard aerial-photographs with 1:20,000 and 1:8,000 have intensively been used on the forest inventory system. Aerial-photographs are taken for the forested areas at five years interval since 1961 by the Geographical Survey Institute and the Forestry Agency. Every part of the country has already been covered 5 or 6 times with stereoscopic aerial photographs.

The main purposes of aerial-photographs are to compose forest maps, to set an operational site and to roughly estimate growing stock. The practical system to estimate growing stock is operated
by the multi-equations method in which factors are directly read from air photo images except tree age.

The items of estimating stand volume are tree height, crown closure, number of tree/ha, azimuth, altitude and tree age. The yield table arranged by aerial-photographs are utilized in parallel with the yield table, based on the ground survey.

REGISTRATION AND INVENTORY

Forest Base Maps

Forest maps with 1:5,000 scale cover almost all forests in Japan. These maps consist of the boundaries of sub-compartment and compartment, contour lines, forest roads and so on. Forest base maps are transferred to the Plane Rectangular Coordinates System to calculate directly the acreage and distance from maps. In addition to these features, forest base maps in the national forest describe species, tree age, soil stability, wildlife, water resource and recreation use. Overall logging layout, opening size, configuration, etc. are designed on forest base maps to practice smoothly site preparation and reforestation. Also based on these maps, forest management planning unit map, soil maps and site class maps are arranged.

Conversely forest maps in private forests are poor qualitatively specially in natural forests, because many forest estates in private lands are smaller than one hectare and it is too expensive to prepare maps excessively and precisely. This results in unreliable forest maps about private forests except some prefectures. Then many prefecture government have started to introduce GIS to correct their forest maps. Forest maps are renewable every five years in accordance with re-planning a regional forest plan.

Compartment and Sub-compartment

The basic element of the forest management planning unit is a sub-compartment which is delineated depending on species, tree age, stand type, operational type, cutting method, land productivity, ownership, etc. The boundaries of a sub-compartment are not fixed, because the changes of surrounding conditions involving human activities force to divide or modify sub-compartment. But we set a compartment as a permanent boundary lines are depicted along terrain or ridge of mountain, river, road, fire line and township.

Items of forest register

<table>
<thead>
<tr>
<th>National forest</th>
<th>Private forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Name of regional planning area, management area, ranger district and local public organization.</td>
<td>(1) Names of regional planning areas, local public organization and land register</td>
</tr>
<tr>
<td>(2) Forest compartment, sub-compartment and previous name of sub-compartment</td>
<td>(2) Forest Compartment and sub-compartment</td>
</tr>
<tr>
<td>(3) Protection forest and logging area</td>
<td>(3) Protection forest</td>
</tr>
<tr>
<td>(4) Land classification, management group and method of cutting</td>
<td>(4) Forest area</td>
</tr>
<tr>
<td>(5) Forest area and left over area of this sub-compartment</td>
<td>(5) Locality</td>
</tr>
<tr>
<td>(6) Land productivity and locality</td>
<td>(6) Forest Management type</td>
</tr>
<tr>
<td>(right tree species and grade)</td>
<td>(7) Tree species and mixture rate</td>
</tr>
<tr>
<td>(7) Bearing of slope and dip</td>
<td>(8) Stand age and crown density</td>
</tr>
<tr>
<td></td>
<td>(9) Land productivity and economical standings (expected species in future)</td>
</tr>
</tbody>
</table>
(8) Tree species, damaged tree and mixture rate
(9) Stand age, stand density and crown density
(10) Diameter height and number of stands per hectare
(11) Management type and stand type
(12) Volume, growth and growth rate
(13) Method of inventory, year of re-generation
(14) Nature of land and soil
(15) Scores of non-timber use functions

The preceding table shows the items which are attributed to a sub-compartment. These data are stored on the database to produce the forest resource tabulations and ledgers corresponding to any level of the forest management plan.

Since 1973, the management planning unit inventory programme has been expanding to include the collection of environmental data. So items concerning the multiple usage of a forest are added to the information of sub-compartments.

The size and the number of compartments and sub-compartments are shown below.

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Total number</th>
<th>Average size</th>
<th>Sub-compartment</th>
<th>Total number</th>
<th>Average size</th>
</tr>
</thead>
<tbody>
<tr>
<td>National forests</td>
<td>54,481</td>
<td>129.08 (ha)</td>
<td>713,580</td>
<td>10.58 (ha)</td>
<td></td>
</tr>
<tr>
<td>Private forests</td>
<td>269,448</td>
<td>64.18</td>
<td>34,229,188</td>
<td>0.51</td>
<td></td>
</tr>
</tbody>
</table>

**Growing Stock Establishment**

Since 1960 the whole country is covered by 39 based yield tables which are based on different climates and species. This yield table is presented in both graphical and tabular forms. All sample constructing yield tables were treated as temporary inventory samples. Also minor yield tables which are predictable growing pattern locally are prepared on every management planning unit by modifying the based yield table.

**Forest Inventory**

The forest inventory systems at the national and regional level are defined by the Forest Law and enforced periodically every five years. The systems are divided into two types. One is called "ordinary inventory" and the other is called "simultaneous inventory". The purpose of ordinary inventory is to grasp accurately the state of an individual forest. To determine the quantity of a whole stand or a partial stand, a sample plot method is applied. The forests which were cut and renewed in last five years or prearranged to cut within next planning period are examined in detail and if necessary the boundary line and the name of the sub-compartment are changed. The results of the survey added to the forest register and the map.
The purpose of simultaneous inventory is to grasp the total volume of a whole forest. A
stochastic method is applied. The outline of the sampling plot method established in 1958 is
explained briefly as follows.

- The unit of inventory is a regional planning area which has been defined so by being a
watershed.

- A stratified sampling method is applied to the national forest and expected to obtain accuracy
within 10 percent in a managed forest and 15 percent to 20 percent in an unmanaged forest.
A simple sampling method is applied to private forests and expected to obtain accuracy with
15 percent.

- A plot's size is 0.1 hectare and the shape is rectangular.

- Location of a plot is selected at random from the grid and drawn on a map. To identify that
point on the ground, aerophotograph is referred to.

- Permanent plots are also designated and a periodic inventory is continued.

- The data of the sample plots is processed statistically and the total volume is calculated by an
interval estimation method. The confidence coefficient is 95 percent.

Recently, this sampling survey has not been conducted and the Japanese forestry statistics has
been depended on the database established from ordinary inventory, because the data accuracy of the
ordinary inventory has been getting better.

DISCUSSION

In view of the inherent complexity of the forest use, comprising both timber and non-timber
sectors, planning for their efficient use and effective management has become an increasingly difficult
task. Especially, in order to decide on the appropriate non-timber use of forest land the planner must
assess the human needs for goods and services as well as the productivity of the forest land.
Therefore, the decision maker has to collect a broad range of information covering not only the nature
of the forest resources but also human activities which relate to the non-timber uses of the forest. But
there is, as yet, no experience in the forest sector of including such social-environmental information
in the forest resources database. Moreover, some forest uses are frequently in conflict and there is
no common measure that can be used to evaluate all of them satisfactorily. Economic value can be
attached to timber outputs, but there is presently no sound way of evaluating economic costs of the
social welfare effects of the forest.

Therefore the New Forest Planning System has at present two main tasks to complete:

(1) to establish a new database corresponding to non-timber forest uses and valid for both
private and national forests,
(2) to develop the appropriate trade-off analysis criteria between conflicting forest uses.

Now the research into these topics is being rushed through as the new system for the national
forest planning will be used from 1997.
LITERATURE CITED

Konohira, Y., Minowa, M. and Amano, M., 1983 Data regarding the forest management in Japan, Forest Management in Various Countries of the World, IUFRO, Bucharest, Romania, 349-360
Japan - use of forestry statistics in planning; current situation and future directions

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Japanese Forest Resources

Natural Forest 57%
Plantation 43%

Growing Stock

Natural Forest 49%
Plantation 51%
Forest Area

National Forests 34%

Private Forests 66%

Amano

Japan
Until 1920: Exported timber
1923: the Tokyo Earthquake
   Imported timber for several years
1959  Opened the timber market to foreign countries
Demand/supply and trade of industrial wood in the world

Source: FAO "Yearbook of Forest Products 1990"
Image of the ideal forest use

On the management of forests

1993 Survey
Who should bear the expense of forest management

Don't know
Others
Forest owners
Donation by public
Beneficiaries pay their share of management costs
Subsidies by governments

The proportion of natural and man-made forests

Don't know
Ought to increase plantation
Maintain the status quo
Ought to increase natural forests
Forest Resources and Interest Group

Village people
- Traditional group
  - Timber
  - Minor forest products
  - Grazing

Forest industry
- Traditional group
  - Timber

Citizens
- New group
  - Major
    - Living environment
    - Recreational area
    - Wildlife habitat
    - Water source protection
Forest Planning System

Basic Plan Regarding Forest resources

Long range prospect of demand and supply

Nationwide Forest Plan

Large Watershed Forest Plan

Regional Forest Plan

Regional Forest Plan for Private Forest

Regional Forest Plan for National Forest

Forest Management Plan (Forest owner)

Forest Management Plan (National Forest)

Land capability Plan
Structure of Model
Forest Statistics in Japan

- Nationwide forest inventory
- Forest Inventory Book
- Monitoring forest harvest

Forest planning system
Nationwide Forest Inventory

Implemented in 1950s and 1960s

longitude

Sample 10,000 grid randomly.
Estimate growing stock within 95% reliability.
National Forests

1. Compartment & Sub-compartment Name
2. Area
3. Land classification
4. Location
5. Operating Method
6. Terrain
7. Tree Species & Mixtured Rate
8. Stand Age, Stand Dencity(Crown Density)
9. Diameter, Height, & number of stands/ha
10. Volume, Growth Rate
11. Management Type and Stand Type
12. Method of Inventory
13. Nature of Land and Soil
14. Evaluated Scores of Non-timber Use
15. Method of Inventory
16. etc
Forest Inventory Book

Eye estimate - Aerial photo - Ground survey

Forest Inventory Book

220,000 compartments
35,000,000 sub-compartments

Update at 5 years interval

Summarized report on the watershed planning unit

Regional Forest Plan
Monitoring Forest Harvest

Select sub-compartments (one sample $\geq 2.5$ha) to estimate harvesting area with 95% reliability.

This survey is conducted annually.
Scheme of forest record unit

Forested area in Japan

Large watershed plan unit

Regional forest plan unit (watershed area)

Compartment

Sub-compartment

Large watershed plan unit

Regional forest plan unit (watershed area)

Compartment

Sub-compartment
Supply Model

Forest Resource Statistics

Forest resource (age, volume, area, species)
Harvesting Tendency
Ownership

Economic Statistics

Logging costs
Road network
Labour (availability, cost, etc.)
Machine
Regeneration costs
Subsidy
Etc.,

Roundwood Market Model

Economic Statistics

Timber Price

Social Statistics

Non-timber use value
Public behaviour
Population
Demand Model

Forest Products Statistics

Economic Statistics
- Housing starts
- Economic growth rate
- Population
- Energy costs
- Sawmill and pulpmill capacity

Overseas Countries Statistics
Scope of Models over time

1980 Model

Timber Supply & Demand Model

Forest Resource Statistics
Forest Products Statistics

1987 Model

Forest Sector Model

Forest Resource Statistics
Forest Products Statistics
Socio-economic Statistics

1996 Model?

Forest Resource Statistics
Forest Products Statistics
Socio-economic Statistics
Ecological Statistics
(land use, biodiversity, ecosystem, global environment)
↓
Sustainable Development criteria

N.B. Complexity of models has grown with time.
NIGERIA - BUILDING UP INSTITUTIONAL AND TECHNICAL CAPABILITIES AT NATIONAL LEVEL FOR IMPROVED COLLECTION AND ANALYSIS OF FORESTRY STATISTICS - PRESENT AND FUTURE

by S.A. Okonofua
Federal Department of Forestry, Abuja, Nigeria

SUMMARY

This paper presents a scenario of the Nigerian situation with respect to forestry statistics and also underlines the role in administration, policy and planning. A review is also made of international agencies involvement and some recent developments in the world.

The problems encountered in the collection and utilisation of forest products statistics are presented and suggestions for future improvement proffered. The needs for sustainable sources of funds, adequate manpower development, infrastructure and appropriate equipment, including computer hardware and software, and logistic support are highlighted.

The paper concludes by proposing the development of a National Forestry Statistical and Information System with Coordinating Committees at the Federal and State Levels and the establishment of a National Forestry Data Bank.

INTRODUCTION

Forestry statistics development has taken a centre stage in the evaluation of the importance of forestry in the rural and urban economics of most countries. Also, the desire at the national and international levels to understand and measure levels of sustainable development, management and utilization of forest resources for intervention by government, international agencies, non-governmental organizations, etc, in line with recent development in the international scene such as the United Nations Conference on Environment and Development (UNCED) and National Forestry Action Programme has aroused greater interest in forestry statistics.

A GENERAL OVERVIEW OF ISSUES

Forest products and services are important to the socio-economic development of developing countries contributing to the national income, employment and economic growth. The gross value of forest sector production in 1989 in the Sub-Saharan Africa was about US$13 billion, and the contribution of forestry to Gross Domestic Product (GDP) is also significant at country level: about 9.7 percent, 5.6 percent, 5.1 percent and 1.3 percent in Ghana, Gabon, Cameroon and Nigeria respectively. Generally, the official statistics do not give a true picture of the extent of the contribution of forest resources to socio-economic development because many forest products and services are either not traded or traded within the informal sector where statistics are not readily available.

A lot of decisions are made in forestry based on available statistics. These include policy decisions, managerial plans, and day to day decisions on the job. The level of decision making requires different functionaries, depending on interests and mandates. The functionaries could include any or a combination of foresters, farmers, sawmillers, loggers, international organizations, etc. Similarly, the types of decisions vary. They could be about production options, marketing and pricing, investment profiles and financing, raw material sourcing, and legislative control depending
on the functionary involved. The multiplicity of the decision options and the consequential effects require different types of statistical information and a sound rational and empirically based approach.

Data issue is very critical in many decision making processes. The statistical information can be relied on if the data are available at the appropriate time and the quality and quantity are adequate. The major issues are whether the forest products data in use in many developing countries reflect the changes that have been occurring at country level and international scene these past few years given the nature of the institutional arrangement for the collection, analysis and dissemination of statistical information in these countries and whether they can provide a basis on which accurate decisions can be taken by both public and the private sectors.

Statistics are normally assumed to represent objective measures (indicators) which are basically measures of spatial or temporal changes in any given event. Simple indicators may represent changes of a single socio-economic variable. Complex indicators will on the other hand reflect changes of a structural nature affecting a number of independent variables. Example will be the estimated parameters from complex mathematical model. Changes in indicators that are quantitative in their nature can facilitate making qualitative judgement about changes in the socio-economics phenomena over time and space. It is important to note that decision makers do not rely on sources of quantitative information only in attempting to reach rational decisions. They depend on qualitative information as well. Qualitative survey findings enable causality to be introduced between variables, which is indispensable in analyzing quantitative survey data.

As most developing countries are moving towards a free market system and political pluralism, efficient management and sustainable use of natural resources including forests are crucial factors. For a free market economy to operate effectively, information is critical. The decision making units must be able to access vital information on timely basis to be able to respond adequately to the price signals which are the life line of a market system. Information management then becomes of critical importance. The ability to attract local and foreign investment in forestry will depend on both the type of information made available on the sector and the level of confidence of these investors on the level and reliability of the available data. The major issues of statistical information flow in many developing countries are their quantum, comprehensiveness, reliability as well as timeliness for planning and decision making.

The world is now a smaller place to be in with the new communication order based on new technologies. The new economic order has further facilitated a new information order with virtually instantaneous delivering of information globally thereby encouraging growing inter-dependence. The consequence is the increasing economic linkages among countries through trade and financial flows. While the opportunities for collective gains may be enhanced, the vulnerability of some players could also increase. For example, in many developing countries, the information system is not fully developed. The inability to manage the system adequately so as to respond appropriately could result in lost opportunities and also increased vulnerability.

From the foregoing it is observed that situations where there exist paucity of reliable, comprehensive, timely and accurate forestry data and imperfection in information flow are worrisome. It is as a result that the attempt is made to outline a system of improved forestry statistics highlighting the methodological and empirical problems. Our expectation is that through an appropriate machinery and support to organizations in forestry, the forestry sector information system can emerge to assist both the producers and users of forestry statistics. With the system fully developed, a more efficient allocation of available resources will also become entrenched into public administration. Decision making will become more transparent and meaningful.
INTERNATIONAL LINKAGES WITH FORESTRY STATISTICS

In line with recent developments in the international scene as already highlighted, the need to develop adequate capacity in developing countries for forestry information and statistics at national level on protection, conservation and sustainable development and utilization of the forest resource is crucial. Information is a costly commodity and should be collected where relevant and with the details and precision appropriate to the decisions that have to be made.

Many International and Regional Organizations work with countries to collect and disseminate information on the forestry sector. They depend largely on information supplied by governments. They also rely on estimates and unofficial sources where the desired information is lacking. These later sources are often not verifiable. Some countries however, have more detailed information than others.

Information on forest products is by nature changing rapidly. Some countries have cooperation with international organizations such as United Nations Development Programme (UNDP) which are assisting in setting up statistical systems to meet both country and international statistical needs. African Timber Organization (ATO) has developed programme for networking of forestry statistics with member countries with the appointment of statistical correspondents in the National Forestry Departments of member countries. The process provides information on each member country as well as facilitates regional exchange. The hope is that detailed forestry sector information can be obtained on country by country basis. The task of a statistical correspondent is the production of quality, reliable and relevant data within a time frame and cooperation with other statistical agencies in the country and involvement in information flow at the international level.

The general problems in an international networking of forestry information flow are numerous and significantly tied to the problems at country level. The country related problems include, lack of financial and human resources, lack of cooperation between the various sources of forestry statistics, lack of harmony between questionnaires of international organizations and those of the statistical services of the reporting countries, lack of common measuring units, definitions, and classification of products and the periodicity in the collection of statistical information, as well as the unreliability and difficulty in verification of data. For example, there are estimates of coniferous sawnwood exports by some countries including Kenya, Ghana and Cote d’Ivoire in the 1993 Forest Products, FAO Yearbook, which had no previous records of coniferous sawnwood products exports. It is possible that the species were wrongly identified and classified due to some imperfection from the sources of data.

INSTITUTIONAL ARRANGEMENTS AND TECHNICAL CAPABILITIES

The National Statistical and Information System (NSIS) in Nigeria has evolved in line with the political and administrative structure in the country. Currently, the system is semi-decentralized. Each level of government has its own independent statistical service. At both the Federal and State levels the services and structures are generally well established. At the local government level, statistical production is not so developed, with statistical units functioning only in a few local governments. With respect to forestry, several agencies are involved in the collection and processing of statistics.
Agencies Involved at the Federal Level

Federal Office of Statistics

The Federal Office of Statistics (FOS) is the apex organization in Nigeria for the production and processing of data with particular reference to the economy. Specifically, the Federal Office of Statistics which resides in the National Planning Commission has the following responsibilities:

(a) Collect and compile data through surveys and census of inhabitants and establishments in the Federation.

(b) Collaborate with ministries and agencies for compilation of statistics from records of administration.

(c) Organize a coordinated scheme of socio-economic statistics in the Federation. FOS focuses on National Accounts, Trade and Production Statistics (Industrial and Manufacturing). It releases some publications annually and these in part contain some forest sector statistics. The usual publications of FOS include:

   (1) Digest of Statistics
   (2) Annual Abstract of Statistics
   (3) Social Statistics in Nigeria
   (4) Facts and Figures about Nigeria
   (5) Review of External Trade
   (6) National Integrated Surveys on Households

The Federal Office of Statistics has a National Office and Field Offices in each state of the Federation and has built some statistical infrastructures needed to support information generation. It employs its own enumerators who collect the information which is processed for publication. FOS also relates directly with the Planning, Research and Statistics Department (PRSD) of the Federal Ministry of Agriculture and Natural Resources (FMANR) for agricultural statistics and coordination. For surveys and census in the forestry sector, FOS collaborates with the Federal Ministry of Agriculture and Natural Resources through the Department of Forestry. Statistics in relation to forestry published by FOS is not comprehensive enough as it relates to forestry, particularly, the aspects dealing with domestic production and trade. Forest products and commodities are too aggregated into broad classification thus limiting the utility of the information.

FOS products classification or coding system follows that of the United Nations International Standard Industrial Classification (ISIC), the Central Product Classification (CPC) and the Standard International Classification (SITC).

National Data Bank

This is the apex data bank in the country and resides in the National Planning Commission. The National Data Bank (NDB) as with FOS relates directly with the Planning Research and Statistics Department in FMANR in forestry statistics through the agricultural sectoral data bank, National Agricultural Data Bank, located in PRSD. The PRSD collaborates with the NDB in data analysis and information generation. Appropriate departments of some private and public sector organizations including, the Forestry Research Institute of Nigeria and the Universities also relate to FOS and NDB in similar manner as the PRSD. No doubt, some general activities of FOS and NDB overlap at data processing and data analysis stages. They perform important functions which are complementary.
There is a basic difference, however, in the mode of dissemination of information. With the establishment of NDB therefore, users of forestry statistics would in due course be able to obtain data directly from FOS or through NDB. While FOS disseminates to data users mainly as hard copies, NDB relies mainly on electronic devices, tapes, diskettes, CD-ROM and computer-to-computer connections.

**Planning, Research and Statistics Department (PRSD), FMANR**

It has been discussed that the FOS and the NDB are the apex organizations in the National Statistical and Information System. The mandate of national agricultural sectoral statistics resides in the PRSD of FMANR. Its linkages with FOS and NDB have already been mentioned. PRSD has a major responsibility for compilation of sectoral agricultural statistics.

FMANR has set up a National Agricultural Data Bank (NADB) in PRSD and is developing a network of institutional linkages to all possible sources of agricultural data. The aim is to develop an agro-statistics and information centre with properly organized feeder, retrieval and dissemination system. All the technical services departments in FMANR, including the Federal Department of Forestry, are also suppliers of data regarding their respective sectors.

For the purposes of fulfilling its responsibility for collection, verification, analysis, interpretation and dissemination of national agricultural data, NADB has zonal offices, each comprising a group of states in the Federation. NADB operates through Committees at National and State levels, the National Agro-Statistics Coordinating Committee (NASCCO) and the State Agro-Statistics Coordinating Committee (SASCCO) respectively. SASCCO facilitates the collaboration of all Agricultural and Agri-related institutions to ensure uniform system of data reporting from Local Government Level of administration through the State level to the Federal Level and accommodates all levels of interests of producers and users of agro-statistics of all types including forestry statistics. SASCCO is evolving the system that will generate reliable, timely, verifiable and easily accessible agro-statistics for planning development projects and programmes. SASCCO in each state is coordinated and supported financially under the NADB system which is presently constrained by insufficiency of personnel and fund shortages. PRSD is publishing an annual agricultural journal. The current edition is in press.

**Federal Department of Forestry**

At the national level, the Federal Department of Forestry (FDF) has taken the mandate of developing a continuous system of data collection, compilation, analysis, storage and publications to meet the needs of various users and producers of information. It has a Statistics Unit but has not been very effective in the production of data because of several institutional and financial constraints including lack of personnel, vehicles, and computers. Data collection activities of the Unit is complemented by monthly, quarterly and annual returns from Field Offices, located in each state of the Federation. These Field Offices liaise closely with the State Forestry Department and other agencies and organisations at the State and Local Government Levels involved in forestry statistics. FDF has linkages with the NSIS through the NADB.

Annual Statistical Reports by FDF have not been published within the last decade. Forestry data production have mainly been on ad-hoc basis to address specific needs and issues. Among the recent studies is the Review of Wood-Based Sector in Nigeria, 1993, based on a survey of a representative sample of wood-based enterprises in Southern Nigeria; and the World Bank Forestry Sector Review, 1992.
Central Bank of Nigeria

This is the apex financial institution. It is also involved in publishing statistical information on the forestry sector. The Central Bank of Nigeria Annual Report and Statement of Accounts contains information on forestry sector statistics aggregated in the figures of major agricultural commodities.

Forestry Research Institute of Nigeria

This is the institute responsible for forestry research in Nigeria. It also has the mandate of training and providing skilled technical (middle-level) manpower for the development and management of forestry resources. It produces and disseminates research findings.

Universities

Universities as centre of learning and research are also involved in data production and usage. There are three specialized Universities of Agriculture and many departments or faculties of Forestry in some of the other Federal and State Universities. The Universities provide high level manpower training in forestry including statistics and information management and also produce and disseminate research findings.

Other Agencies

Other agencies involved in forestry statistics include the Federal Ministry of Finance through its Customs and Excise Department (in relation to exports and imports), Ministries of Trade and Industry, Nigerian National Petroleum Corporation (NNPC), private organizations and individuals.

Agencies Involved at the States and Local Government Level

The institutional arrangement in forestry sector statistics is similar at both the State and the Federal Levels. PRSD of each State Ministry of Agriculture collaborates with the apex statistical agency in that State (usually in the Governor's office) and other producers of data. The State Forestry Department (FD) is involved in primary data collection and analysis through the licensing and issuance of permits for the removal and harvesting of products from the forests as well as the trade in forest products and monitoring of forestry industries. The emphasis, however, is on revenue generation and administrative records. In states where the control of forest estates have been removed from the Local Governments (LG), there is no production of forestry statistics at the LG level. Where the control still exists, the motivating factor is also revenue generation.

THE NEED FOR COORDINATION

The need for better coordination of the various agencies involved in forestry statistics and a well planned information flow becomes obvious from the above description of the structure of the system. While most of the agencies involved are able to fulfil certain roles in forestry statistics, they do not form a coherent institutional framework. With several independent units, there is ample chance for duplication of efforts, use of inconsistent concepts or standard and consequently poor quality and inconsistent output as well as a confusion among suppliers of data. The calls for a National Forestry Statistics and Information System (NFSIS) with a National Forestry Data Bank (NFDB) under FDF as the apex organization and linked directly with the NADB system.
NATIONAL FOREST PRODUCTS

National Forest Products can be classified into the informal sector products and the modern sector products.

Informal Sector Products

It is more difficult to have reliable, periodic and continuous flow of information on production, trade, capacity and prices on the informal sector products, basically because they are directly obtained from the forest and utilised and also no organised market for their sales. Perhaps fuelwood and charcoal products are the main informal sector forest products. These are mainly used as domestic fuels and other forms of energy by people in the rural areas, and urban poor as well as for some other industrial uses like in bakeries and tobacco curing. In Nigeria, it is estimated that about 95 percent of those living in rural areas depend on this form of energy. This figure may have increased with the 1994 hike in petroleum prices. The percentage of households using fuelwood in the urban areas may also have increased and part of this comes from sawmill waste and residues including sawdust.

The market for fuelwood is quite large because of the large population of people who live in rural areas. This is particularly the position for those living in the less wood endowed part of the country where various sizes of bundles of fuelwood can be seen displayed for sale along major highways. In the other part, the display is not as common, possibly because of the existence of forest which serves as a direct source of fuelwood. Sellers of fuelwood can however be found in major cities. Prices for fuelwood as well as units of measurements are not standardized and they vary within towns and villages. It would appear that surveys to determine the prices of fuelwood have not been carried out on period basis.

Charcoal is not a prominent source of domestic fuel when compared to fuelwood. In the cities, it is mainly used as a source of heat for seasoning of foodstuffs like meat and fish, and roasting of maize and yams. There is no standardization of prices and measurements. Generally, it is sold in bags of different sizes, but more of 25 kg bags or guess estimates of fraction of such bags.

Assessment of fuelwood and charcoal production and trade depends largely on ad hoc surveys. These surveys attempt to assess the per capita consumption, production in the forest, volume transported to consuming areas and volume sold in markets.

Many fuelwood consumers living in rural areas are involved in wood gathering for their domestic consumption and the market. It is very difficult to assess the volume of fuelwood removals by this class which forms a greater majority of people in the rural areas. The State Forestry Departments do not keep comprehensive records of fuelwood and charcoal production. The available statistics from this source are restricted to removals from the forest estates including plantations for which formal permits or licenses have been issued, which as observed in the field constitute only a small percentage of the fuelwood supply and wood converted into charcoal and only about 3 percent of supply is obtained from plantations. A survey showed that the demand for fuelwood increased by 3.0 percent between 1990 and 1993 while the supply for the same period decreased by 7.1 percent (see Appendix 1). The Federal Office of Statistics carries out a household survey every year. The results are indicative of consumption patterns of various goods. The per capita domestic energy consumption is aggregated, that is, including other sources of energy besides biomass. Example, animal dungs.
Other informal sector products other than fuelwood and charcoal include wildlife, gum, cork, tannin, honey, nuts, fodder and mushrooms, all found in the forests. Most people in the rural areas and some urban dwellers depend on these products. Data on their production and trade are also obtained from ad-hoc studies and guess estimates. There are no standardization of units of measurements and prices.

In all parts of Nigeria, informal sector forest products are obtained from both reserved and unreserved natural forests. Under normal conditions, extraction of forest products from these sources should be approved through licensing and issuance of permits by appropriate government authority subject to some privileges and rights given to some category of persons to extract for own-uses.

**Modern Sector Products**

The modern sector products include sawnwood, wood-based panels, pulp and paper products and industrial roundwood. Statistics in these products are fairly well developed and generally easier to obtain.

From available statistics, the number of sawmills for the production of sawnwood in Nigeria is about 1600 most of which are the CD series. All the sawmills are currently operating below installed capacity. World Bank Forestry Sector Survey, 1992 shows that while sawmills capacity was around 12 million m³ in 1980, it dropped to 8 million m³ in 1990. The sawmills are designed to handle large diameter logs. There is a growing demand (domestic and export) for plantation species but the local sawmills are not designed to handle small diameter plantation logs resulting in the loss of efficiency during conversion and quality of output.

There are eight plymills operating as components of integrated complexes with sawmills while five are also fitted with particle board plants. The rate of capacity utilization in 1992 was 57.3 percent with a production figure of 72,240m³. The import of wood based panels peaked at about 70,000m³ in 1980 but gradually reduced to about 20,000m³ in 1990. There are two particle board mills producing about 39,000m³ equivalent of panels annually but the combined installed capacity is 85,500m³ (CBN, 1993).

At present there are two pulp and paper mills operating in Nigeria with total installed pulp capacity of 102,000 MT per year and a paper capacity of 170,000 MT per year. The CBN 1993 report also indicates that the Nigerian Newsprint Manufacturing Company (NNMC), Oku-Ibokwu which has a paper capacity of 100,000 MT/year achieved a capacity utilisation rate of 3.65 percent in 1993 compared with 13.3 percent in the previous year. The quantity of kraft paper produced by the Nigerian Paper mill (NPM), Jebba also fell sharply by 70.6 percent to 2318.87 tonnes in 1993 with the rate of capacity utilisation dropping from 12.1 percent of the previous year to 3.5 percent. Production in the industry was constrained by inadequate working capital, raw material, frequent shut down and spare parts coupled with high interest rates. The total local production of newprint was 15000 MT while import was 17000 MT. A third mill, Iwopin Pulp and Paper Company Limited (IPPC) with planned output capacity of 138,000 MT/year of fully bleached pulp, using wood from local plantations about 60 percent of which would be for export while the balance would be converted into fine writing, printing and paper for the domestic market, is yet to be commissioned. Estimates of raw material supply/demand; and output of some forest products are presented in Appendices 1 and 2 respectively.
METHODOLOGIES FOR ASSESSMENT OF FORESTRY STATISTICS

Proper utilisation of forestry statistics requires appropriate methodologies for collecting the data. The information generated must be that which it purports to measure, all of it and nothing but it, that is, it must be technically valid. The methodologies adopted should therefore be adequate. Consequently, we shall discuss the methodologies that have been found used in the assessment of production, trade, capacity and price, among others, in Nigeria.

Production Statistics

At a global level, production involves the transformation of a new material into a processed from which is usable either in further processing or as a consumable product. Forest products are directly obtained from the forests. Some are consumed or utilized in their natural state while most of them undergo further processing or conversion. Therefore, the statistics of production has to do with the form, quality and quantity.

Round Production

This is the volume of wood harvested from or "mined" in the forest including natural forests and plantations.

Harvesting and dealing in wood not authorized and evidenced by the issuance of permits or grant of a license is prohibited. The Forestry Department in each State of the Federation administers the process. This formal control system in respect of tree harvesting enables the compilation of official roundwood production figures through the administrative channel of reporting by the State Forestry Officers to the Director of Forestry (State). The reporting formats are periodic written reports - weekly, monthly, quarterly and annually or at times on headquarters summons or ad-hoc basis. The data at field level is usually comprehensive including the location, type of species, volume measurement and stumpage. Most of the details are left unprocessed in files or reports as the emphasis of most states is on revenue generation. Information is also obtained from loggers, sawmillers and exporters. However, the accuracy of data from these latter sources is sometimes suspect because of their usual reluctance to provide data on their activities for fear that they might be used for unfair tax assessment or other extraneous reasons. Roundwood production is measured, usually as the numbers of logs or volume in cubic feet over bark.

Sawnwood Production

This is estimated from sawmill production output and roundwood production. The installed capacity of the sawmills and the estimated average capacity utilisation over a given period provide information on the sawnwood production over a time frame. With the frequent shut down of some of the mills due to spare parts and other logistics problems, the accuracy of the method is greatly reduced introducing more bias.

The large wood industries are generally well organized, with structured administrative set-ups and good record keeping, thus providing more detailed and reliable production figures. Many of these industries produce not only sawnwood but other timber products like veneer and plywood. The other groups, the medium and small sawmills, generally do not keep records in a methodical manner and accurately. Record keeping is virtually unknown in the case of pit sawyers, where they still exist, and itinerant sawyers, using power saw to convert logs into sawnwood in the forest. Some illegal logs are also converted by this class of operators in the forest. For comprehensive records on production of sawnwood, sample surveys of the industry are often conducted.
Woodbased Panels

They include veneer, plywood, particleboard, and fibre board. There is no fibre board production in Nigeria. Woodbased panel products are produced in medium to large scale integrated mills or companies and the usually keep good records for their operational purposes and statutory requirement, hence the production information on woodbased panels are easily accessible from the mills, when available, reliable and verifiable. However, alternative information is obtained from surveys of the rate of capacity utilisation of the mills and actual production figures, and product consumption obtained from surveys of major distributors of the products.

Pulp and Paper Products

The record keeping in the industries producing these classes of products is generally good and should therefore be easily accessible and verifiable. However, on a national average, the data status of wood based industries is not current, and also lacking in terms of value added to the products and productive inputs.

Fuelwood and Charcoal

Routine production of data on fuelwood and charcoal is not undertaken. There is no established mode of reporting fuelwood harvest from the forest. Most of the producers and marketers of fuelwood are rural people where the fuelwood is obtained. This class of people harvest fuelwood for their uses and sometimes for the market (urban and rural) and do not have record keeping habits of such activities. Production figures are obtained through ad-hoc studies and survey based on the assessment of per capita consumption.

Non-wood Forest Products

These products include bushmeat, animal skins, ivory and other artifacts, forest fruits, nuts, seeds, vegetables, species, canes, mushrooms, honey, and other minor forest products such as gum arabic, tannin, raphia palm, shea butter, rattan palm and chewing sticks. Generally these products are traded informally through local and sometimes urban market. Lack of data may be partly due to institutional incapacity to monitor and collect data on the products coupled with the fact that the major players in the harvesting and marketing of the products are rural people living around or in the forest areas who do not traditionally keep records of such enterprises. Furthermore, data on some of the products are only easily recorded in monetary values. The most practical method of collecting data has been through commissioned surveys and studies.

Price Statistics

The price of product may be seen as what a consumer is willing to pay based on his valuation of the product; the price can be determined by market forces of demand and supply, the producer of the product, among others. The collection of price information on forest products depends on the specific type of product. Generally, prices are influenced by the source of products, availability, market trends, season of the year, the species or product and spatial variation from State to State and also within towns and markets.

In Nigeria, each State government fixes the amount payable for the direct removal or extraction of forest products from forest reserves and protected areas outside the reserves in the form of tariff. A scale of charges or prices is thus administratively set and published in government gazette, legal notice or bulletin by the appropriate authority. There are no Forest Market Reports Publications. Prices so administratively set are neither based on the true value of the product or are
they market forces determined. Each State government through this mechanism manipulates the prices of forest products directly at the point of extraction or removal from the forests. The result is an imperfect market at this phase of the process. The administration of this pricing system in roundwood production is based on out-turn volume measurement or unit area assessment of the resource or stumpage value of each tree determined on minimum growth basis (examples: Tables 1.2 and 3).

Table 1: Stumpage rate on Reserve (in Naira)

<table>
<thead>
<tr>
<th>Species</th>
<th>Edo</th>
<th>Ondo</th>
<th>Oyo</th>
<th>Cross River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milicia excelsa</td>
<td>400</td>
<td>200</td>
<td>26</td>
<td>48</td>
</tr>
<tr>
<td>Gmelina arborea</td>
<td>200</td>
<td>150</td>
<td>5</td>
<td>36</td>
</tr>
<tr>
<td>Mansonia altissima</td>
<td>300</td>
<td>250</td>
<td>7</td>
<td>48</td>
</tr>
<tr>
<td>Khaya (spp. Mahogany)</td>
<td>300</td>
<td>150</td>
<td>26</td>
<td>48</td>
</tr>
<tr>
<td>Afzelia africana</td>
<td>300</td>
<td>250</td>
<td>19</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: Review of Wood-Based Sector in Nigeria, FORMECU, 1994

Table 2: Stumpage rate outside Reserves (in Naira)

<table>
<thead>
<tr>
<th>Species</th>
<th>Edo</th>
<th>Ondo</th>
<th>Oyo</th>
<th>Cross River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milicia excelsa</td>
<td>400</td>
<td>40</td>
<td>26</td>
<td>120</td>
</tr>
<tr>
<td>Gmelina arborea</td>
<td>200</td>
<td>30</td>
<td>5</td>
<td>90</td>
</tr>
<tr>
<td>Mansonia altissima</td>
<td>300</td>
<td>20</td>
<td>7</td>
<td>120</td>
</tr>
<tr>
<td>Khaya (spp. Mahogany)</td>
<td>300</td>
<td>40</td>
<td>26</td>
<td>120</td>
</tr>
<tr>
<td>Afzelia africana</td>
<td>300</td>
<td>30</td>
<td>19</td>
<td>120</td>
</tr>
</tbody>
</table>

Source: Review of Wood-Based Sector in Nigeria, FORMECU, 1994
Table 3: Out-Turn Volume (OTV) Tariff per m\(^3\) (in Naira)

<table>
<thead>
<tr>
<th>Species</th>
<th>STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Edo</td>
</tr>
<tr>
<td>Milicia excelsa</td>
<td>n/a</td>
</tr>
<tr>
<td>Gmelina arborea</td>
<td>n/a</td>
</tr>
<tr>
<td>Mansonia altissima</td>
<td>300</td>
</tr>
<tr>
<td>Khaya (spp. Mahogany)</td>
<td>300</td>
</tr>
<tr>
<td>Afzelia africana</td>
<td>300</td>
</tr>
</tbody>
</table>

Source: Review of Wood-Based Sector in Nigeria, FORMECU, 1994

The sale of sawnwood is carried out largely in the timber market. The market consists of many participants and the flow of information appears fairly efficient. Sawnwood is measured in cubic feet and prices are based on this volume measurement. The common sizes are:

(i) 1" x 12" x 12' (254mm x 3048mm x 3.66m)
(ii) 2" x 2" x 12' (508mm x 508mm x 3.66m)
(iii) 2" x 3" x 12' (508mm x 762mm x 3.66m)
(iv) 2" x 4" x 12' (508mm x 1016mm x 3.66m)
(v) 2" x 6" x 12' (508mm x 1524mm x 3.66m)

There are variations in prices between States, town and markets. The variations in prices can however be attributed directly to the cost variation in transportation, the activities of middle men and sellers association (see Table 4).

Table 4: Average prices of Sawnwood in some selected states (in N/mm\(^3\))

<table>
<thead>
<tr>
<th>State</th>
<th>Red Wood</th>
<th>White Wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagos</td>
<td>4200</td>
<td>5250</td>
</tr>
<tr>
<td>Ogun</td>
<td>3680</td>
<td>4975</td>
</tr>
<tr>
<td>Ondo</td>
<td>3480</td>
<td>4800</td>
</tr>
<tr>
<td>Edo</td>
<td>3645</td>
<td>4560</td>
</tr>
<tr>
<td>Cross River</td>
<td>3250</td>
<td>4960</td>
</tr>
<tr>
<td>Akwa Ibom</td>
<td>3800</td>
<td>4300</td>
</tr>
<tr>
<td>Kaduna</td>
<td>4325</td>
<td>5800</td>
</tr>
<tr>
<td>Kano</td>
<td>4325</td>
<td>6000</td>
</tr>
<tr>
<td>Oyo</td>
<td>3800</td>
<td>4980</td>
</tr>
</tbody>
</table>

Source: Federal Department of Forestry, 1994

USS1 = about N84 (Autonomous Foreign Exchange Market, October, 1995

Note: Redwood - Examples - Mahoganies, Brachystegia, and Piptadenistrom species.
       Whitewood - Examples - Antharis, Cieba, Danellia
Price statistics of woodbased panels, pulp and paper products are however easier to obtain from the producers or distributors because of systematization and standardization of the products marketing.

With furniture, mouldings and other secondary wood industry products, the prices are difficult to obtain due to the number of people involved and the variations in the quality and types of the products. Other forest products such as fuelwood and charcoal and non-wood forest products are sold either along road-side or at various locations and general markets in urban and rural areas. Prices statistics of these categories of products are more difficult to collect exhaustively because of the frequency of variation.

Generally, with the economic down-turn in Nigeria and the inflationary trends, prices are less stable, changing constantly. It is therefore necessary to be aware of the time regimes for the prices obtained. These should have influence on average prices which may be reported. Accounting for prices of processed forest products can also be affected by normal sales practices (discounts on sales and deductions from quantity purchased).

**Trade Statistics**

Trade statistics in forest products involves imports and exports. Forest products export trade information is normally collected by the Custom and Excise Department in the Federal Ministry of Finance, the Ministry of Trade and Central Bank of Nigeria as well as from producers. With the ban on export of round logs, FMANR through the Federal Department of Forestry is involved in monitoring the export of semi-processed wood, including furniture and furniture components, which are still allowed for export. Information on export of non-wood product is generally scanty. For gum arabic, because of its utility and value in the international market, data on export trade are now available. The total value of export in 1993 was 57.4 million Naira (CBN, 1993). Generally, the Custom and Excise Department is the most reliable and authoritative source of exports and imports figures but aggregates forest products trade figures in publications without detailed species classification or categorisation.

**People Statistics**

The National Population Commission is the best source of information for people involved in forestry activities through population census. FOS also carries out periodic Labour Force Sample Surveys.

**COLLECTION OF NATIONAL PRODUCT STATISTICS**

In the collection of data on forest products in Nigeria several methodologies are used. These include the use of questionnaires, personal visits, telephone, facsimile and radio messages, extraction of relevant information from publications issued by organizations involved in relevant data collection, and in seminars, workshops and symposia as well as surveys.

**Questionnaires**

These are commonly used for obtaining data in Nigeria. International Organizations such as the FAO and ATO, various companies often request for information from Nigeria through the use of questionnaires. On the country level, agencies such as the Central Bank of Nigeria also request for information from the Federal Department of Forestry through the use of questionnaires. If questionnaires are to meet the desired needs, they should be designed to be comprehensive and couched in a language easy to understand and yet solicit all relevant information required for the
particular exercise and purpose. The Federal Department of Forestry and State Forestry Departments are frequently involved in administering questionnaires to obtain requisite information. Copies of such questionnaires are sent to the recipients by personal delivery or mail. Questionnaires have been extensively used to obtain information on production statistics, employment, rate of capacity utilization in forest industries, etc. For questionnaires administered by the Federal Department of Forestry, its Field Offices in the States are involved in the process of administering and also the retrieval and even sometimes they undertake basic analysis and verification. The duly completed questionnaires are usually returned through the Field Offices or directly to the headquarters. It is important to mention that the statistical information requested through the use of questionnaires should be reasonable so that the required information can be obtained on time as the validity of most questionnaires is time dependent.

**Personal Visits**

Personal visits are paid to data sources to verify information as well as when time is limiting to obtain the required information, and also where it is important to be present to administer the questionnaires or retrieve the completed questionnaires from the respondents. This is usually costly where the coverage is large involving several movements and other logistics issues.

**Modern Communications Network**

The use of telephone, facsimile and radio calls is becoming increasingly important in obtaining information. Where the facilities are functioning and accessible, they are efficient and speedy mode of obtaining information. However, these facilities are not available everywhere and are also expensive compared with other alternatives such as through postal services. Consequently, the information obtained through these media, in terms of scope and content, are highly self limiting. With the programme of national networking of NDB and the NADB Systems, the accessibility to stored data would be greatly enhanced. Such data, even where not current, could be used to extrapolate or make forecast on the future situations for urgent decision making.

**Seminars, Workshops and Symposia**

Seminars, workshops and symposia are organized on various aspects of forestry by different agencies. Through papers presented and discussions, exchanges of statistic information take place. Some of the data so disseminated are also contained in the publications of the proceedings.

**Administrative Records**

The Forestry Departments in Nigeria generate a lot of statistical information in files as result of routine official activities. The data generated in the process are not readily available to other producers or users of forestry statistics outside the bureaucratic set up. The data are also not easily retrievable because of the filing systems as they are not usually stored in any proper and methodical form.

**Surveys and Consultancies**

Surveys and consultancies are undertaken on need basis. They could be limited in scope or extensive. This approach is commonly used in the absence of periodic and systematic collection of statistics. Surveys and consultancies have been conducted to generate basic information on fuelwood, wood products demand and supply and to make other projections. Most of the presently available statistics on forest products were collected and published through this method.
PROBLEMS AND SOLUTIONS TO NATIONAL FOREST PRODUCTS STATISTICS COLLECTION AND DISSEMINATION

Forestry statistics in many developing countries as the case in Nigeria, is stymied by several constraints:

Coordination of Agencies Involved

Several independent units as already discussed, are involved in the collection of basic national forestry statistics. They collect both primary and secondary data. The focus is often different with each agency also producing and storing data differently. Proper coordination will bring about efficient use of available manpower through the process of sharing of expertise, experience and facilities. By this means, the cost of statistical activities will be reduced as well as ensure timely delivery of outputs. Coordination would furthermore allow for the systematic setting of standards and use of consistent and generally accepted concepts, definitions and classifications. The outputs would therefore become easily compatible, consistent, comprehensive, aggregatable and integratable. The overall effect would be the improvement of the quality of data and the facilitation of the storage and retrieval. This calls for a proper net-working of all agencies involved in forestry statistics under the umbrella of a National Forestry Statistical and Information System already proposed, to be coordinated by the Federal Department of Forestry. The NFSIS will have direct linkages with all sources, producers and users of forestry statistics at the Federal, State and Local Government Levels through a National Forestry Data Bank (NFDB). NFDB would be linked directly with FOS and NDB.

Capacity Building and Human Resources Development

As already discussed the responsibility for forestry statistics is scattered among a variety of institutions with compartmentalised mandates and often different interests. The collection of accurate and comprehensive statistical information on all the activities of the forestry sector requires a team including qualified statisticians and forest economists to maintain the information on the sector as well as carry out analysis. This is presently lacking in the forestry sector statistics management requiring new institutional mandate, staff incentives, recruitment and training, and amongst others.

New Institutional Mandate

The apex forestry organization in Nigeria should be given the legal mandate for forest product statistics and as well as engendering institutional linkages with both the public and private sectors.

Staff Incentives

The job of data collection and production is often a difficult task. There is need to provide incentives to people involved through payment of commensurate allowances, and provision of the necessary tools and equipment for effective performance of their jobs. The quality of data to a considerable extent depends on the field staff. Due to lack of adequate incentives, the field staff are reluctant to go to the field to collect data. Improvement in their conditions would therefore be necessary. It may require some basic civil service reform. Some categories of staff in the government service in Nigeria, such as, the Veterinary Doctors are already enjoying enhanced allowances because of the special circumstances of their duties.
Staffing and Training

Skill gaps in the manpower for forestry sector statistics management exist in Nigeria. To remedy the situation, recruitment of appropriately qualified personnel for the collection and production of forestry statistics at both the Federal and State Forestry Departments levels would be necessary. There should also be emphasis on the statistical education of staff, training and retraining on the job and in formal institutions. For this latter reason, the formal institutions conducting training should be strengthened. The record keeping habit of most private sector participants, beside the big companies and some medium ones, is poor. Therefore, capacity building would be needed in the private sector to enhance the record keeping habit.

Improving and Disseminating Information

Different types of forestry statistics are available to different classes of producers and users of information. The absence of functional linkages between them has already been discussed including the need to establish a National Forestry Data Bank which will necessitate a comprehensive survey to obtain information on the current status of forest products statistics and the establishment of monitoring systems for data updates. An integrated participatory approach by all suppliers, users and producers for enhancing the dissemination of information mechanism would be required to engender appropriate response of all participants to data needs.

Funding

Availability of funds is perhaps the most important constraint in the production of forest products statistics in Nigeria. The current world economic recession and the poor state of the nation's economy have reduced the amount of funds available for forestry programmes. Without finance, it is not possible to collect statistics. The value of the Nigerian Naira has depreciated, there is an increase in the inflationary pressures and a weakening of the external sources of funds. Funds are not therefore available to provide the necessary logistic supports and modern equipment for data management. Funds are also inadequate to undertake field data collection, processing and publication. To remedy the situation requires improvement in the level of government funding and international donors assistance.

Measurements and Quality of Products

The official units of measurement in Nigeria are the metric units. However, many participants of the forest products sub-sector use the imperial units of measurement. Also, some of the non-wood products, because of the diversity of the product classes and difficulties in quantification in absolute terms, they are expressed in monetary terms. For similar reasons, monetary value measurement is used for secondary and tertiary forest industry products.

Apart from quality standards in the production of woodbased panels, and pulp and paper products, there are generally no agreed quality standards for other forest products. For example, no uniform grading system of sawn timber in the informal wood based sector. The grading is largely subjective and classified as good, good rough, rough and jacket with no standard yardstick of the quality in each locality. The Tropical Square Edge and Sawnwood (SATA) and ATIBT grading rules being promoted by ATO are only been used in some industries in the modern wood sector.

Respondents

A general apathy and delay in supplying statistical information by respondents has been experienced in Nigeria. In the private forestry sector, apart from the big business forestry enterprises
and some medium outfits, record keeping is slack. For some, the data are not even kept. Where the data are kept, there is the common misapprehension by some respondents that the information if supplied would be used for unfair tax assessments and other fiscal measures inimical to their economic interests. Furthermore, some respondents regard requests for information as time wasting. There exist another group of respondents who have not been exposed to any formal education and so can not read and write. This group therefore cannot complete questionnaires on their own. This is a common situation in fuelwood consumption surveys. In such circumstances, reliance is placed on the use of translators, but could result in the loss of confidence by the respondents in the system thus introducing sources of bias particularly when confidential information is required. It is therefore very important to sensitize all respondents on the value of providing accurate data.

**Processing Facilities and Logistics Supports**

The use of computer in data management for forestry statistics has not been fully developed country wise. Many producers of forestry statistics do not have microcomputers. Several data are therefore commonly found in files, record books and reports where they are not easily accessed. Vehicles and other logistic supports are lacking creating difficulties in primary data collection and processing.

**Legislation**

Legal support to efforts to collect forestry data from the various sources of data and industries' operators is lacking. Necessary legal instrument would be required to invigorate efforts at data collection and production.

**Political Will**

The status of forestry statistics and information management is not the best in the present circumstances and the forestry sector requires greater political muscle to upgrade the present standard.

**AGENCY OFFICIALS**

There is lack of awareness and commitment of some agency officials to the need to collect, store and publish accurate data of their working areas. Proper retraining and attitudinal orientation would be required to put such officials on stream to collect and publish accurate data. There are also the activities of the illegal fellers for which the forestry officials are not able to get statistics.

**Imports and Exports**

The Customs and Excise Department published data on imports and exports are aggregated. They are not broken down into species and other classes, perhaps because the department has no technical forestry expertise to do so and it has so many other sectors data to deal with, coupled with the fact that revenue generation is of a higher priority of the department. It is therefore, difficult to have statistics on exports and imports trade in forestry products from the department in the form and content needed for publication of a forestry journal.

**INSTITUTIONAL ARRANGEMENTS FOR FORESTRY POLICY AND PLANNING**

Forest policy is a national planning exercise. It usually involves various interest groups and professional disciplines within and outside the traditional forestry sector. Adequate information is required for policy and planning. It is necessary to establish and maintain adequate and comparable data base and monitoring systems at the sectoral level.
Planning and policy formulation is a continuing process involving the preparation of strategies, programmes and projects based on the best available data at the point in time. Having appropriate national institutions also plays important role at both the formulation and implementation stages. Three elements are crucial to institutions’ operations and performance, these are, the organizational framework, technical infrastructure and all the human elements (participants).

The Federal Ministry of Agriculture and Natural Resources in Nigeria through its Forestry Department (Federal Department of Forestry) is the national focal point for forestry-related issues. There is a National Council on Agriculture (NCA), chaired by the Honourable Minister of Agriculture, responsible for overall agricultural policy in Nigeria. Its membership includes all the State Commissioners responsible for agricultural matters including forestry. The National Forestry Development Committee (NFDC) is a committee of the NCA chaired by the Director of Federal Department of Forestry. The major function of NFDC is to initiate national forest policies and advice government on important forestry issues. Its membership includes all the State Directors of Forestry, Director of FRIN, and Heads of Forestry Departments in Universities.

The Federal Department of Forestry which was set up in 1971 has the responsibility for formulating national forest policy, fostering forestry development, promoting and funding projects of national interest, and coordinating and monitoring State Forestry activities in respect of foreign funded (World Bank and African Development Bank) projects and institutional development. The foreign funded projects are administered under a specialized unit, the Forestry Monitoring, Evaluation and Coordinating Unit (FORMECU). A new Agricultural Policy for Nigeria was developed in 1988 containing the National Forest Policy (NFP). The thrust of the NFP is the achievement and sustainable management of the forest resources for self-sufficiency.

The Forestry Department in each State has the responsibility for setting and administering policies for its forests and addressing, amongst others, the regulatory framework for the management of the forest lands and utilization of forests, pricing and marketing of forest products, management and control of enterprises in the forestry sector and private sector participation in forestry development. Other agencies directly or indirectly involved in forestry policy include the Ministries of Finance, Education, Industries, and Trade; Federal Environmental Protection Agency (FEPA) and Non-Governmental Organizations such as Nigerian Conservation Foundation. They all tend to affect policy and forestry planning activities. At all levels of their involvement in policy and planning processes, accurate data are indispensable aid to reasonable and rational judgements.

**THE FUTURE OF FORESTRY STATISTICS**

The current issues in the forestry statistics sector have been highlighted to some details. Some suggestions for improvement in the future are proffered. Some are achievable concurrently within a short time while others require long term planning to achieve the desired objectives.

(a) Inter-agency coordination of producers, suppliers and users of forestry statistics should be promoted at the Federal level with the Federal Department of Forestry as the focal point and including donor agencies and non-governmental organizations so that there can be effective input of resources into the National Forestry Statistical and Information System optimizing the utilisation of the available resources. A National Forestry Data Bank (NFDC) has been proposed within the framework of NFSIS.

(b) A National Forestry Statistical Committee (NFSCO) should be set-up as a sub-committee of the National Forestry Development Committee to advise it on matters relating to forestry statistics as well as coordinate States efforts.
At the State level, the State Forestry Statistics Committee (SFSCO) under the Chairmanship of the Director of Forestry of the State, with the Field Office of the Federal Department of Forestry serving as the secretariat and membership comprising representatives of producers, suppliers and users of primary data is essential. This body will relate also with SASCCO. It will also be responsible for sending all data collected to the National Forestry Data Bank for processing and storage to prevent loss of information content. The NFDC would have direct linkage with the NADB through the National Forestry Data Bank, and the NADB with the FOS and NDB. The linkages would ensure adequate coordination and networking. A basic requirement therefore is a reasonable level of computerization at the State level to produce statistical information and enhance routine access to data and information flow with the NFDB in place.

The NFSIS must be properly oriented to the various needs and markets as well as the public sector led development strategy requirement for data and information at very disaggregated level at relatively short time intervals. Hence regular dialogue between users, suppliers and producers of statistical information should be promoted to review and define data needs, including the needs of international organization.

Statistical information management should be sufficiently and adequately funded on sustainable basis, internally (government and private sectors) and through donor support funds.

Federal Department of Forestry in collaboration with FOS and PRSD in FMANR should work on standardization of concepts, definitions, classifications, methodologies, and computer hardwares and softwares, subject to local operations, for effective coordination and through a deliberate policy and well laid down procedure for agency coordination and collaboration. In particular, they should develop appropriate quantitative methodologies for assessing the informal products sector.

There is need to provide on the job formal training to forestry officials on data collection and handling as well as provide incentives to staff to enhance performance.

Establishing proper networking of information flow at country and international levels for quick exchange of desired information is necessary.

Law on the submission of accurate data by all suppliers to the NFDB should be promulgated.

Ways and means to get the participation of private sector in the production and dissemination of forestry statistics through public education and enlightenment campaign should be explored.

There is the need to retrieve raw data which are presently locked up in files, reports etc. for analysis and publications. FDF should publish detailed forestry statistics periodicals and also ensure that there is uniformity in data dissemination. Continuous production and publications of forestry statistics require proper funding and acquisition of necessary technical capacity including the provision of equipment and recruitment of the right calibre of staff. These needs should be appropriately addressed by government at all levels, private sector and international donor agencies.

It seems that the final underpinning factor in evolving the national forestry statistic sector and engendering a general forestry statistical culture in Nigeria is through the NFSIS. This is
suggested for other developing countries where similar systems do not exist, subject to local circumstances.

CONCLUSIONS

The scenario of the institutional set up and technical capabilities for improved collection and analysis of forestry statistics as it presently obtains in Nigeria has been presented.

The institutional arrangements have been loose and fairly uncoordinated. There is a paucity of relevant information. It would appear most appropriate that for forestry statistical data, the Federal Department of Forestry should be given the legal mandate to organise the collection, processing and publication as the focal point in a properly developed and coordinated National Forestry Statistical and Information System. A National Forestry Data Bank domiciled in Federal Department of Forestry has also been proposed with direct linkages with all the suppliers, producers and users of forestry statistics at the State level through the proposed State Forestry Statistical Committee and also at the Federal level with proper linkages to NADB, FOS and NDB. A National Forestry Statistical Committee, a sub-committee of the NFDC has also been suggested.

For efficient implementation of these proposals, a crop of people with requisite technical skills and drive should be available to operate the system. Consequently, apart from the acquisition of required computer hardwares and softwares, selection and training of the right type of personnel is called for. This will involve expenditure of funds that are presently in short supply in many developing countries. The implication is that, funds should be sourced internally (private sector and government) and also from external donor agencies.

As regards policy formulation, generators of forestry statistics should be brought together by the Federal Department of Forestry under the umbrella of the NFSIS. The plan should not loose sight of regional peculiarities. In addition, encouragement should be provided for States to programme and execute policies not at variance with the national policies. The Federal Department of Forestry should as a matter of priority superintend over the generation and supervision of such State-based policies to ensure their being in agreement with the national ones.

BIBLIOGRAPHY


Appendix 1: Raw Material Supply/demand Balance of Some Forest Products (in '000m³)

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>1993</th>
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<tbody>
<tr>
<td><strong>(A) Poles, Piling and Posts (Utility Wood)</strong></td>
<td></td>
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</tr>
<tr>
<td>Required</td>
<td>2279</td>
<td>2514</td>
</tr>
<tr>
<td>Produced</td>
<td>1410</td>
<td>1359</td>
</tr>
<tr>
<td>Balance</td>
<td>-869</td>
<td>-1155</td>
</tr>
<tr>
<td><strong>Sawlogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawnwood required</td>
<td>2711</td>
<td>1091</td>
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<tr>
<td>Sawlogs/Sawnwood ratio</td>
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<tr>
<td>Sawlogs required</td>
<td>5422</td>
<td>6182</td>
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<td>Sawlogs produced</td>
<td>3582</td>
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<td>Sawlogs balance</td>
<td>-1840</td>
<td>-2767</td>
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<tr>
<td>Capacity (log input)</td>
<td>8136</td>
<td>NA</td>
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<td><strong>(B) Veneer Logs</strong></td>
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<tr>
<td>Plywood required</td>
<td>179</td>
<td>206</td>
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<td>Veneer log/plywood ratio</td>
<td>3.0</td>
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<tr>
<td>Veneer logs required</td>
<td>537</td>
<td>618</td>
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<td>Veneer log produced</td>
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<td>161</td>
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<td>Veneer log balance</td>
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<td>-457</td>
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<td>Capacity (log input)</td>
<td>555</td>
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<td><strong>(C) Industrial Residues</strong></td>
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<td>Particle board required</td>
<td>2279</td>
<td>2514</td>
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<td>Board/Residue ratio</td>
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<td>1359</td>
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<td>Residues required</td>
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<td>-1155</td>
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<tr>
<td>Residues produced by sawmills and plymills</td>
<td>1904</td>
<td>1815</td>
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<tr>
<td>Residue balance</td>
<td>1848</td>
<td>1746</td>
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<tr>
<td>Capacity (particle board output)</td>
<td>111</td>
<td>NA</td>
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<tr>
<td><strong>(D) Pulpwood</strong></td>
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<td>Total paper required (ton)</td>
<td>183</td>
<td>175</td>
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<td>Paper produced (ton)</td>
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<td>Paper balance (ton)</td>
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<td>-164</td>
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<td>Pulpwood/Paper ratio (m³ton)</td>
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<td>Pulpwood required</td>
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<td>39</td>
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<tr>
<td>Pulpwood produced</td>
<td>689</td>
<td>689</td>
</tr>
<tr>
<td>Pulpwood balance</td>
<td>651</td>
<td>651</td>
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<tr>
<td><strong>(E) Fuelwood</strong></td>
<td></td>
<td></td>
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<tr>
<td>Required</td>
<td>100430</td>
<td>103474</td>
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<td>Produced (from forests)</td>
<td>85276</td>
<td>81261</td>
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<td>Produced (Residues and Pulpwood Surplus)</td>
<td>2173</td>
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<tr>
<td>Balance</td>
<td>-12981</td>
<td>-22213</td>
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<tr>
<td>Total wood required</td>
<td>108763</td>
<td>112896</td>
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<tr>
<td>Supply</td>
<td>91127</td>
<td>84489</td>
</tr>
<tr>
<td>Balance</td>
<td>-17636</td>
<td>-28407</td>
</tr>
</tbody>
</table>

Sources:
1. World Bank Forestry Sector Review, 1992
2. Review of Wood-Based Sector in Nigeria, FORMECU, 1994
### Appendix 2: Estimates of Output of Some Forest Products (Volume in '000m³)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
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<tr>
<td>Roundwood</td>
<td>100,043</td>
<td>103,964</td>
<td>106,062</td>
<td>108,507</td>
<td>110,731</td>
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<tr>
<td>Sawnwood</td>
<td>996</td>
<td>1,121</td>
<td>1,125</td>
<td>1,168</td>
<td>1,217</td>
</tr>
<tr>
<td>Woodbased panels</td>
<td>126</td>
<td>102</td>
<td>131</td>
<td>112</td>
<td>110</td>
</tr>
<tr>
<td>Paper and paper boards (000 mt)</td>
<td>45</td>
<td>50</td>
<td>30</td>
<td>21</td>
<td>18</td>
</tr>
</tbody>
</table>

Source:
CASE STUDY OF A NATIONAL YEARBOOK-REQUIREMENTS FOR THE PHILIPPINES

by Dolores R. Catindig
Chief, Forestry Statistics Section, Forest Economics Division, Forest Management Bureau, Department of Environment and Natural Resources

INTRODUCTION

Forestry in the Philippines has always been one of the pillars of the economy through the income it generates and the employment opportunities it provides the people, among other socio-economic benefits. It represents the biggest slice of the country’s resource base and is responsible for providing the people’s needs for raw material for the wood processing industry, fuelwood, recreation, habitat for wildlife, water and other beneficial uses.

Status of Forest Resources

The country’s forests have dramatically changed from an abundant to an alarming state at present due to depletions experienced during the past years. As of 1994, the country’s forest comprised about 5.686 million hectares or roughly 19 percent of the total land area of the country.

There are four (4) major forest types in the country namely: 1) the dipterocarp forest, which is the dominant type; 2) the pine forest; 3) mangrove; and 4) mossy forests.

Table 1. Forest Cover of the Philippines, as of 1994

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Area in '000 ha</th>
<th>% to total hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5.686</td>
<td>100.00</td>
</tr>
<tr>
<td>Dipterocarp</td>
<td>3.768</td>
<td>66.27</td>
</tr>
<tr>
<td>Old Growth</td>
<td>0.805</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>2.963</td>
<td></td>
</tr>
<tr>
<td>Pine</td>
<td>0.232</td>
<td>4.08</td>
</tr>
<tr>
<td>Mossy</td>
<td>1.070</td>
<td>18.82</td>
</tr>
<tr>
<td>Mangrove</td>
<td>0.120</td>
<td>2.11</td>
</tr>
<tr>
<td>Submarginal</td>
<td>0.496</td>
<td>8.72</td>
</tr>
</tbody>
</table>

Source: 1994 Philippine Forestry Statistics

As of 1994, the dipterocarps comprised 3.768 million hectares or 66 percent of the total forest area of which 0.805 million hectares are virgin or old growth, while 2.963 million were residual forests. Pine covered 0.232 million hectares, mangrove comprised 0.120 million hectares, while mossy accounted for 1.07 million hectares.
The volume of timber found in the commercial forest was estimated at 437 million cubic meters as of 1994.

**Forest Management**

The Philippines has focused its development efforts towards conservation and development of the remaining forest resources after realizing the impact of its over exploitation. Guided by the 25 year Master Plan for Forestry Development and the Philippine Strategy for Sustainable Development (PSSD), policies have evolved towards the wise use of the forest resources one of which was the logging ban in the old growth forest since 1992 and in areas above 50 percent in slope and elevations above 1,000 meters. Logging has since been limited in the residual forests. These restrictions have greatly reduced log production to an average of 1.1 million cubic meters per year from 1992 to 1994. The negative trend in log production is also partly attributed to the drastic reduction of licensed logging companies from 81 in 1991 to only 46 in 1994.

Parallel with the conservation measures adopted by the government, intensified reforestation efforts are being vigorously undertaken. The Master Plan for Forestry Development envisions around 3 million hectares of plantation forest by 2015. This will ensure that domestic requirements for wood will be satisfied. The Philippines likewise adheres to the concept of sustainable management as a key response to the forestry crisis emphasizing the right of people and communities in the management, conservation and utilization of forest resources. Thus, the present thrust is the development of community-based forest management projects.

**Wood-processing Industry**

In 1994, there were 93 regular sawmills nationwide with a total daily rated capacity of 4,279 cubic meters. Plywood mills numbered 40 having a total daily rated capacity of 5,450 cubic meters. Table 2 shows a listing of the wood-processing mills in the country as of 1994.

*Table 2. Wood-processing Industry*

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Daily Rated Capacity (cum.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawmills</td>
<td>93</td>
<td>4,279</td>
</tr>
<tr>
<td>Veneer</td>
<td>6</td>
<td>208</td>
</tr>
<tr>
<td>Plywood</td>
<td>40</td>
<td>5,450</td>
</tr>
<tr>
<td>Blockboard</td>
<td>26</td>
<td>454</td>
</tr>
<tr>
<td>Particleboard</td>
<td>3</td>
<td>172</td>
</tr>
<tr>
<td>Fiberboard</td>
<td>1</td>
<td>708</td>
</tr>
</tbody>
</table>

Source: 1994 Philippine Forestry Statistics

The wood-processing industry has also exhibited a downward performance due to the decline in the supply of local logs. Table 3 shows production trends from 1984 - 1994 of the three major wood products in the country.
From being a log export-oriented market in the 60’s and 70’s, the Philippines has, since 1989 become an importer of log primarily to augment local supply and cater the domestic wood requirement of the wood-based industry. From 1989 to 1994, importation of log has recorded an average of 452,000 cubic meters per year.

Table 3. Production of Lumber, Veneer, and Plywood

<table>
<thead>
<tr>
<th>Year</th>
<th>Lumber</th>
<th>Veneer</th>
<th>Plywood</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>407</td>
<td>39</td>
<td>258</td>
</tr>
<tr>
<td>1993</td>
<td>440</td>
<td>65</td>
<td>273</td>
</tr>
<tr>
<td>1992</td>
<td>647</td>
<td>80</td>
<td>331</td>
</tr>
<tr>
<td>1991</td>
<td>726</td>
<td>54</td>
<td>321</td>
</tr>
<tr>
<td>1990</td>
<td>841</td>
<td>49</td>
<td>397</td>
</tr>
<tr>
<td>1989</td>
<td>975</td>
<td>61</td>
<td>344</td>
</tr>
<tr>
<td>1988</td>
<td>1,033</td>
<td>85</td>
<td>415</td>
</tr>
<tr>
<td>1987</td>
<td>1,233</td>
<td>75</td>
<td>517</td>
</tr>
<tr>
<td>1986</td>
<td>977</td>
<td>73</td>
<td>424</td>
</tr>
<tr>
<td>1985</td>
<td>1,062</td>
<td>77</td>
<td>350</td>
</tr>
<tr>
<td>1984</td>
<td>1,234</td>
<td>84</td>
<td>438</td>
</tr>
</tbody>
</table>

Source: 1994 Philippine Forestry Statistics

To further meet local demand for processed wood products, the country has also resorted to importation of lumber averaging 380,652 cubic meters per year for 1993 and 1994. An existing selective lumber export ban is also being observed to curb local wood shortage.

The combined revenue generated by the export of forest-based products amounted to US$ 496 million in 1994.

THE FORESTRY STATISTICAL SYSTEM

The Forest Management Bureau (FMB) of the Department of Environment and Natural Resources (DENR) is mandated to compile information on forestry. The primary mode of disseminating these information is the Philippine Forestry Statistics (PFS) yearbook. The PFS is a compendium of basic forestry information on forest resources and operations, forest resources utilization, trade, prices, forest revenues and other forestry-related information such as the Gross Value Added (GVA) in Forestry, contribution of forestry to the GNP, schools offering forestry courses, etc. These information are derived both from primary and secondary sources. The primary data are directly collected by the DENR as by-product of its administrative and regulatory functions, also from surveys or studies which could be one-time or regularly conducted. Secondary data are usually obtained from other publications or offices. Figure 1 illustrates a diagram of the existing forestry statistical system in the DENR.
Figure 1  The Forestry Statistical System

Forest Management Bureau
(Compilation, processing, analysis)

Philippine Forestry Statistics Yearbook (PFS)

Forest Resources Accomplishments/ Status of some Forestry Activities

Production, Industry Profile, Revenues

Prices

Trade

Other Forestry Related Information

NFRM Regional/ Regional Accomplishment Reports

Licensees Reports/ Regional Statistical Reports

Regional Price Survey Reports

Trade Publications (NSO)

Others (Annual Reports, Publications, etc.)
Methodologies in data collection and sources

Data on forest resources (area and volume) are projections based on the results of the second National Forest Resources Inventory Project of the DENR which was concluded in 1988. Projection models were formulated by the said project to update the data every year. Other resource data are culled from administrative reports submitted by the regional offices. These include accomplishments in reforestation, status of implementation of community-based forestry projects, forest protection efforts, etc.

Information on production and the utilization of forest resources and the wood processing industry are obtained from periodic reports of licensees and regional offices which are submitted to the central office. Standard formats have been prescribed to achieve uniformity of reports. These include area, allowable cut and log production of logging companies, rated capacities and production of wood processing mills, non-timber production and number and area of existing forest plantations in the country.

Trade data are obtained from a secondary source which is the National Statistics Office (NSO). NSO’s data are based on recorded trade transactions in a given time. Trade data (import and export) include log and processed wood products, non-timber forest products, wood manufactures, etc.

Price data are collected by the DENR regional price monitoring units through monthly surveys in selected establishments within their respective jurisdictions. Included are the local prices of log by species and grade; lumber and plywood by species, grade and size, and the non-timber forest products such as rattan, also by species and diameter size, and others.

Data on revenues which are actually the forest charges paid by licensees for harvesting forest products are likewise obtained from reports submitted both by the licensees and regional offices.

Other forestry-related data are obtained from various government agencies such as the National Statistical Coordination Board (NSCB), NSO, the Department of Education, Culture and Sports and others. Some of these information are: the contribution of forestry to the GNP, graduates of forestry courses, census of forestry establishments, etc.

DATA VALIDATION

Data obtained from the different sources except trade and information obtained from other offices, are validated at least twice a year to check its accuracy and reliability. Production of log is validated by comparing the licensees’ reports with the report of the DENR scalers. Adjustments are then made to reflect inconsistencies between the two reports. To validate price data, sales invoices provided by the establishments are used to check the reports of the regional price monitoring units. Revenues (forest charges) reports of the licensees are validated by the official receipt of payments for every transaction which are issued at the regional office. For most of the reports, validation of data are being carried out from time to time whenever there are inconsistencies and dubious figures through dialogues and follow-ups with the concerned units which collected the data. Supplementary data sources are also used to correct deficiencies in most situations.

INFORMATION TECHNOLOGY

In the Central Office and Regional Offices, computers are widely used in the storage, processing and analysis of data. Data exchange and transmission are likewise facilitated with the aid
of facsimile machines, radios and other communication media. Spreadsheets such as LOTUS 123 are commonly used in the handling of data.

Database management softwares such as FOXPRO, PARADOX and DBASE are also used. Preparations are underway for networking which will link all the offices within the DENR to facilitate data exchange and access. Statistical packages are used in analyses such as the MICROSTAT, SAS, etc.

**USES OF FORESTRY STATISTICS**

The Philippine Forestry Statistics serves as handy reference of information on forestry that are used as vital inputs to the following endeavours:

i. Planning, policy formulation and decision-making undertaken by government agencies concerned with the forestry sector and its related sector. In the drafting of the Master Plan for Forestry Development, statistics played a key role in setting the priorities for development.

ii. Market research and analysis, and project and feasibility studies of prospective investors and those already engaged in the utilization of forest resources.

iii. Research work and specific studies of researches from the academe and non-government organization in the field of forestry and related subjects.

iv. Publication of statistical yearbook of other government agencies and international organizations.

**PRIORITIES FOR THE DEVELOPMENT OF FORESTRY SECTOR STATISTICS**

Baseline information is a critical factor in the formulation of policies and plans that would ensure that the forestry sector is properly managed. Information is like wise vital in evaluating existing policies in terms of its effectiveness versus the goals of the different forestry programs, and also to revise or change existing policies to attune to existing situations. Discussed below are some of the major demands in the forestry statistical system in the Philippines.

**Philippine Strategy for Sustainable Development (PSSD)**

The Medium-Term Philippine Development Plan (MTPDP), underscores an ecosystem-based approach to agri-industrial development for 1993 - 1998. This approach is also known as the Philippine Strategy for Sustainable Development (PSSD) which was adopted by the Philippine government in response to positions raised at the 1992 Earth Summit in Rio de Janeiro. It defines policies that the country requires in order to protect the environment while the economy move towards agri-industrialization. Through the PSSD, all decision-making shall consider environmental concerns. Under the plan, sustainable development in the management of forest resources can be achieved through the following policy measures:

i. Proper pricing and natural resource accounting for all forest resources;

ii. The promotion of lesser-known/lesser-used tree species (LKS/LUS) to ease the demand for the traditional tree species;

iii. Establishment of community-based forest management projects;
iv. Ensuring the participation of women, indigenous people and other concerned parties in managing the forest resources. The implementation of the PSSD requires lots of information to achieve its objectives. The data requirements of the program are presently part of the major concerns in the development of data bases for the forestry sector.

The Master Plan for Forestry Development

The Master Plan for Forestry Development is a 25-year (1991-2015) macro scheme for the development of the forestry sector. Specifically, the Plan spells out the development programs designed to achieve the goals and objectives of the forestry sector; the resources required to implement the programs and the scenarios and impacts envisaged as a result of program implementation. The general goal of the Plan is to transform the forestry sector toward a condition whereby all of the forest resources will be under efficient and equitable management conservation, and utilization, satisfying in appropriate ways and on a sustainable basis the needs of the people for forest-based commodities and services.

Specific Objectives of the Master Plan

i. To conserve and protect the forest ecosystem and its resources.

ii. To meet the needs for forest products by placing all of the country’s production forest under sustainable management.

iii. To manage the upland watersheds properly to provide for the basic needs of the people.

iv. To generate employment and contribute to the country’s economic development.

v. To promote equitable access to forest resources

The Master Plan Programs

The Master Plan has three main programs which are made up of 10 development programs and 5 institutional support programs. These are:

i. Man and the Environment

ii. Forest Management and Products Development

iii. Institutional Development

Items 1 and 2 deals with forest resources concerns and how it is utilized by people while item 3 deals with the support system necessary to effectively implement the different programs.

One of the requirements in the implementation of the Master Plan is the strengthening of planning at the national, regional and local levels specifically assisting in translating the macro-level plan into regional and operational level plans. In formulating the regional and operational level plans, statistics play a vital role. The success of these plans rests on good information. Improvements in statistics generation are currently anchored in the requirements of the Master Plan. Some of the basic requirements of the Plan may be summarized as follows:
Land Use

Required data would be topography, slope, type of soil, present land-use pattern, forestry, grazing, shifting cultivation, etc.

Forest Protection

For the long term survival of the forestry sector, protection of existing national forests and plantation from destruction are priority consideration. Some of the data needed are: forest population, shifting cultivation, siltation, erosion, watershed characteristics, extent of destruction by cause, etc.

Reforestation

New forest plantation require data on site classification, growth and yield, prices of wood, various factor inputs, etc.

Wood Industries Development

Data required are present and future mill locations and capacities, machineries, trade, consumptions, market, transport, infrastructure, etc.

Forest Management

Information needed are: forest inventories, growth and yield data, future demands for forest products, production and export of logs, logging wastes, forest destruction, etc.

Most of these data requirements are currently being collected but have to be improved in terms of timeliness, reliability and desegregation. Data collection have to be expanded to capture the gaps.

Natural Resources Accounting

One of the recent concerns in the Philippines is to modify the conventional economic accounts in order that they may better reflect environmental and natural resource degradation. The Philippine Natural Resources Accounting Project (NRAP-Phase 1) was a research undertaking tasked to develop an understanding of the relationships between natural resource degradation and economic activity in the Philippines as measured by the Philippine National Accounts. The project undertook the formulation of a framework for determining the optimal extraction rates of different approaches for forest land-based resources and to strengthen the capabilities of relevant Philippine institutions to undertake natural resource policy analyses. The institutionalization stage is presently being initiated starting off with the models developed by the NRAP-Phase 1. The relevant institutions identified are the Department of Environment and Natural Resources and the National Statistical Coordination Board which are now already coordinating with each other in developing the Philippine System of Integrated Environmental and Economic Accounting (PSEEA) frame work. Specifically, the Technical Working Group composed of people from the two agencies is tasked among other things to operationalize the PSEEA, to identify environmental trends and concerns in the country, to identify data requirements and data gaps and to do estimations/compilations of the 1992 PSEEA. Some of these data requirements are: resource stock, flows (value and quantity), cost of extraction, output prices, informal use, etc.
PRIORITIES FOR IMPROVING CAPACITY BUILDING

To meet the requirements of the identified priority areas for development, there is an urgent need to address the following concerns within the organization, its human resources and facilities. These would ensure the success of the implementation of the national plans and the strengthening of the capability of the DENR to generate the reliable data that would serve as a basic tool in planning, policy formulation and decision-making.

1. Strengthening/Development of data validation mechanism to obtain accurate and reliable data
2. Strengthening the monitoring system and interaction among the Central Office and the field units statistical staff to ensure close coordination among themselves.
3. Continuous training of statistical personnel in data collection, statistical techniques and analysis, data base management, computer software packages.
4. Provision of computers and communication equipment to the lowest unit of the organization which implements forestry operations.
5. Provision of adequate financial support to statistical activities especially in the field units.
6. Development/Improvement/Maintenance of forestry databases that would capture all the data requirements of the forestry sector.

CONCLUSIONS

One of the recent developments in the forestry sector of the Philippines is the development of a forest management information system which aims to strengthen the government agency's capability to generate reliable and timely statistics. The forestry statistical system is focused towards that direction and it is hoped that in the near future, data availability and access will be at one's immediate disposal. The use of statistics as an important tool in planning and policy formulation has significantly evolved in the recent years which may be purely attributed to a wider coverage and dissemination of needed information. To sustain its ability to provide information, the sector needs logistical support for its statistical activities. It is also important to address the present problems that hamper statistical development and improvement.

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CURRENT STATUS OF NATIONAL AND INTERNATIONAL FOREST SECTOR STATISTICS
RUSSIAN FEDERATION: CASE STUDY OF A COUNTRY IN TRANSITION

by V.E. Sokolov
Vice-Chairman of the Board, Russian Union of Timber Exporters (RUTEX)

GENERAL SITUATION IN THE FIELD OF STATISTICS IN RUSSIA IN THE TRANSITION PERIOD

Introduction

Radical transformation of social and economic conditions in the Russian Federation - changes that are going on at international and state levels - necessitated the reform of Russian statistics with the establishment of a virtually new national statistical service with a status corresponding to the needs of an independent state.

At present, as it was in the former USSR, the Russian Federation State Committee for Statistics (Goskomstat of Russia) is the main state body responsible for collection, analysis and use of statistical information in the country.

Disintegration of the USSR has led to almost complete destruction of the entire information and statistical service of the country, and the breakage of inter-agency ties. New forms of ownership have appeared and, correspondingly, new interrelations within each agency, as well as between agencies and states.

Today the process of formation and consolidation of the Russian national statistical service is under way. The tasks undertaken by Goskomstat of Russia under the new conditions of economic, political and social development are:

- learning to master new methods of accounting, classification of indexes and other aspects of the methodological base used in world practice;
- the search for and introduction of new forms of work organization for the purpose of harmonizing the interests of statistical services of different levels, leading to a unified system of information which, in turn, provides preconditions for improvement of methodology and principles of information processing and analysis;
- the introduction of advanced methods of statistical observation with due regard for new economic indexes. This process is connected with the intensive development of the non-governmental sector, formation of market infrastructure, rapid social stratification of population and other qualitatively new phenomena.

The first objective is to solve, as soon as practicable, the problem of coverage by statistical accounting of the growing number of economic enterprises, particularly those within the non-governmental sector of the economy. For the period from 1 January 1993 to 1 January 1994 their number increased from 0.5 million units to 1.5 million units. Currently the number of market agents is doubling annually. At the beginning of 1995 they numbered about 4 million (for comparison, in the United States there are about 15 million market agents on the register). The volume of statistical information that is processed increased during one year by 14 percent and now accounts for 11.3 billion indexes.
The traditional method of data collection through the system of obligatory complete statistical accounting (as prevailed in USSR statistics under the conditions of a directed economy) proved inadequate to new conditions. Serious difficulties have arisen obtaining accounts from enterprises, particularly in the non-governmental sector of the economy, in trade and services, small businesses, farms and peasant farms.

Under these conditions urgent measures have been taken for the development and introduction of methodology enabling final calculations of selected indexes characterizing commodity circulation, services production, cash income of population, capital investments, export and import operations and some others.

The immediate objective is reformation of the system of statistical observation. In a radical revision of statistical indicators and the methodology of their calculation, the main emphasis is on their adaptation to the conditions of a market economy and international standards.

Efforts are being made to introduce to statistical practice an all-Russia classification of types of economic activities, products and services harmonized with similar classifications used in other countries (i.e. internationally).

Other research and development efforts include:

- creation of a system of indicators characterizing inflation (including prices of raw materials to producers);
- investigations of labour market characteristics (relating to both employment and unemployment);
- a system of household inspection, in line with international practice, to provide more detail on social indicators relating to the standard and cost of living;
- a reappraisal of the capital assets of the country on 1 January each year.

The basis for reformation of statistics under the new conditions is the State Programme for 1993-1995 of transition of the Russian Federation towards an accounting and statistics system, as adopted in world practice, that is in accordance with requirements of market economy development.

Within this programme are measures for:

- development of a system of national accounts;
- international comparison of gross domestic product;
- transformation of financial, budgetary and bank statistics;
- development of balances of payments;
- bringing into line with international requirements statistical indexes of prices, population, labour, foreign trade, including customs statistics.

Statistical generalization of results of economic development can be found in monthly reports of Goskomstat of Russia, "Social and economic situation in Russia", which are forwarded to ministries and departments, newspapers, radio and television. This contributes to consolidation of
regular statistical informing of mass media and the public. In addition, frequent press releases containing statistical materials on problems of economic development are forwarded to mass media.

Annual collected statistical materials, “Russia in figures” and “Russian Statistical Yearbook” are official publications of Goskomstat of Russia. These publications (see Appendix 1) are meant for the general public and since 1994 their contents have been very close to international standards. Information close to world standards is also published in the new monthly magazine, “Statistical Review”.

**Cooperation with international and national statistical services of developed countries**

International ties are important in enabling Russia to meet certain obligations to international organizations and to make use of the experience of international and national statistical services in adapting Russian statistics to the conditions of a market economy. Cooperative interaction with international and national statistical services is accomplished at the level of Goskomstat of Russia, as well at that of regional statistical bodies.

Cooperation is based on harmonization of methodology, classification and standards with those of international organizations and collection and development of economic and statistical information with those of statistical services of developed countries, although with regard for national peculiarities and traditions of Russian economy.

The need for comparable economic information (on development and structure of national economies and living standards in different countries) has increased markedly with the intensive development of integration processes in the world economy. The results of comparisons are used for analytical and practical work by international organizations, national state bodies, non-governmental organizations and scientists. Comparisons of macroeconomic cost indicators yield the most valuable information.

A major effort in developing comparability of information began in 1994 with consolidated national accounts allowing quarterly characterization of production and use of gross domestic product. This indicator reflects not only the production of material goods but also other sectors of the economy such as commercial banking and insurance services, various exchanges and other elements of infrastructure. This made it possible for Russia to compare its indicators of economic development with those of other countries, determine its place in the world economy and undertake its information obligations to international economic organizations.

**Use of computers in statistical information systems**

New information technology using a computer system enables integrated automation of statistical operations, including collection, processing, storage, accumulation, actualization, presentation, dissemination and use of statistical information at the federal, regional and district levels.

Goskomstat of Russia has elucidated the main directions for state statistics information for 1995-97, the primary goal being development of an information and computer system of statistics (ICSS). The immediate tasks, to be realized in 1995, involve:

- introduction of the technology of collection, processing, storage and presentation of information using data banks, registers;
- refinement of design and establishment of network statistical data based on "client-server" technology; introduction of network technologies and optimization of local computer networks (LCNs);
- shifting the tasks to the LCN medium.

Components of software and hardware will operate using WINDOWS.

**Organizational structure of state statistics**

The united system of state statistics consists of Goskomstat of Russia, its bodies in republics, territories, regions, autonomous regions and autonomous districts, and enterprises, organizations and educational institutions under their jurisdiction (see Figure 1).

Goskomstat of Russia is a federal body with executive powers, performing management of Russian statistics in accordance with Article 71 of the constitution of the Russian Federation.

**Territorial bodies of state statistics**

The organization of Russian state statistics is a multilevel system of 2250 organizations: seven at federal level, 87 committees and statistical bodies at regional level (republics of the Russian Federation, autonomous regions, district, territories, regions), and 2156 district (municipal) departments of statistics (of which 1000 are municipal) at district level.

Operation of the statistics information system is based on computer facilities using 486/4 PCs. Collection, processing, storage and presentation of statistical information is maintained by means of integrated computer information processing, as well through databases and data banks of federal and regional levels.

The volume of state statistical information processed includes 12 billion indexes. The system of statistical information is based on state statistical accounting, data of selective statistical surveys and registration and accounting of all operating enterprises.

**Major official statistical publications of Goskomstat of Russia**

The official publications of Goskomstat of Russia are listed in Appendix 1. Publications are divided into three groups: current publications; statistical publications; statistical publications based on the population micro-census in Russia conducted in 1994.

In 1995 the state committee started publishing a new monthly magazine, "Current Statistical Survey" (in Russian, German and English versions).

**Current priorities in statistics in Russia**

Priorities in the development of Russian statistics are determined by the radical changes that have occurred internationally and domestically and the transformation in the social and economic spheres:
- Russia has become a sovereign state, necessitating the setting up of a national statistical service in keeping with the status of an independent state;
Figure 1. Organizational structure of state statistics in Russia

GOSKOMSTAT OF RUSSIA

- Central laboratory of social and economic measurements of the Russian Academy of Sciences and Goskomstat of Russia
- Centre for economic classifications of Gosstandart and Goskomstat of Russia

Computing centre

Institute for statistical and economic research

Scientific research and project and technological institute of statistical information system

Magazine "Problems of Statistics"

TERRITORIAL BODIES OF STATE STATISTICS

- Republican, territorial, regional, of autonomous region, district committees (boards) of statistics
- Educational institutions

District, municipal departments (boards) of statistics
- Russia's entry into the world community implies the adoption of methods of accounting, classifications, indicators and other methodological aspects in use throughout the world;

- the adoption of the constitution of the Russian Federation, in which emphasis is placed on strengthening the foundations of federalism and extending the powers of its constituent elements, presupposes a search for forms of cooperation between statistical services at various levels which will make it possible to maintain a single information pool.

- the reform of the Russian economy, the intensive development of the non-state sector, the creation of market infrastructure, the accelerated social stratification of the population and other qualitatively new phenomena dictate the use of new methods of organizing statistical observation and the development of fundamentally different system components and a new set of economic indicators. A further aim is to bring them into line with methods for the elaboration of statistical information and standards followed in developed countries and international economic organizations.

At this early stage, it is unrealistic to meet all requirements of the System of National Accounts (SNA). It is more realistic to develop the capacity to estimate the main aggregates of the system (specifically, value-added and final expenditures in the domestic economy at current and constant prices) and follow the so-called "basic short-term priorities".

*Public finance, money and banking and balance of payments:* These data constitute essential inputs for macro-economic analyses and policy making, and provide the basis for decisions on monetary, fiscal, exchange rate and other external economic policies. Government expenditure is a high proportion of expenditure in all economies and particularly in economies in transition.

*Prices:* Estimates of changes in aggregate consumer prices and in selected prices of basic materials and semi-manufactured goods are required monthly, especially during periods of high inflation which many countries in transition are experiencing.

*Household income and consumption, employment and unemployment:* These data are essential in all economies and are critical in countries in transition where the process of adjustment has a radical impact on, for example, income and employment in the various sectors. Household expenditures provide the weights for the consumer price index. Generally, they can represent as much as two-thirds of the total national expenditure.

*Foreign trade:* These data are usually derived from customs administration and are available in great detail. Where such data are not available but trade is still conducted by a handful of authorized enterprises, information may be obtained from the latter.

*Industrial statistics, including the agricultural industry:* Separate estimates for the outputs of agriculture, mining, manufacturing and public activities are required. These estimates, which can be shown as indexes, are useful guides to changes in aggregate economic activity. It is important that estimates of output be produced for the large state-owned enterprises and that mining, manufacturing, electrical and water plants be tracked for the foreseeable future. In agriculture a combination of list sampling (for the largest producers) and area sampling (for all others) might represent a good approach.
Retail sales: A combination of a list of the largest enterprises with an area frame to provide the basis for an estimate of the contribution of all business engaged in the retail sector represents an approach that can quickly become operational. Data should be collected promptly and frequently.

FORESTRY SECTOR STATISTICS

Background

The first part of this report has covered the general situation faced by the overall official state organization, Goskomstat of Russia. In the forest sector, as in other branches of industry, the situation is different. Since the start of the new economic reforms in 1990-91, changes such as the intensive development of the non-state sector, the creation of market infrastructure and privatization have had a great influence on statistics in Russia.

Negative factors in the forestry sector statistics

The process of transition to a market economy is characterized principally by a shift from state to private ownership and control of production. At present there are three types of ownership in Russia: federal property (18 percent), regional property of the Russian Federation (14 percent) and municipal property (68 percent) (see Table 1).

Table 1. Distribution of privatized enterprises by ownership types (percent)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal property</td>
<td>27</td>
<td>18</td>
</tr>
<tr>
<td>Property of the subjects of the Russian Federation</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>Municipal property</td>
<td>50</td>
<td>68</td>
</tr>
</tbody>
</table>

Note: State or municipal enterprise is considered privatized if there is a formal decision to transform this enterprise into an open-type joint-stock company.

In the logging and woodworking, pulp and paper industry, the number of non-state enterprises in total branches of industry is very high (73.9 percent) (see Table 2). Their share in total output of industrial production is 88 percent. This means that most of the enterprises are out of strong control of the state. In the absence of appropriate laws and of a mechanism of statistical accounting, the privatized enterprises do not have strong responsibilities for statistical accounting. More importantly, they are trying not to show their real activities in order to avoid a heavy burden of state taxes. Today, the number of different taxes is over 60.

Another negative factor in the forest sector statistics in Russia is the absence of a state (governmental) organization which would be responsible for the activity of enterprises in the timber, woodworking and pulp and paper industry, including the statistical sphere.
There were two main governmental (state) ministries in the former USSR responsible for all spheres of forest sector activities: Ministry of the timber, woodworking, pulp and paper industry; State Committee for Forestry.

At present, there is only one governmental body the Federal Forest Service of Russia (see Figure 2), which controls forest lands of 1,111 million ha. Its main tasks are:

- managing forests with the objective of protecting biodiversity of forest ecosystems, regulating the carbon budget and ensuring sustainable development of the forest sector;
- developing a national forest policy directed to the reduction of final clear-cutting, increasing reforestation activities and suspension of using environmentally destructive harvesting machinery (equipment).

**Forest sector statistical system today**

There are two types of statistical information in the forest sector:

- forestry information;
- timber, woodworking, pulp and paper industry information.

The Federal Forest Service of Russia is responsible for the collection, processing, analysis and dissemination of statistical information covering forestry activities, which include the following large-scale indexes:

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**Table 2. Shares of non-state enterprises and of monopolies in total industrial sector, 1995**

<table>
<thead>
<tr>
<th></th>
<th>Number of enterprises</th>
<th>percent share of total number of enterprises</th>
<th>percent share of total output of industrial production</th>
<th>percent share of total number of industrial and production personnel</th>
<th>percent share of total output of monopolies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-state enterprises</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total industry</td>
<td>17455</td>
<td>75.5</td>
<td>87.7</td>
<td>77.7</td>
<td></td>
</tr>
<tr>
<td>Logging and woodworking, pulp</td>
<td>2213</td>
<td>73.9</td>
<td>88.0</td>
<td>84.2</td>
<td></td>
</tr>
<tr>
<td>and paper industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Monopolies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total industry</td>
<td>489</td>
<td>2.1</td>
<td>21.9</td>
<td></td>
<td>34.6</td>
</tr>
<tr>
<td>Logging and woodworking, pulp</td>
<td>12</td>
<td>0.4</td>
<td>10.0</td>
<td></td>
<td>11.6</td>
</tr>
<tr>
<td>and paper industry</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1 Excluding joint ventures, small enterprises and production units of non-industrial organization.

2 Enterprises included in federal section of the Russian Government register of monopolies, associations and enterprises.
- forested area and standing volume;
- forest protective groups;
- forest fund lands categories;
- species composition and age structure of forests;
- forest use;
- national parks and forest restoration;
- conversion of young stands into the category of economically valuable forests;
- raising of planting material;
- thinning and sanitary cuttings;
- forest reclamation;
- forest fire protection and pest control;
- forest inventory;
- food production and personnel.

As to the timber, woodworking, pulp and paper industry, no governmental organization is responsible for statistical data collection and analysis. This situation creates great difficulties in the sphere of statistics in the forest sector as a whole. At the current stage of the country’s development, it is practically impossible to collect reliable and complete information about the timber industry’s activities, in particular for publishing a national yearbook of forest products.

There are scattered sources of information such as the Ministry of External Economic Relations of the Russian Federation (trade), the State Customs Committee of the Russian Federation (trade) and some research institutes of the former Ministry of timber, woodworking, pulp and paper industry. All of them are acting now on a commercial basis.

The most important institute, in terms of information availability, is the JSC “NPIEILESPROM” (Scientific research institute on economics, information and management of the timber, woodworking, pulp and paper industry). It provides information covering all aspects of the timber industry activities. For example, the market report on “State of the forest sector of Russia in 1994 and its prospects”, presented at the 53rd UN-ECE Timber Committee session (13-16 November 1995, Geneva) and attached as a supplementary document to the present report, was prepared with the active participation of the above institute and on the basis of the information collected and analyzed by its staff.
Figure 2. Scheme of management and statistical data collection in forestry

Government of Russia

Federal Forest Service of Russia

Ministry of Environmental Protection and Natural Resource

Governments of Republics

Forest Ministries and State Committees of Republics

Organizations providing forestry functions

Air Forest Fire Control bases - 18

Forest planning and inventory units - 12

All Russian Research and Information Centre of Forest Resources

Forest Research Institutes - 8
### Appendix 1. Official statistical publications of Goskomstat of Russia, 1995

<table>
<thead>
<tr>
<th>Publication name</th>
<th>Date of issue</th>
<th>Publication name</th>
<th>Date of issue</th>
<th>Publication name</th>
<th>Date of issue</th>
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<tr>
<td><strong>Current publications</strong></td>
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<td><strong>Statistical publications</strong></td>
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<tr>
<td>The Russian Federation in Figures, 1995</td>
<td>Q-2</td>
<td>Russia in Figures, 1995</td>
<td>Q-2</td>
<td>Agriculture in Russia, 1995</td>
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<td>Russian Statistical Yearbook, 1995</td>
<td>Q-3</td>
<td>Transport and communication in Russia, 1995</td>
<td>Q-3</td>
<td>Industry of Russia, 1995</td>
<td>Q-3</td>
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<tr>
<td>Commodity markets and trade of Russia, 1995</td>
<td>Q-3</td>
<td>External Economic Relations of Russia, 1995</td>
<td>Q-4</td>
<td>Social relations in Russia, 1995</td>
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<td>Labour and employment in Russia, 1995</td>
<td>Q-4</td>
<td>Construction in Russia, 1995</td>
<td>Q-4</td>
<td>Demographic Yearbook of Russia, 1995</td>
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<td>National accounts in Russia in 1989-1994</td>
<td>Q-4</td>
<td>Regions of Russia, 1995</td>
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<td><strong>Statistical publications based on the population micro-census in Russia conducted in 1994</strong></td>
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<td>Main indicators of micro-census in Russia</td>
<td>Q-2</td>
<td>Sources of means of subsistence for Russian population</td>
<td>Q-2</td>
<td>Type and structure of households in Russia</td>
<td>Q-2</td>
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<tr>
<td>Distribution of Russian population knowing foreign languages</td>
<td>Q-2</td>
<td>Marital status and birth rate in Russia</td>
<td>Q-3</td>
<td>Dwelling conditions of population in Russia</td>
<td>Q-3</td>
</tr>
<tr>
<td>Duration of residence by places of permanent residents</td>
<td>Q-3</td>
<td>Educational attainment in Russia</td>
<td>Q-3</td>
<td>Statistical Studies (scientific and information magazine)</td>
<td>Monthly</td>
</tr>
</tbody>
</table>
STATE OF THE FOREST SECTOR OF RUSSIA IN 1994 AND ITS PROSPECTS

presented by V. E. Sokolov
Vice-Chairman of the Board, Russian Union of Timber Exporters (RUTEX)

GENERAL ECONOMIC SITUATION

**GDP** - In 1994 GDP of Russia dropped by 15 percent against 1993. In 1993 the decline was 12 percent against 1992.

In 1994 the budget deficit amounted to 10.2 percent compared with 7.3 percent in 1993. The deficit planned for 1995 will not be less than 7.8 percent of GDP.

**Inflation** - The level of inflation remained high - at 356.8 percent - although it was considerably lower than in previous years (1606 percent in 1992 and 919.7 percent in 1993). In 1995 inflation will remain, on average, at the level of 7.8 percent per month.

**Taxes** - The tax system remains complex and unstable. The number of taxes that the average business taxpayer must declare amounts to 64. At present, the president, both chambers of the parliament, central government, autonomous republics and local authorities can unilaterally fix tax rates and do so.

**Industry** - Recession in all branches of the industry continued during 1994. Industrial products output reduced by 22.8 percent against 1993. Production output in forest, woodworking and pulp and paper industries reduced by 31.2 percent as well. In 1995 production of most forest products will improve slightly although the total reduction of production will amount to 11 percent against 1994. Meanwhile, the overall reduction of production in all branches of the national economy was accompanied by the crisis of relative "overproduction", especially in raw material sectors, where domestic market prices equalled those of the world. General economic indexes of the country are presented in Table 1.

**Foreign investment** - In the first half of 1995 foreign partners invested US$702 million in the Russian economy: this is 27 percent more than in the first half of 1994. This increase was the result of growth of direct investments - they rose twice against the first half of 1994 and amount to 65.5 percent of the total volume of investment (US$460.3 million), whereas in the first half of 1994 their share was only 38.9 percent.

In the second quarter of 1995 the profit of foreign investors rose 20 times against the first quarter and accounted for US$3.3 billion. The entire rise was almost entirely the result of growth of portfolio investments. In the first six months the shares of privatized enterprises of the forest sector were sold at a price 1.6 times higher than the nominal one.

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1 The information in this paper was originally prepared by the Union of Timber Exporters of Russia for the 53rd session of the FAO/ECE Timber Committee (Switzerland, Geneva, 13-16 November 1995) and was also made available at the FAO Working Group on Forestry Statistics by V.E. Sokolov.
Recently the Government of the Russian Federation has taken some measures for revaluation of the rouble, intentionally triggering an artificial bank crisis aimed at the redistribution of raw material and commercial and banking capital among unprofitable and state-subsidized sectors of the Russian economy.

**STATE OF THE FOREST SECTOR**

**Utilization of forest resource potential**

The total forest area of Russia is 763 million ha. Forest resource amounts to 80.7 billion m³. The share of mature and overmature forests is 44.1 billion m³, of which 35.3 billion m³ (80 percent) are coniferous species. Annual allowable cut is 509.5 million m³. General characteristics of the forest resources and indexes of the basic forest industrial regions of Russia are presented in Appendices 1-4. Most resources are available for intermediate felling: 140 million m³, of which only 10 percent are cut.

In Russia the volumes of wood (in million m³) cut annually were as follows: 1990, 304; 1991, 269; 1992, 238. In 1994 harvesting volume fell to 122.4 million m³, which accounted for only 24 percent of potential allowable cut. The volume of wood harvested in the forests of the European region of Russia amounted to about 40 percent of allowable cut and in the forests of Siberia and the Far East to only 15 percent of allowable cut.

**Production**

In 1994 compared with 1988 wood removals reduced to 34.5 percent, output of sawn timber to 36.2 percent, plywood to 51.5 percent, particle board to 47.8 percent, pulp to 38.7 percent, paper to 41.5 percent and paperboard to 36.7 percent. That is, the reduction was two to three times. As
As a result, production of forest products fell to the level of the 1950s-1960s. The dynamics of basic forest products output are presented in Table 2 and Figure 1.

**Table 2. Dynamics of forest products output in the Russian Federation for the period 1988-94**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundwood million m³</td>
<td>258.6</td>
<td>164.1</td>
<td>110.4</td>
<td>78.9</td>
<td>30.5</td>
</tr>
<tr>
<td>Sawn timber million m³</td>
<td>84.9</td>
<td>53.4</td>
<td>40.9</td>
<td>30.7</td>
<td>36.2</td>
</tr>
<tr>
<td>Plywood thousand m³</td>
<td>1727</td>
<td>1268</td>
<td>1042</td>
<td>890</td>
<td>51.5</td>
</tr>
<tr>
<td>Particle board thousand m³</td>
<td>5490</td>
<td>4522</td>
<td>3941</td>
<td>2625</td>
<td>47.8</td>
</tr>
<tr>
<td>Fibreboard million m²</td>
<td>501.0</td>
<td>426.5</td>
<td>362.0</td>
<td>240</td>
<td>47.9</td>
</tr>
<tr>
<td>Pulp (total production) thousand t</td>
<td>8349</td>
<td>5676</td>
<td>4403</td>
<td>3239</td>
<td>38.7</td>
</tr>
<tr>
<td>Paper thousand t</td>
<td>5334</td>
<td>3608</td>
<td>2884</td>
<td>2215</td>
<td>41.5</td>
</tr>
<tr>
<td>Paperboard thousand t</td>
<td>3249</td>
<td>2157</td>
<td>1607</td>
<td>1192</td>
<td>36.7</td>
</tr>
<tr>
<td>Total wood removals million m³</td>
<td>354.3</td>
<td>238.0</td>
<td>174.6</td>
<td>122.4</td>
<td>34.5</td>
</tr>
</tbody>
</table>

**Figure 1. Sawn timber output in relation to total wood removals (million m³) for the period 1988-94.**
The financial position of most enterprises is unsteady and the number of enterprises that are potential bankrupts is growing. Credit indebtedness at the beginning of 1995 exceeded 5 trillion roubles. Taking into account that prices for forest products are growing at a lower rate than the prices for materials, energy and machinery used in the forest industry, profitability of the latter is declining steadily, as is clear from Table 3.

Table 3. Profitability of production of basic forest products, percent

<table>
<thead>
<tr>
<th>Types of production and products</th>
<th>1992</th>
<th>1993</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest industrial production as a whole</td>
<td>36</td>
<td>24</td>
<td>10.1</td>
</tr>
<tr>
<td>Wood removals</td>
<td>35</td>
<td>15</td>
<td>-5.4</td>
</tr>
<tr>
<td>Sawn timber</td>
<td>39.6</td>
<td>23</td>
<td>6.7</td>
</tr>
<tr>
<td>Particle board</td>
<td>21.1</td>
<td>25.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>25</td>
<td>12.4</td>
<td>-5.2</td>
</tr>
<tr>
<td>Plywood</td>
<td>46.3</td>
<td>45.1</td>
<td>18.7</td>
</tr>
<tr>
<td>Pulp</td>
<td>39.3</td>
<td>18.7</td>
<td>26.3</td>
</tr>
</tbody>
</table>

In general, profitability of forest industries reduced more than three times during the past three years and accounted for only 10.1 percent in 1994. The logging industry and production of fibreboard became unprofitable.

In the first half of 1995 the rate of production reduction slowed down. That is related, in the first place, to the attempts made by enterprises to improve their disastrous financial position. In January-June 1995 the output of basic forest products as a percentage of the output for the same period of 1994 was:

- Wood removals: 90%
- Sawn timber: 86%
- Plywood: 104%
- Particle board: 87%
- Fibreboard: 98%
- Pulp (total production): 133%
- Pulp (market): 145%
- Paper: 115%
- Paperboard: 119%

The more satisfactory situation in production of plywood and pulp and paper products is related to their favourable position in foreign markets and the growth of export deliveries of these products. However, it is still early to draw conclusions as to any serious changes in forest products output trends.
According to data of State Customs Committee of Russia, exports of roundwood decreased to less than half their 1991 levels, sawn timber by 39.2 percent, particle board to less than a third, paper and paperboard by 28 percent. In contrast, pulp exports dipped only slightly and exports of plywood increased by 57.7 percent compared with 1991 (Appendix 5).

In terms of country of destination, export of all forest products (except roundwood and particle board) to “far abroad” countries (i.e. countries other than former republics of the USSR and including the Baltics) has increased, whereas deliveries of forest products to “near abroad” countries (i.e. former republics of the USSR, excluding the Baltic states) have dropped sharply.

The structure of forest product export has also changed: export of roundwood and sawn timber is declining, while export of products of chemical and chemi-mechanical processing is increasing. The structure of Russian export does not compare favourably with that of developed timber-

---

1 According to data of State Customs Committee of Russia.

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1 Export trade is normally grouped according to whether destination is “near abroad” or “far abroad”. “Far abroad” includes former Republics of the USSR, excluding the Baltic States; “near abroad” covers the Baltics and other countries.
producing countries. The share of roundwood in the currency earnings from sale of forest and paper products is 42.7 percent (in comparison, almost no roundwood is exported from Finland, Sweden or Canada). The share of pulp and paper products in Russia’s currency earnings is only 19.4 percent (in comparison, the equivalent for the United States is 55 percent, for Canada 68 percent, Sweden 77 percent and Finland 82 percent); the share of particle board and fibreboard is 3.1 percent and sawn timber is 34.8 percent.

The geography of export deliveries of Russian forest products is diverse. Russia exports roundwood to 40 countries, sawn timber to 52 countries and pulp and paper products to 74 countries.

Table 5. List of ten biggest importers of forest and paper products from Russia (by currency earnings, 1994), percent

<table>
<thead>
<tr>
<th>Importing countries</th>
<th>Total forest and paper products</th>
<th>Roundwood, sawn timber wood-based panels, plywood</th>
<th>Pulp</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>22.9</td>
<td>33.4</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>Finland</td>
<td>9.4</td>
<td>12.9</td>
<td>0.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Germany</td>
<td>8.2</td>
<td>9.2</td>
<td>5.3</td>
<td>7.1</td>
</tr>
<tr>
<td>Great Britain</td>
<td>6.8</td>
<td>7.8</td>
<td>4.7</td>
<td>4.3</td>
</tr>
<tr>
<td>Italy</td>
<td>5.2</td>
<td>4.5</td>
<td>9.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Sweden</td>
<td>5.1</td>
<td>2.9</td>
<td>12.8</td>
<td>5.7</td>
</tr>
<tr>
<td>Egypt</td>
<td>4.3</td>
<td>4.5</td>
<td>0.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3.0</td>
<td>1.3</td>
<td>10.3</td>
<td>2.1</td>
</tr>
<tr>
<td>China</td>
<td>2.6</td>
<td>2.3</td>
<td>3.6</td>
<td>2.8</td>
</tr>
<tr>
<td>USA</td>
<td>2.2</td>
<td>2.9</td>
<td>-</td>
<td>1.4</td>
</tr>
<tr>
<td>Total currency earnings</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Japan takes the first place in export of forest and paper products from Russia: its share in currency earnings is 23 percent (Table 5). Finland takes the second place, although far behind. Export product to these countries is mainly roundwood.

By a decree of the president of the Russian Federation (Decree No. 245 of 6 March 1995, “On basic principles of foreign economic activities in the Russian Federation”), the institute of special exporters of strategically important raw material products was eliminated. This provided equal conditions for all participants in foreign economic activities.

Information on consumption, production, export and import of forest and paper products in Russia over the period of 1994-96 is presented in Appendix 6.
Prospects for export

In the near future no serious changes in forest products export are expected. The balance of production and consumption of forest products given in Appendix 6 indicates that in 1995 the output of roundwood, sawn timber and wood-based panels is reducing against 1994. Only in 1996 will output grow and nearly reach the level of 1994.

The output of plywood, pulp, paper and paperboard will show an upward trend in the period under consideration.

Taking into account the demand, export of roundwood will be stable at the level of 14 million m³ per year. Export of sawn timber will decline slightly. Export of plywood and pulp and paper products will grow (see Table 6).

There are great possibilities for expansion of export of furniture, for which there is a substantial market. The first steps have been already made by the Russian exporters. Solid wood furniture is in great demand abroad and Russia has a considerable potential for production and export of such furniture.

Table 6. Export of basic forest products in the first six months of 1994 and 1995

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Roundwood (thousand m³)</td>
<td>6742</td>
<td>6849</td>
<td>101.6</td>
</tr>
<tr>
<td>Sawn timber (thousand m³)</td>
<td>2506</td>
<td>1839</td>
<td>73.4</td>
</tr>
<tr>
<td>Plywood (thousand m³)</td>
<td>327</td>
<td>287</td>
<td>87.6</td>
</tr>
<tr>
<td>Market pulp (thousand tonnes)</td>
<td>410</td>
<td>630</td>
<td>153.8</td>
</tr>
<tr>
<td>Newsprint (thousand tonnes)</td>
<td>302</td>
<td>487</td>
<td>161.3</td>
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</table>

STATE OF INDIVIDUAL COMMODITY MARKETS

Export of roundwood

Export of round softwood amounted to 20 million m³ in 1991, 12 million m³ in 1992, 9 million m³ in 1993 and 8 million m³ in 1994. (Note that pulpwood is not included in the volume of round softwood.) Over 95 percent of round softwood volume was exported to the “far abroad” countries. The major export volume of round softwood from the Russian Federation is shipped to Japan, Finland, Sweden, Norway, China, South Korea, Italy and Austria.

In the first six months of 1995 export of both soft and hard roundwood increased by 1.6 percent compared with the same period of 1994.

Expectations for 1995 total roundwood export volume were for 14 million m³, that is, at the level of 1994. This situation will continue in 1996 (see Appendix 6). In terms of improvement of forest industrial production structure, export of rough roundwood will be declining in future.
Production and market of sawn softwood

In 1994 production of sawn softwood accounted for only 24 million m³, which is 3.2 times lower than in 1988 and 2.6 times lower than in 1991. Over recent years export of sawn softwood has also reduced from 9.5 million m³ in 1990 to 8.5 million m³ in 1991, 6.8 million m³ in 1992, 6.1 million m³ in 1993 and 5.9 million m³ in 1994. The preceding figures are the total export to all destinations. If we consider only “far abroad” countries, a slight increase in export of sawn softwood is observed.

The main buyers of sawn timber are presented in Figure 2 and Appendix 7.

At present over 20 percent of sawn timber produced in Russia goes for export (Appendix 6). The largest regions producing export products are: Krasnoyarsk Territory (22.6 percent of total export of the Russian Federation), Arkhangelsk region (31.4 percent), Republic of Karelia (16 percent).

In 1994, enterprises of Arkhangelsk region, Kirov region and Republic of Karelia substantially increased output of export products; production of sawn timber reduced at enterprises of Khabarovsk Territory and Sverdlovsk and Yumens regions. The latter reduction is attributed to the growth of transport tariffs. These contribute to a considerable increase in export prices and often lead to loss of foreign markets. For example, the cost of shipment of one wagon of sawn timber from Krasnoyarsk to Novorossiysk port is 2 million roubles - or 45 percent of the cargo value.

Russia exports mainly rough logs. This situation is attributed to shortage of equipment for their processing. The resultant level of prices (for example, the price for edged board is three times that of rough logs) causes the country an annual loss of about US$100 million.

Figure 2. Major export destinations of sawn timber exports
The level of prices for sawn timber is determined by growth of costs as well as by growing demand in the domestic market. In 1994 prices increased 3.8 times; that is, they exceeded the growth of prices in the industry on the whole. According to forecasts, in 1995 an upward trend in prices and supply of sawn timber (in the first half of the year by about 60 percent) is expected to continue as a result of the level of inflation and increases in energy costs and transport tariffs.

The most favourable regions for purchase of sawn timber are Kirov, Vladimir and Tomsk regions, Udmurt Republic, and Nizhniy Novgorod, Kostroma, Tyumen and Irkutsk regions. These regions are notable for high export potential and a relatively low level of prices. In comparison with an average figure for the Russian Federation of 3.3 percent, the increase in production profitability was 8 percent for enterprises of Kirov region, 4.5 percent for Vladimir region and 5 percent for both the Tomsk region and Udmurt Republic, giving these regions a higher rating for making purchases.

Under the conditions of a market economy and focus on gaining maximum profit, the growth of sawn softwood export to “far abroad” countries led to a decline in domestic consumption of this product. A local shortage of sawn softwood is observed in all spheres: construction, machine building, furniture manufacturing. Thus, domestic consumption of sawn softwood accounted for 60.6 million m³ in 1988 and 50.6 million m³ in 1990, whereas domestic consumption was only 18.1 million m³ in 1994.

In the first half of 1995 the reduction of production of sawn softwood continued (86 percent compared with the same period of 1994 - the lowest index for all forest products). Reduction in export was even greater at 73.4 percent in the first half of 1995 compared with the same period of 1994).

In 1995 and 1996, because of instability of economic situation and changes in forest industrial production structure (priority of chemical wood processing), production of sawn softwood will be at the level of 22-23 million m³ - that is, below the level of 1994. There will be a slight reduction in export. However, this will concern mainly “near abroad” countries.

**Production and market of plywood**

Production of plywood has declined since 1991. Production data (in thousand m³) are: 1991, 1520; 1992, 1268; 1993, 1042; 1994, 890. Demand for plywood is stable on the domestic market, as well as on foreign markets. However, because of higher prices even under the conditions of considerable reduction of production, plywood export has been increasing over recent years (Table 7).

**Table 7. Export of plywood (1991, 1993, 1994) in thousand m³**

<table>
<thead>
<tr>
<th></th>
<th>1991</th>
<th>1993</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Far abroad&quot; countries</td>
<td>254</td>
<td>362</td>
<td>566</td>
</tr>
<tr>
<td>&quot;Near abroad&quot; countries</td>
<td>157</td>
<td>84</td>
<td>80</td>
</tr>
<tr>
<td>Total export</td>
<td>411</td>
<td>446</td>
<td>648</td>
</tr>
</tbody>
</table>

Plywood was mainly exported to “far abroad” countries. Domestic demand for plywood is not satisfied, especially for machine building and construction. In 1994 only 242,000 m³ of plywood reached the domestic market compared with 1,119,000 m³ in 1991; that is, five times less.
In the first half of 1995 plywood output tended to increase slightly (104 percent against the first half of 1994). At the same time export of plywood reduced slightly (87.6 percent against the first half of 1994). In 1995 and 1996 production of plywood will increase. The growth is intended mainly for domestic consumption.

Production and market of particle board

Production of particle board has declined at a somewhat lower rate than that of sawn timber. The particle board market is oriented mainly at domestic consumption and the needs of Commonwealth of Independent States (CIS) countries. Particle board production (in thousand m$^3$) accounted for: 1991, 5409; 1993, 3941; 1994, 2625.

The equivalent figures (in thousand m$^3$) for particle board export (with the volume, also in thousand m$^3$, exported to “far abroad” countries given in parentheses) are: 1991, 666 (46); 1993, 411 (46); and 1994, 190 (15). This export situation can be explained by the narrow assortment and low quality of particle board produced in the country.

In the first half of 1995 a further decline in particle board output was observed (13 percent compared with the same period of 1994). Export of particle board did not grow either. The estimate for 1995 and forecast for 1996 indicate that reduction will continue in 1995 but in 1996 production and export of particle board will increase by 5-10 percent.

Production and market of fibreboard

Production of fibreboard amounted to 474 million m$^2$ in 1991, 362 million m$^2$ in 1993 and 240 million m$^2$ in 1994.

Fibreboard’s share in total forest products export is not considerable. In 1994 the total export of fibreboard was 50 million m$^2$, of which 30 million m$^2$ went to “far abroad” countries and 20 million m$^2$ to “near abroad” countries. Over the period of 1991-94 export of fibreboard reduced by 26.5 percent. In the near future production of fibreboard will be stable at the level of 250-260 million m$^2$ per year. Export of fibreboard will also remain stable at 40-50 million m$^2$ per year.

Pulp market

The state of the pulp market is determined by the tendency towards change in demand for paper, development of the resource potential and the situation arising on the world market. Over recent years the demand for this product has remained stable and high.

At the same time conditions for the production of pulp and paper could be described as extremely difficult. Pulp and paper production is a very power-consuming industry. As a result of unrestrained growth of prices for energy carriers, the share of energy costs in the prime cost of products is also growing (70 percent in 1994 compared with 17 percent in 1991). Consequently, a lot of enterprises with outdated equipment have become unprofitable. So, in spite of a relatively insignificant reduction in demand in 1992-94, the accelerating decline in pulp supply continues (Table 8).
Table 8. Output of market pulp (thousand tonnes)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>2088.36</td>
<td>1620.1</td>
<td>1283.0</td>
<td>850.0</td>
</tr>
<tr>
<td>Import</td>
<td>4.8</td>
<td>6.2</td>
<td>5.1</td>
<td>1.7</td>
</tr>
<tr>
<td>Export</td>
<td>956.9</td>
<td>231.0</td>
<td>82.0</td>
<td>50.0</td>
</tr>
<tr>
<td>&quot;near abroad&quot; countries</td>
<td>597.6</td>
<td>685.5</td>
<td>944.0</td>
<td>631.0</td>
</tr>
</tbody>
</table>

Decline in supply of the product is caused, to a large extent, by reduction in production of pulpwood for technological needs. Over 90 percent of the pulpwood harvested is used for production of pulp. (In 1993 production of pulpwood reduced by 30 percent, in 1994 by 47 percent, i.e., over the 1991-94 period more than three times.)

The forecasted growth of raw material forest products and increase in demand will soon lead to a slowing down of the decline rate in pulp products output. Already in 1994, in spite of overall reduction in production, a tendency to growth appeared. Data in thousand tonnes were: quarter 1, 286.5; quarter 2, 298.4; quarter 3, 322.3; and quarter 4, 395.2. For the first six months of 1995 production of pulp accounted for 145 percent against the same period of 1994.

Over the past year prices increased 4.7 times. High level of demand on domestic and foreign markets will contribute to a continuing substantial growth of prices for pulp: in quarter 1 of 1995 the prices increased by 30 percent, in quarter 2 by 28 percent. By the end of the first six months the average price is forecast to account for 3 million roubles per tonne. Future export prices are predicted to approach world levels. That will make pulp export highly effective, even with insignificant growth in its output and, consequently, more complete satisfaction of domestic demand.

**Paper**

Over recent years demand for newsprint, printing and base paper for production of wood-based panels has been growing. At the same time demand for wrapping and packaging paper, wallpaper base and offset paper is limited. The paper products market can be considered balanced from the point of view of demand and supply. The tendency towards growth of paper products consumption is observed throughout the Russian Federation, the growth being especially marked in some regions in 1994. Increase in demand for some paper grades and decline in demand for others causes a general tendency towards change in supply of these products (Table 9).

Compared with the preceding year, the reduction in total paper production amounted to 20 percent in 1993 and 24 percent in 1994. In contrast, newsprint production showed an 11 percent reduction in 1993 but an increase of 23 percent in 1994 compared with the preceding year.

Paper price growth rates are higher than those of the industry as a whole and higher than inflation rates. Thus the growth was 1150 percent in 1993 and 470 percent in 1994. Newsprint price growth was 1370 percent in 1993 and 390 percent in 1994. Considerable growth of prices for newsprint compared with average prices for paper products is caused by keen demand. Analysis
of change in export prices for newsprint indicates that export prices are growing, approaching world levels.

Note: Materials of the magazine "Vneshtniaya Torgovlia" No 5, 1995, were used in the sections on sawn softwood, pulp market and paper

Table 9. Output of paper products (thousand tonnes)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>3608</td>
<td>2884</td>
<td>2215</td>
<td>1302</td>
</tr>
<tr>
<td>newsprint</td>
<td>943</td>
<td>844</td>
<td>1038</td>
<td>603</td>
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<td><strong>Export: &quot;near abroad&quot; countries:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>795</td>
<td>350</td>
<td>230</td>
<td>155</td>
</tr>
<tr>
<td>newsprint</td>
<td>289</td>
<td>60</td>
<td>94</td>
<td>62</td>
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<tr>
<td><strong>Export: &quot;far abroad&quot; countries:</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>248</td>
<td>715</td>
<td>730</td>
<td>400</td>
</tr>
<tr>
<td>newsprint</td>
<td>178</td>
<td>433</td>
<td>571</td>
<td>488</td>
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</table>
Appendix 1: Structure of forest products consumption (in roundwood equivalents) in the national economy of Russia in 1994 (%)
Appendix 2: General characteristics of the forest resource potential of the Russian Federation

<table>
<thead>
<tr>
<th>Index</th>
<th>Unit</th>
<th>Data of forest inventory, conducted in 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forested area</td>
<td>million ha</td>
<td>763</td>
</tr>
<tr>
<td>Growing stock:</td>
<td>billion m³</td>
<td>80.7</td>
</tr>
<tr>
<td>coniferous species</td>
<td>billion m³</td>
<td>63.7</td>
</tr>
<tr>
<td>non-coniferous species</td>
<td>billion m³</td>
<td>17.0</td>
</tr>
<tr>
<td>Mature and overmature stands in total</td>
<td>billion m³</td>
<td>44.1</td>
</tr>
<tr>
<td>growing stock of Russia:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>coniferous</td>
<td>billion m³</td>
<td>35.3</td>
</tr>
<tr>
<td>Annual allowable cut</td>
<td>million m³</td>
<td>509.5</td>
</tr>
<tr>
<td>Actual cut in 1994</td>
<td>million m³</td>
<td>122.4</td>
</tr>
<tr>
<td>Utilization of annual allowable cut</td>
<td>percent</td>
<td>24.0</td>
</tr>
</tbody>
</table>
Appendix 3: Characteristics of the forest resource of the Russian Federation (according to inventory data of 1 January 1993)

**Forest area, million ha */ %**

- 530/69%
- 142/19%
- 19/3%

**Growing stock, billion m³ */ %**

- 63.73/79%
- 13.5/16.2%
- 2/2.5%
- 1.9/2.3%
- other
Appendix 4: Main forest industrial regions of the European part of Russia

<table>
<thead>
<tr>
<th>Regions, Republics</th>
<th>Exploitable forests, million m²</th>
<th>Total growing stock</th>
<th>Increment per year</th>
<th>Removals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkhangelsk</td>
<td>2004.0</td>
<td>19.9</td>
<td>18.6</td>
<td></td>
</tr>
<tr>
<td>Vologda</td>
<td>825.8</td>
<td>14.7</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>Karelia</td>
<td>768.5</td>
<td>11.9</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>Kirov</td>
<td>717.8</td>
<td>14.8</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>Komi</td>
<td>2410.5</td>
<td>26.3</td>
<td>16.9</td>
<td></td>
</tr>
<tr>
<td>Novgorod</td>
<td>271.3</td>
<td>5.2</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Kostroma</td>
<td>483.7</td>
<td>10.3</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Leningrad</td>
<td>531.7</td>
<td>9.7</td>
<td>5.3</td>
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<tr>
<td>Perm</td>
<td>1084.5</td>
<td>20.4</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Tver</td>
<td>313.6</td>
<td>6.9</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>Bashkiriia</td>
<td>514.7</td>
<td>13.2</td>
<td>4.5</td>
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</tr>
</tbody>
</table>

Forest industrial regions of Siberia and the Far East

<table>
<thead>
<tr>
<th>Regions, Republics</th>
<th>Exploitable forests, million m²</th>
<th>Total growing stock</th>
<th>Increment per year</th>
<th>Removals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amur</td>
<td>1695.4</td>
<td>27.5</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>Buryatia</td>
<td>230.5</td>
<td>19.8</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Irkutsk</td>
<td>5266.7</td>
<td>38.8</td>
<td>31.0</td>
<td></td>
</tr>
<tr>
<td>Krasnoyarsk</td>
<td>7526.0</td>
<td>113.6</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>Primorskiy</td>
<td>1358.8</td>
<td>17.2</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>Sverdlovsk</td>
<td>1059.3</td>
<td>24.1</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>Tomsk</td>
<td>2288.7</td>
<td>27.9</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>Tyumen</td>
<td>3280.5</td>
<td>44.9</td>
<td>12.9</td>
<td></td>
</tr>
<tr>
<td>Chelyabinsk</td>
<td>179.2</td>
<td>6.0</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Chita</td>
<td>1640.9</td>
<td>30.3</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Yakutia</td>
<td>4081.5</td>
<td>80.3</td>
<td>2.8</td>
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</table>
### Appendix 5: Export of basic forest and paper products from the Russian Federation in 1991-94

<table>
<thead>
<tr>
<th>Product, units</th>
<th>Year</th>
<th>Total</th>
<th>Including</th>
<th>far abroad</th>
<th>near abroad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundwood, million m³</td>
<td>1991</td>
<td>32.0</td>
<td>15.2</td>
<td>16.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>14.2</td>
<td>11.5</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994</td>
<td>13.8</td>
<td>12.8</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>43.1</strong></td>
<td><strong>84.2</strong></td>
<td><strong>6.0</strong></td>
<td></td>
</tr>
<tr>
<td>Sawn timber, million m³</td>
<td>1991</td>
<td>10.2</td>
<td>4.5</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>6.4</td>
<td>4.6</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994</td>
<td>6.2</td>
<td>5.4</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>60.8</strong></td>
<td><strong>120.0</strong></td>
<td><strong>14.0</strong></td>
<td></td>
</tr>
<tr>
<td>Plywood, thousand m³</td>
<td>1991</td>
<td>411.0</td>
<td>254.0</td>
<td>157.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>446.0</td>
<td>362.0</td>
<td>84.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994</td>
<td>648.0</td>
<td>568.0</td>
<td>80.0</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>157.7</strong></td>
<td><strong>223.6</strong></td>
<td><strong>51.0</strong></td>
<td></td>
</tr>
<tr>
<td>Particle board, thousand m³</td>
<td>1991</td>
<td>666.0</td>
<td>46.0</td>
<td>620.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>411.0</td>
<td>46.0</td>
<td>365.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994</td>
<td>190.0</td>
<td>15.0</td>
<td>175.0</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>28.5</strong></td>
<td><strong>32.6</strong></td>
<td><strong>28.2</strong></td>
<td></td>
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<tr>
<td>Fibreboard, million m³</td>
<td>1991</td>
<td>68.0</td>
<td>15.0</td>
<td>53.0</td>
<td></td>
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<tr>
<td></td>
<td>1993</td>
<td>64.0</td>
<td>31.0</td>
<td>33.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994</td>
<td>50.0</td>
<td>30.0</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>73.5</strong></td>
<td><strong>200.0</strong></td>
<td><strong>37.7</strong></td>
<td></td>
</tr>
<tr>
<td>Pulp, thousand tonnes</td>
<td>1991</td>
<td>1140.0</td>
<td>427.0</td>
<td>713.0</td>
<td></td>
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<tr>
<td></td>
<td>1993</td>
<td>1044.0</td>
<td>805.0</td>
<td>239.0</td>
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<tr>
<td></td>
<td>1994</td>
<td>1026.0</td>
<td>876.0</td>
<td>150.0</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>90.0</strong></td>
<td><strong>205.2</strong></td>
<td><strong>21.0</strong></td>
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</tr>
<tr>
<td>Paper and paperboard, thousand tonnes</td>
<td>1991</td>
<td>2013.0</td>
<td>435.0</td>
<td>1578.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>1394.0</td>
<td>892.0</td>
<td>502.0</td>
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<td></td>
<td>1994</td>
<td>1450.0</td>
<td>1050.0</td>
<td>400.0</td>
<td></td>
</tr>
<tr>
<td><strong>1994 / 1991, %</strong></td>
<td></td>
<td><strong>72.0</strong></td>
<td><strong>241.4</strong></td>
<td><strong>25.3</strong></td>
<td></td>
</tr>
</tbody>
</table>

¹ Far abroad: former republics of the USSR, excluding the Baltic states; Near abroad: other countries, including the Baltics.
Appendix 6: Production, consumption, export and import of basic forest and paper products in the Russian Federation in 1994-96

<table>
<thead>
<tr>
<th>Product (units)</th>
<th>Year</th>
<th>Production</th>
<th>Consumption</th>
<th>Export</th>
<th>Import</th>
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</thead>
<tbody>
<tr>
<td>Roundwood, total</td>
<td>1994</td>
<td>79</td>
<td>65.2</td>
<td>13.8</td>
<td>-</td>
</tr>
<tr>
<td>(million m³):</td>
<td>1995</td>
<td>71</td>
<td>57</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>78</td>
<td>64</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>- round softwood for sawing (million m³)</td>
<td>1994</td>
<td>39</td>
<td>31</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>33</td>
<td>25</td>
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<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>38</td>
<td>30</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>- round hardwood for sawing (million m³)</td>
<td>1994</td>
<td>10</td>
<td>9.6</td>
<td>0.4</td>
<td>-</td>
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<tr>
<td></td>
<td>1995</td>
<td>8</td>
<td>7.6</td>
<td>0.4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>9</td>
<td>8.6</td>
<td>0.4</td>
<td>-</td>
</tr>
<tr>
<td>- pulpwood</td>
<td>1994</td>
<td>20</td>
<td>15.4</td>
<td>4.6</td>
<td>-</td>
</tr>
<tr>
<td>(million m³)</td>
<td>1995</td>
<td>23</td>
<td>18.2</td>
<td>4.8</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>25</td>
<td>20</td>
<td>5</td>
<td>-</td>
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<tr>
<td>Sawn softwood</td>
<td>1994</td>
<td>24</td>
<td>18.1</td>
<td>5.9</td>
<td>-</td>
</tr>
<tr>
<td>(million m³)</td>
<td>1995</td>
<td>22</td>
<td>17.3</td>
<td>4.7</td>
<td>-</td>
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<tr>
<td></td>
<td>1996</td>
<td>23</td>
<td>17.8</td>
<td>5.2</td>
<td>-</td>
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<td>Sawn hardwood</td>
<td>1994</td>
<td>6</td>
<td>5.8</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>(million m³)</td>
<td>1995</td>
<td>6</td>
<td>5.8</td>
<td>0.2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>7</td>
<td>6.7</td>
<td>0.3</td>
<td>-</td>
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<tr>
<td>Plywood</td>
<td>1994</td>
<td>890</td>
<td>242</td>
<td>648</td>
<td>-</td>
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<tr>
<td>(thousand m³)</td>
<td>1995</td>
<td>920</td>
<td>270</td>
<td>650</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>960</td>
<td>300</td>
<td>660</td>
<td>-</td>
</tr>
<tr>
<td>Particle board</td>
<td>1994</td>
<td>2625</td>
<td>2435</td>
<td>190</td>
<td>-</td>
</tr>
<tr>
<td>(thousand m³)</td>
<td>1995</td>
<td>2450</td>
<td>2270</td>
<td>180</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>2800</td>
<td>2610</td>
<td>190</td>
<td>-</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>1994</td>
<td>770</td>
<td>610</td>
<td>160</td>
<td>-</td>
</tr>
<tr>
<td>(thousand m³)</td>
<td>1995</td>
<td>770</td>
<td>620</td>
<td>150</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>865</td>
<td>705</td>
<td>160</td>
<td>-</td>
</tr>
<tr>
<td>Pulp, total</td>
<td>1994</td>
<td>3239</td>
<td>2218</td>
<td>1026</td>
<td>5</td>
</tr>
<tr>
<td>(thousand tonnes)</td>
<td>1995</td>
<td>4400</td>
<td>3205</td>
<td>1200</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>4800</td>
<td>3510</td>
<td>1300</td>
<td>10</td>
</tr>
<tr>
<td>Paper and paperboard</td>
<td>1994</td>
<td>3407</td>
<td>2137</td>
<td>1450</td>
<td>180</td>
</tr>
<tr>
<td>(thousand tonnes)</td>
<td>1995</td>
<td>4160</td>
<td>2830</td>
<td>1500</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>4740</td>
<td>3290</td>
<td>1600</td>
<td>150</td>
</tr>
</tbody>
</table>
### Appendix 7: Export of sawn softwood from Russia by countries, 1993-94 (thousand m³)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>578</td>
<td>617</td>
<td>Lithuania</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Ireland</td>
<td>35</td>
<td>14</td>
<td>Estonia</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Belgium</td>
<td>77</td>
<td>56</td>
<td>Egypt</td>
<td>183</td>
<td>593</td>
</tr>
<tr>
<td>Greece</td>
<td>36</td>
<td>41</td>
<td>Morocco</td>
<td>57</td>
<td>25</td>
</tr>
<tr>
<td>Denmark</td>
<td>52</td>
<td>34</td>
<td>Tunisia</td>
<td>42</td>
<td>98</td>
</tr>
<tr>
<td>Iceland</td>
<td>77</td>
<td>31</td>
<td>Japan</td>
<td>326</td>
<td>437</td>
</tr>
<tr>
<td>Italy</td>
<td>369</td>
<td>340</td>
<td>Lebanon</td>
<td>135</td>
<td>197</td>
</tr>
<tr>
<td>Netherlands</td>
<td>92</td>
<td>69</td>
<td>Cyprus</td>
<td>104</td>
<td>23</td>
</tr>
<tr>
<td>France</td>
<td>144</td>
<td>111</td>
<td>Malta</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Hungary</td>
<td>147</td>
<td>83</td>
<td>Israel</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>26</td>
<td>7</td>
<td>Saudi Arabia</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>Finland</td>
<td>332</td>
<td>337</td>
<td>Yemen</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Liechtenstein</td>
<td>36</td>
<td>18</td>
<td>Syria</td>
<td>39</td>
<td>139</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>3</td>
<td>1</td>
<td>Iran</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Turkey</td>
<td>187</td>
<td>57</td>
<td>Jordan</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>Austria</td>
<td>21</td>
<td>49</td>
<td>China</td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>Sweden</td>
<td>11</td>
<td>12</td>
<td>Taiwan</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Norway</td>
<td>2</td>
<td>7</td>
<td>Korea South</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2</td>
<td>15</td>
<td>Korea North</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>4</td>
<td>3</td>
<td>Mongolia</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Czech &amp; Slovak Repubs</td>
<td>14</td>
<td>13</td>
<td>Canada</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Croatia</td>
<td>5</td>
<td></td>
<td>Australia</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Latvia</td>
<td></td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total export sawn softwood</strong></td>
<td><strong>3900</strong></td>
<td><strong>4300</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Appendix 8: Railway tariffs in Russia

<table>
<thead>
<tr>
<th>Date</th>
<th>Cost of delivery of 1 m³ by distance (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500 km</td>
</tr>
<tr>
<td>01.01.94</td>
<td>4.2</td>
</tr>
<tr>
<td>15.01.94</td>
<td>6.4</td>
</tr>
<tr>
<td>01.04.94</td>
<td>7.4</td>
</tr>
<tr>
<td>01.07.94</td>
<td>7.2</td>
</tr>
<tr>
<td>01.08.94</td>
<td>7.2</td>
</tr>
<tr>
<td>01.09.95</td>
<td>9.8</td>
</tr>
</tbody>
</table>

**Example:**

Delivery cost of one cub.m. sawn timber by railway from Krasnoyarsk to port Novorossiisk - $63, besides: trains-shipments in port - $12, duty - $ 6. Total 63+12+6=$81. Sale price of 1 cub.m. $140. 140−81= $ 59, including production over-head expenses.
INSTITUTIONAL ARRANGEMENTS FOR NATIONAL FORESTRY STATISTICS IN THE NEAR-EAST (INCLUDING A CASE STUDY WITH PARTICULAR REFERENCE TO THE SUDAN)

By Amira Awad M. Salih
Forests National Corporation, Ministry of Environment and Tourism, Khartoum, Sudan

INTRODUCTION

General

"Forests are complex ecosystems capable of providing a wide range of economic, social and environmental benefits. Forests provide products and services which contribute directly to the well-being of people every where and are vital to our economies, our environment and our daily lives. While forests and woodlands are now recognised as essential for human life, their benefits and services are valued differently by different people and different groups."

However, whatever functions forests serve, the sustainable supply of their benefits can only be maintained through planning. A major demand of planning is statistics. Forestry statistics are essential for: (i) national policy formulation, planning and decision making; (ii) the more detailed requirements of planning and management of forestry and forest industry operations; and (iii) international exchange of information in the forestry sector necessary to place national planning in an international perspective.

This paper first presents material related to the Near East and the context of world data (as related in the FAO Yearbook of Forest Products). It then focuses on the forestry statistics situation of the Sudan which thus serves as a case study.

STATISTICS IN THE NEAR EAST

The Political Structure of the Near-East

Under the regional structure of FAO, the Near East Region comprises the following 26 countries: Afghanistan, Algeria, Bahrain, Cyprus, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Malta, Mauritania, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates, and Yemen. The region stretches over 17.5 million km² in Africa and Asia, from the Atlantic coast of Mauritania and the southern shores of the Mediterranean Sea across the northern half of Africa, eastward over the Arabian Peninsula, the Iranian and Afghan Plateaux to Pakistan. It includes Cyprus and Turkey in the north and Somalia and the Sudan in the South.

The Physical Environment

The Near-East is one of the oldest inhabited regions of the world where man’s activities have had a profound impact on the land and its resources. In two of the main river basins, the Mesopotamia and the Nile Valley, man developed agriculture over 10,000 years ago. The agricultural evolution was brought about with the cultivation of crops and the domestication of livestock. Civilizations originated in this region and succeeded one another for centuries.

Aridity is the dominant physical characteristic of the region. With few exceptions of high altitude areas, some 75 percent of the total area of the region is desert, and 15 percent are arid or semi-arid and cold mountainous lands. Ecologically, these zones are fragile and difficult to develop. The greatest part of the region is characterized by scarcity of precipitation and the erratic pattern of the little rainfall; extremely wide variations in temperature; high wind velocities; hot dry winds in certain periods of the year; and high evapotranspiration.

The physical characteristics of the region stem essentially from the combined effects of climate and topography, with maritime influences playing an important role. These characteristics are the major determinants of the use to which land is put, though it is also true that patterns of land-use over the centuries have shaped the physical environment.

The total population of the region in 1991 was estimated at 466 million, with a growth rate averaging 3.1 percent, representing one of the highest in the world.

The Economic Environment

In terms of economic development, the region is marked by striking disparities. It consists of some of the richest oil producing States with per capita incomes among the highest in the world but also has some of the poorest human societies. With few exceptions where commerce and industry are producing a sizable proportion of the national income, agrarian economies and traditional societies and structures prevail.

Trade in food, metals and timber started in the region centuries ago. Tons of copper and iron have been melted, shaped and baked into pots and vases using firewood as a source of energy. With the exception of the relatively recent rate of deforestation in the tropics, no other region of the world epitomizes so vividly the impact of man on forest resources as the Near-East.

Forest Resource base

In the temperate zone of the Near-East, forests are considered to be those lands which carry stands of trees, usually of commercial value. With few exceptions, such as in Turkey, the Caspian Sea area, Northern Pakistan and Southern Sudan, forests of commercial timber do not exist. Forest resources in the Near-East consist of savanna and open woodlands, scattered trees and shrubs, reeds in wetlands and trees which are cultivated as windbreaks or along roads and canals.

The Near East in FAO Yearbook of Forest products

A summary of the data content of the FAO Yearbook is provided here to highlight the level of participation of the Near-East Region in World trade in Forest products. The FAO yearbook of Forest Products used as reference is the 47th issue, (1982-1993). It declares that the publication of the yearbook has been made possible by the cooperation of the various governments which have supplied most of the information in form of replies to questionnaires. The tables of the FAO Yearbook are arranged basically in three parts:

- The first part contains tables dealing with the volume of production and the volume and value of trade. Data is presented for 12 years (1982-1993). For any commodity, the tables show data on production, imports and exports.

According to the above reference, the world's total wood removals was 3.4 billion m³ in 1993 of which 44.9 percent was harvested for industrial purposes and the remaining 55.1 percent was burnt as fuel. Roundwood production in the Near-East countries (of which 82 percent was
consumed as fuel) represented only 3 percent of world production. The Near-East production of sawn wood is currently estimated at 1.75 percent of world’s output of the product. The region’s production of wood-based panels is 1.1 percent and only 0.26 percent for wood pulp. Most of the three products comes from Turkey (see Table 1).

The second part contains tables dealing with the direction of trade which is based on export data. The data are derived from data collected in computer-readable form by United Nations Statistics Offices. From the information, none of the Near-East countries plays a major role as an exporter. All countries of the Near-East Region mentioned in the tables were only listed as importers. From the trade data, only Morocco (0.4 million m$^3$) and Turkey (2.6 million m$^3$) appeared as major importers of round wood in the region. This gives an indication that the production of the Near-East countries is largely consumed locally. Trade in wood by the Near-East Region was estimated at:

* US$ 350.7 million for round wood imports (2.7 percent of the world imported value). (see Table 2).

* US$ 737.7 million for imported sawn wood (volume about 3.2 percent of total world’s imports of sawn wood) (table 3).

* US$ 597.6 million for imported wood-based panels (volume about 4.5 percent of world’s imported wood panels) (table 3).

* US$ 245.6 million for imported wood pulp (volume about 2.2 percent of world’s imports of wood pulp (see Table 3).

The third part contains tables showing the unit value in trade (imports and exports) of some commodities which have been obtained by dividing total value by total volume traded. Data are reported for twelve years 1982-1993.

Comments on the Data Content of the FAO Yearbook

It is observed that the information on production, trade and consumption of non-wood forest products is currently not provided by the FAO Yearbook. However, to some economies, certain non-wood products can be important in trade. For example, the value of exports of non-wood forest products for the Sudan (mainly gums) has been more than her imports of wood products during last ten years from 1986-1995. This confirms the positive effect of the forest sector on the country’s balance of payment. Gum arabic is one of the main export commodities in the Sudan. It plays an important role as a major source of foreign exchange, accounting for about 13.6 percent of annual export income.
### Table 1: World and Near-East Wood Production 1993

<table>
<thead>
<tr>
<th>Geographical region</th>
<th>Roundwood Removals (10^6 m³)</th>
<th>Wood Products* (10^6 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Industrial</td>
</tr>
<tr>
<td>World</td>
<td>3404.4</td>
<td>528.6</td>
</tr>
<tr>
<td>Near-East (Africa)</td>
<td>44.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Near-East (Asia)</td>
<td>59.2</td>
<td>15.0</td>
</tr>
<tr>
<td>Near-East Total</td>
<td>103.7</td>
<td>18.6</td>
</tr>
<tr>
<td>- As % of World Total</td>
<td>3.0</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* Figures given are product volume.


---

1 Metric tons for wood pulp.
Table 2: World and Near-East: Value of Imported Roundwood 1993 in (million US$)

<table>
<thead>
<tr>
<th>Geographical region</th>
<th>Total Roundwood</th>
<th>Industrial</th>
<th>Fuelwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>13099</td>
<td>12867</td>
<td>232</td>
</tr>
<tr>
<td>Near-East (Africa)</td>
<td>55.3</td>
<td>55.0</td>
<td>-</td>
</tr>
<tr>
<td>Near-East (Asia)</td>
<td>295.3</td>
<td>282.7</td>
<td>-</td>
</tr>
<tr>
<td>Near-East (Europe)</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>


Table 3: World and Near-East: Value of Imported Wood Products 1993 in (million US$)

<table>
<thead>
<tr>
<th>Geographical region</th>
<th>Sawn wood</th>
<th>Wood-based Panels</th>
<th>Wood Pulp</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>22864</td>
<td>13077</td>
<td>11011</td>
</tr>
<tr>
<td>Near-East (Africa)</td>
<td>407.4</td>
<td>92.4</td>
<td>61.2</td>
</tr>
<tr>
<td>Near-East (Asia)</td>
<td>327.2</td>
<td>499.2</td>
<td>183.8</td>
</tr>
<tr>
<td>Near-East (Europe)</td>
<td>3.1</td>
<td>6.0</td>
<td>8.6</td>
</tr>
<tr>
<td>Near-East</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total</td>
<td>737.7</td>
<td>597.6</td>
<td>245.6</td>
</tr>
<tr>
<td>- As % of World Total</td>
<td>3.2</td>
<td>4.5</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Most of the Near-East countries do not contribute significantly to foreign trade in forest products; however, some are major users of wood products, deriving their supply locally. This was confirmed in the Sudan by the Forest Products Consumption Survey of 1994. Total wood consumption was estimated as 15.77 million m³ for all wood products. This finding points to the need for the expansion of the content of the FAO Yearbook to provide information on the volume of *internal or local trade* in wood products within countries.

**FORESTRY STATISTICS - CASE STUDY FOR THE SUDAN**

**Data Content Of Forestry Statistics Yearbook of the Sudan**

**General**

The Forests National Corporation (FNC) has the responsibility for the coordination of forestry development in the Sudan. The Corporation emphasizes the development of a forestry information system and planning database, as part of national capacity building for effective planning, policy analysis and programme implementation.

FNC with the assistance of FAO Economists/Planners who served under the Forestry Development Project in the Sudan (GCP/SUD/047/NET) achieved much in information system development. One of these accomplishments was the regular publication of the "Handbook of the Forestry Sector of the Sudan", in which available information on forestry is presented in a systematic manner, useful for planning.

**The Forestry Statistical Yearbook of the Sudan**

The first issue (1992) of the "Handbook of Statistics of the Forestry Sector of the Sudan" was published in 1993. The handbook presented the available information in a concise form making it possible for cross checks of data content for improvement.

The second issue of the Handbook (1994 issue, published in 1995) confirms the emphasis placed by the Forests National Corporation on development of a forestry information system and planning database, as part of national capacity building for effective forestry planning, policy analysis and programme implementation.

The Current Forestry Yearbook of Statistics is very comprehensive, highlighting data on the socio-economic development in the Sudan; land use; forest industrial sub-sector development; forest products consumption, imports, exports, prices and tariffs; and manpower in the forestry sector.

Certain limitations were recognised at the publication of the first issue of Handbook of Forestry Statistics (1992 issue) and used to improve the 1994 handbook. However, the general problems remaining unresolved include information inaccuracy and the incomplete nature of certain information, particularly in areas such as land use. Secondly, it has not been possible to reconcile the conflicting information on several important aspects of forestry as in the case of forest area, deforestation, sustainable supply and wood production.

However, this resource information should improve after the completion of the on-going National Forest Resource Inventory in the Sudan, which is a component of the Netherlands's Government supported forestry development project.

The data contents of the second issue was an improvement over the first as it concentrated on data important for planning and left out information that can be included in annual reports. The
issue benefited from the findings of the Forest Products Consumption Survey of 1994 which came out with realistic data which enabled the FNC to overcome the problem of the lack of information on demand/consumption. The data content of the Statistical Handbook of the Sudan is highlighted below.

Land use information

The different estimates about geographical area, land use, forest area and growing stock have been derived from the Energy Sector Assessment undertaken in 1983 and Forestry Sector Review by the World Bank in 1986. Efforts were also made to include information on forest management. The information describes the state of forest management in the country as assessed in terms of area under reserves, area under sustainable management, and annual programme of forest regeneration with some detailed information about areas under plantations, including location and species regenerated (See Table 4).

Forest Industry Statistics

The source of current information on industries in the Yearbook are the reports of specific studies carried out as part of the Forest Products Consumption study. It allowed the compilation of relevant data in the hands of the private sector covering number of processing units, installed and utilized capacities. Tables 5 and 6 summarizes this information.

Table 4: Sudan: Land use (1983 and 1990 Estimates in million ha)

<table>
<thead>
<tr>
<th>Category</th>
<th>1983 Assessment</th>
<th>1990* Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Desert</td>
<td>86.50</td>
<td>74.27</td>
</tr>
<tr>
<td>2. Semi Desert/Scrub and Pasture</td>
<td>50.34</td>
<td>94.41</td>
</tr>
<tr>
<td>3. Swamps</td>
<td>2.93</td>
<td>3.19</td>
</tr>
<tr>
<td>4. Agriculture</td>
<td>16.91</td>
<td>18.12</td>
</tr>
<tr>
<td>5. Woodlands and Forests</td>
<td>93.87</td>
<td>60.31</td>
</tr>
<tr>
<td>6. Urban</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td>Total</td>
<td>250.50</td>
<td>250.58</td>
</tr>
</tbody>
</table>

* Based on the Estimate of Forestry Sector Planning Committee 1990.
Table 5: Northern Sudan: The Structure of the Sawmilling Industry in 1994

<table>
<thead>
<tr>
<th>Mill Type / Ownership</th>
<th>No of Units</th>
<th>Installed Capacity for Sawnwood (m³)</th>
<th>Sawnwood Production (m³)</th>
<th>Capacity Utilization (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Bandmill</td>
<td>1</td>
<td>50,000</td>
<td>5,000</td>
<td>10</td>
</tr>
<tr>
<td>- Circular Saws</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Private</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Circular Saws</td>
<td>1</td>
<td>5,000</td>
<td>2,000</td>
<td>40</td>
</tr>
<tr>
<td>- Carpentry mills</td>
<td>30</td>
<td>45,000</td>
<td>10,440</td>
<td>22</td>
</tr>
<tr>
<td>- Pit Saws</td>
<td>424</td>
<td>32,900</td>
<td>27,296</td>
<td>83</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>132,000</strong></td>
<td><strong>44,636</strong></td>
<td></td>
</tr>
</tbody>
</table>

Average Product Recovery by mills = 40%.
Contribution of Pit saws to Sawnwood production = 61.7%

**Forest Products Consumption**

The source of this information is the Forest Products Consumption Study of 1994. The information presented includes total and per capita consumption of forest products for the Sudan and for its constituent States. The projected wood consumption for the nation were also incorporated (see Tables 7 and 8). Other consumption figures are presented in Appendices 2 - 5.

Table 6: Northern Sudan: Permanent Employment in the Sawmilling Industry in 1994

<table>
<thead>
<tr>
<th>Mill Type / Ownership</th>
<th>No of Units</th>
<th>Employment 1994.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Band</td>
<td>1</td>
<td>240*</td>
</tr>
<tr>
<td>- Circular</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td><strong>Private</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Circular</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>- Carpentry</td>
<td>30</td>
<td>860</td>
</tr>
<tr>
<td>- Pit Saws.</td>
<td>424</td>
<td>1440</td>
</tr>
<tr>
<td>Subtotal</td>
<td>455</td>
<td>2325</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>465</td>
<td>2565</td>
</tr>
</tbody>
</table>

* This total applies to both band and circular mills.
Table 7: Sudan: Total and Per Capita Consumption of Forest Products in 1994 (m³)

<table>
<thead>
<tr>
<th>Product</th>
<th>Volume in roundwood equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Capita</td>
</tr>
<tr>
<td>Charcoal</td>
<td>0.30</td>
</tr>
<tr>
<td>Fuelwood</td>
<td>0.35</td>
</tr>
<tr>
<td>Poles and Sawlogs</td>
<td>0.09</td>
</tr>
<tr>
<td>Wood-based Panels</td>
<td>0.00</td>
</tr>
<tr>
<td>Paper¹</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 8: Sudan: Projected Wood Consumption: Year 2000, (in million m³)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Scenario</th>
<th>Fuelwood</th>
<th>Poles &amp; Sawlogs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>High</td>
<td>17.824</td>
<td>2.289</td>
<td>20.113</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>10.778</td>
<td>2.064</td>
<td>12.842</td>
</tr>
<tr>
<td>Industry</td>
<td>High</td>
<td>1.375</td>
<td>0.020</td>
<td>12.842</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>1.232</td>
<td>0.018</td>
<td>1.250</td>
</tr>
<tr>
<td>Services</td>
<td>High</td>
<td>0.662</td>
<td>0.097</td>
<td>0.759</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>0.525</td>
<td>0.087</td>
<td>0.612</td>
</tr>
<tr>
<td>Total</td>
<td>High</td>
<td>19.861</td>
<td>2.406</td>
<td>22.267</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>12.535</td>
<td>2.169</td>
<td>14.704</td>
</tr>
</tbody>
</table>

Notes: 1. Fuelwood includes firewood, charcoal and dukhan wood (i.e. local sauna wood).
2. Consumption in Services include consumption of wood by Quranic schools.

Forest products Export and Import Trade statistics

Export and import information in the statistical handbook of the Sudan includes: volume and value of gum arabic exports (table 9); shares of the main market for gums; volume and value of forest products imports (table 10); share of Sudan's main suppliers of wood products; and volume and value of paper imports. Other Statistics provided by the Yearbook of Forestry Statistics of the Sudan include:

- Prices and Tariffs for forest products: sawnwood import prices; prices of locally produced wood products; and prices of standing timber (tariffs).

¹ Units for paper are metric tons (mt).
- **Forestry Policy, Institutions and Programme**: on-going externally assisted projects; manpower of the Sector; research focus and Manpower; and universities offering Forestry related courses.

- **Production of important Products**: this is an area in which information available is incomplete and most often unreliable in the Handbooks.

Table 9: **Sudan Volume and Value of Gum Arabic Exports**

<table>
<thead>
<tr>
<th>Year</th>
<th>Tons</th>
<th>Value (‘000 US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>41,248</td>
<td>57,690</td>
</tr>
<tr>
<td>1984</td>
<td>33,235</td>
<td>45,389</td>
</tr>
<tr>
<td>1985</td>
<td>26,828</td>
<td>36,784</td>
</tr>
<tr>
<td>1986</td>
<td>18,717</td>
<td>48,028</td>
</tr>
<tr>
<td>1987</td>
<td>17,744</td>
<td>78,791</td>
</tr>
<tr>
<td>1988</td>
<td>18,603</td>
<td>55,713</td>
</tr>
<tr>
<td>1989</td>
<td>19,352</td>
<td>46,787</td>
</tr>
<tr>
<td>1990</td>
<td>21,912</td>
<td>54,595</td>
</tr>
<tr>
<td>1991</td>
<td>24,978</td>
<td>50,819</td>
</tr>
<tr>
<td>1992</td>
<td>14,068</td>
<td>23,447</td>
</tr>
<tr>
<td>1993</td>
<td>15,730</td>
<td>40,040</td>
</tr>
<tr>
<td>1994</td>
<td>21,755</td>
<td>76,498</td>
</tr>
</tbody>
</table>

Source: The Central Bureau of Statistics

**CURRENT FORESTRY DATA COVERAGE AND INSTITUTIONS INVOLVED**

Different Institutions are involved in the activities of forest statistics in the Sudan; they include the Central Bureau of Statistics, the Forest National Corporation, the Bank of Sudan, Ministry of Trade, and the Gum Arabic Company. Other institutions such as the Universities, the Forestry Research Centre, the Ministry of Energy, the Institute of Energy Research, and Non-Governmental Organizations, collect forestry data on ad-hoc basis, usually for research and policy analysis. With the exception of the FNC, none of the institutions has an organized unit handling forestry statistics. Most of the institutions collect only statistics relevant to their function. The FNC data collection and collation activities are most broad to meet the forestry sector’s overall needs.

The Central Bureau of Statistics (CBS) is in principle the custodian of statistical information from various sectors of the economy. The forestry sector information published by the CBS often includes foreign trade statistics on forest products; number of trees per homestead, trend of charcoal prices, and sector manpower. The CBS depends on the Ministry of Trade and the Bank of Sudan for foreign trade information. Major infrastructure includes: states offices; computer units; agriculture statistics census division; and foreign trade section. For data validation software such as IMPS and SPSS are used.
Table 10: Sudan: Value of Forest Products Imports 1985 - 1990  
(in US $ '000 )

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Plywood &amp; Veneer</td>
<td>458</td>
<td>693</td>
<td>563</td>
<td>1092</td>
<td>1050</td>
<td>198</td>
</tr>
<tr>
<td>2 Match splints</td>
<td>229</td>
<td>294</td>
<td>117</td>
<td>-</td>
<td>217</td>
<td>126</td>
</tr>
<tr>
<td>3 Mouldings</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>4 Other wood</td>
<td>13</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>5 Cooperage</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>6 Doors &amp; windows</td>
<td>36</td>
<td>52</td>
<td>206</td>
<td>564</td>
<td>93</td>
<td>440</td>
</tr>
<tr>
<td>7 Sawnwood</td>
<td>8264</td>
<td>5685</td>
<td>1730</td>
<td>11244</td>
<td>7274</td>
<td>5180</td>
</tr>
<tr>
<td>8 Other wood products</td>
<td>100</td>
<td>85</td>
<td>637</td>
<td>637</td>
<td>41</td>
<td>3</td>
</tr>
<tr>
<td>9 Cork</td>
<td>38</td>
<td>13</td>
<td>44</td>
<td>55</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>9138</td>
<td>6823</td>
<td>3303</td>
<td>13598</td>
<td>8707</td>
<td>5992</td>
</tr>
</tbody>
</table>

Source: Department of Statistics (Foreign Trade Statistics Section).
The coverage of the sector's statistics is still incomplete at the national level due to information gaps at different stages of compilation along the chain involving other institutions. As far as FNC is concerned, the system for recording the volume of all forest products produced in the country had been established for many years. It is based on the tabulation of all royalties and revenues as issued by each forest section and States.

After the enactment of the FNC Law in 1989, a clear organizational structure was established within the Corporation. The FNC now has a Planning Department with a Statistics and Information Section responsible for the collection, analysis, compilation and dissemination of Forestry Sector Statistics and Information. The section is equipped with computers and software for data storage, analysis and dissemination. Three Officers are charged with this responsibility. Other Units involved in data collection within FNC are: State Offices; Forest Management Department; Gums and Non-wood products Department; Afforestation Department; and Utilization Department.

**Other Near-East Countries: data coverage and institutions**

Only two other countries are referred to as an illustration. In Afghanistan, the Ministry of Agriculture with its different departments (especially the forestry department) is responsible for forest statistics. Data collection is dependent on traditional methods of reporting and tabulation of data. Computer hardware and software have not been in any appreciable use till now in Afghanistan. The users of national forestry statistics in Afghanistan are Government and individuals who export forest products. In Syria, a Central Statistics Office is responsible for statistics in the whole country. The centre collects information from different Ministries. The Forestry Department of the Ministry of Agriculture, is responsible for forestry statistics. Computers with advanced software are very much in use in Syria for data analysis, validation and storage.

**Data on forest industries** collected in the Sudan can be categorised into two: public sawmills data and private sawmills data. Public sawmill data is collated from the quarterly reports (capacity, employment, material inputs, expenditure and volume and value of outputs) of forestry regions. Private sawmills data is collected from the mills through surveys.

As far as paper industry is concerned there are some small factories producing card board, folding boxes and solid board sheets. These factories however depend on imported raw material. Efforts have not been made to collect data from the paper factories.

The statistics on forest product prices available are mainly on gum arabic and charcoal. The Gum Arabic Company keeps records of gum prices. Charcoal prices are collected by special or occasional surveys by the CBS and the FNC.

**INFORMATION TECHNOLOGY AVAILABLE AND NEEDED IMPROVEMENT**

The most important development in the field of forestry institutions in the Sudan is the establishment of the Forests National Corporation (FNC) through an act of Parliament in 1989 completely replacing the National Forests Administration, with a very clear structure and defined functions.
Since its establishment, the FNC has been instrumental in achieving important changes in forestry. FNC found that the database for planning was very weak including basic statistics about forest areas, growing stock, annual removal, consumption, deforestation, trade in forest products and forest replacement and production costs.

To obtain reliable estimate of consumption of forests products and a reliable estimate of sustainable supply, FNC carried out: (a) a Forest Products Consumption Survey (FPCS) in Sudan (1993-1994) with technical and financial support from the Government of the Netherlands through FAO under the Forestry Development Project in the Sudan; and (b) a National Forest Resources Inventory (NFRI) (full results not yet available at time of writing).

The data from FPCS and the data being anticipated from the NFRI, (representing the supply information) are important in planning national environmental management.

Available information infrastructure and technology

State Offices:
- data collection from reports of the field,
- dissemination through monthly, quarterly and annual reports.

Statistics and Information Section, Planning Division:
- data collection (format)
- data entry
- editing
- validation, processing and analysis.
- dissemination through;
  * Annual report.
  * Handbook of forest statistics.
  * Other means (according to job requirements).

Forest Products Consumption Survey. The survey methodology had been as follows:
- Preliminary study (desk review and pilot studies in studies in selected areas).
- Main Survey: assessment of consumption of wood from different sectors in sample areas.
  * questionnaires
  * manual coding.
  * editing.
  * data entry.
  * validation/processing and analysis.
  * tabulation.
  * dissemination: Report of the finding and other reports incorporating the information of the survey under processing.
- The reports on the topic specific studies.

National Forest Resources Inventory:
- field work (data collection and data entry)
- data analysis.
- data digitizing.
- Reports.
The required improvement

The need for good quality forestry sector statistics has been highlighted by UNCED Agenda 21. For the Sudan, the immediate data requirements was emphasized by Omoluabi as follows in 1995 in his introduction to the Handbook of the Forestry Sector Statistics of the Sudan:

"The established database from which the handbook has derived its statistics will require updating annually. In the future, more effort should be placed on improvement of data quality and the expansion of the scope of current database.

More input into forestry staff development in the areas of economic planning, statistics and computer use is needed to support the development of forestry information system in the Sudan. Also needed is strengthening of state planning offices to acquire capability in providing statistics on the forestry sector at state level"

Other requirements are institutional support to increase the capacity and use of the computer hardware and software; and training programmes (such as seminars and workshops) for lower level personnel about methodologies of data collection.

COUNTRY CAPACITY BUILDING

Deficiencies and Measurements taken

Development of sector Statistics can face institutional problems such as the activities of coordination between institutions within the sector; absence of a long term manpower development policy; poor service conditions and structural rigidities that can impair administration's ability to respond effectively to challenges.

The problems of planning in the forestry sector of the Sudan stems largely from the lack of trained personnel and the limited exposure to forestry economics at degree level training.

Local capability development in forestry economics and planning was dealt with in two ways. Firstly, substantial emphasis was placed on manpower development through on-the-job training of counterparts of the FAO Economists/Planners that served under the Forestry Development Project. Second, a more structured and purpose oriented training plan focusing on the long-term needs of the forestry sector was initiated under the same project through postgraduate training and local group courses and overseas fellowships.

Recommendations

It is recommended that the governments and national institutions concerned with assembly of forestry related statistics and information undertake measures to strengthen country capability in data collection, analysis, storage and dissemination through:

- Establishment of a central forest products and resources statistical unit;
- Provision of the statistical unit with adequate equipment and tools for information and statistics gathering and analysis;
- Organization of training courses, seminars and workshops for forestry statistics personnel.
To achieve coordination of national statistics it is recommended that National Forestry Departments be responsible for forestry data collection, analysis and dissemination.

National forestry statistics should be published annually on regular basis.

To improve coverage and reliability, it is recommended that countries explore possibility of legislation that would make forestry departments in the country have power to deal with defaulting private firms in providing information on their business and co-ordinate information from private and public enterprises, and empowering the department to deploy methods it deems necessary to acquire such information.

It is recommended that FAO undertakes the establishment of a regional forestry information and statistical office with mandate to hold periodic meetings to:

- Review and update information and statistics of forestry resources, industry, production, marketing and trade;
- On basis of such review, assist national statistical units in the performance of their tasks;
- Formulate programmes and mechanisms for improving forest products classification and standardization in production, marketing, trade and pricing.

In establishing and implementing the above, technical and material assistance of the international community, and specifically FAO and other UN Agencies and existing regional organizations, are important.

Infrastructural development is necessary to facilitate exchange of forestry related information and statistics among Near-East Countries through networks.

In view of the immense value of computers in advancing capacity in storing, processing and disseminating statistical data, countries are urged to give full consideration to the development of forestry statistical services through appropriate investment in computer hardware and software. FAO should give assistance in the design of computer facilities and the mobilization of financial and technical support.
**Appendix 1: Forestry Resources of the Near East (from FAO 1990 global assessment estimates) ('000 ha)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Total land area</th>
<th>Forest</th>
<th>Other wooded</th>
<th>Wooded Total</th>
<th>Wooded %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Africa</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>238174</td>
<td>2198</td>
<td>2168</td>
<td>4366</td>
<td>1.88</td>
</tr>
<tr>
<td>Djibouti</td>
<td>2198</td>
<td>71</td>
<td>44</td>
<td>115</td>
<td>5.20</td>
</tr>
<tr>
<td>Egypt</td>
<td>99545</td>
<td>521</td>
<td>-</td>
<td>52</td>
<td>0.05</td>
</tr>
<tr>
<td>Libya</td>
<td>175954</td>
<td>333</td>
<td>446</td>
<td>779</td>
<td>0.40</td>
</tr>
<tr>
<td>Mauritania</td>
<td>103040</td>
<td>554</td>
<td>195</td>
<td>4532</td>
<td>4.40</td>
</tr>
<tr>
<td>Morocco</td>
<td>71500</td>
<td>3557</td>
<td>1161</td>
<td>4718</td>
<td>6.00</td>
</tr>
<tr>
<td>Somalia</td>
<td>62734</td>
<td>8990</td>
<td>53020</td>
<td>6211</td>
<td>99.00</td>
</tr>
<tr>
<td>Sudan</td>
<td>237600</td>
<td>47640</td>
<td>98600</td>
<td>146438</td>
<td>1.10</td>
</tr>
<tr>
<td>Tunisia</td>
<td>15536</td>
<td>424</td>
<td>-</td>
<td>425</td>
<td>270</td>
</tr>
<tr>
<td><strong>Asia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afghanistan</td>
<td>65209</td>
<td>1221</td>
<td>690</td>
<td>1911</td>
<td>3.00</td>
</tr>
<tr>
<td>Bahrain</td>
<td>68</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cyprus</td>
<td>924</td>
<td>153</td>
<td>40</td>
<td>193</td>
<td>20.90</td>
</tr>
<tr>
<td>Iran</td>
<td>163600</td>
<td>3793</td>
<td>14250</td>
<td>18043</td>
<td>11.00</td>
</tr>
<tr>
<td>Iraq</td>
<td>43397</td>
<td>1250</td>
<td>300</td>
<td>1550</td>
<td>3.60</td>
</tr>
<tr>
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<td>9718</td>
<td>71</td>
<td>75</td>
<td>146</td>
<td>1.50</td>
</tr>
<tr>
<td>Kuwait</td>
<td>1782</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lebanon</td>
<td>1023</td>
<td>38</td>
<td>45</td>
<td>84</td>
<td>8.20</td>
</tr>
<tr>
<td>Oman</td>
<td>21246</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pakistan</td>
<td>77088</td>
<td>2640</td>
<td>1105</td>
<td>3745</td>
<td>4.90</td>
</tr>
<tr>
<td>Qatar</td>
<td>1100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>214969</td>
<td>201</td>
<td>1400</td>
<td>1601</td>
<td>0.70</td>
</tr>
<tr>
<td>Syria</td>
<td>18405</td>
<td>190</td>
<td>239</td>
<td>429</td>
<td>2.30</td>
</tr>
<tr>
<td>Turkey</td>
<td>770765</td>
<td>8852</td>
<td>11343</td>
<td>20195</td>
<td>26.20</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>8360</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Yemen</td>
<td>52797</td>
<td>10</td>
<td>4050</td>
<td>4060</td>
<td>7.70</td>
</tr>
<tr>
<td><strong>Europe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Appendix 2: Roundwood Production in the Near East, 1993

<table>
<thead>
<tr>
<th>Region</th>
<th>Production Q</th>
<th>Import Q</th>
<th>Import V</th>
<th>Export Q</th>
<th>Export V</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>3404.4</td>
<td>111.4</td>
<td>13098.7</td>
<td>110.0</td>
<td>10275.1</td>
</tr>
<tr>
<td>Africa</td>
<td>553.1</td>
<td>.5</td>
<td>56.9</td>
<td>5.3</td>
<td>978.5</td>
</tr>
<tr>
<td>Algeria</td>
<td>2.4</td>
<td>-</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Djibouti</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Egypt</td>
<td>2.4</td>
<td>-</td>
<td>5.3</td>
<td>0.1</td>
<td>1</td>
</tr>
<tr>
<td>Libya</td>
<td>0.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mauritania</td>
<td>-</td>
<td>0.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Morocco</td>
<td>2.0</td>
<td>-</td>
<td>84.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Somalia</td>
<td>9.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sudan</td>
<td>24.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tunisia</td>
<td>3.3</td>
<td>-</td>
<td>1.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Asia</td>
<td>1144.5</td>
<td>66.6</td>
<td>100353</td>
<td>16.3</td>
<td>1765</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>7.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
</tr>
<tr>
<td>Bahrain</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cyprus</td>
<td>-</td>
<td>-</td>
<td>1.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iran</td>
<td>7.4</td>
<td>-</td>
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Q = quantity = million cubic metres  
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Q = quantity = million cubic metres  
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## Appendix 5: Sawnwood in the Near East, 1993

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Appendix 6: Wood-based panels in the Near East, 1993

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<td>-</td>
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Q = quantity = million cubic metres  
V = value = million $  
### Appendix 7: Wood pulp in the Near East, 1993

<table>
<thead>
<tr>
<th>Region</th>
<th>Production Q</th>
<th>Import Q</th>
<th>Import V</th>
<th>Export Q</th>
<th>Export V</th>
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<tbody>
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<td>World</td>
<td>152</td>
<td>29</td>
<td>12047</td>
<td>29.7</td>
<td>11011</td>
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<td>Africa</td>
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<td>0.2</td>
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<td>242.2</td>
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<td>Algeria</td>
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<tr>
<td>Djibouti</td>
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<td>Oman</td>
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<td>0.2</td>
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<td>Yemen</td>
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<tr>
<td>Europe</td>
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<td>14</td>
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<td>7.7</td>
<td>3012.3</td>
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<td></td>
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</tbody>
</table>

Q = quantity = million cubic metres  
V = value = million $  
Appendix 8: Northern Sudan: Consumption of Woodfuel, Poles and Sawlogs 1994 (in m³ roundwood equivalent)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Woodfuel</th>
<th>Poles and Sawlogs</th>
<th>Total</th>
<th>As % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>12218587</td>
<td>1887944</td>
<td>14106531</td>
<td>89.44</td>
</tr>
<tr>
<td>Industrial</td>
<td>1061847</td>
<td>3844</td>
<td>1065691</td>
<td>6.76</td>
</tr>
<tr>
<td>Commercial and Service</td>
<td>315535</td>
<td>74293</td>
<td>389828</td>
<td>2.47</td>
</tr>
<tr>
<td>Quranic Schools</td>
<td>209044</td>
<td>393</td>
<td>209437</td>
<td>1.33</td>
</tr>
<tr>
<td>Northern Sudan</td>
<td>13805013</td>
<td>1966472</td>
<td>15771485</td>
<td>100.00</td>
</tr>
</tbody>
</table>

As % of Total Wood: 87.6% 13.5% 100.00%
Per Capita: 0.64 0.09 0.748

Source: Forest Products Consumption Study 1994, Forests National Corporation, Khartoum, Sudan

Appendix 9: Sudan: Charcoal and Fuelwood Consumption by Sectors in 1994 (m³ roundwood equivalent)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Charcoal</th>
<th>Fuelwood</th>
<th>Total</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>6,070,208</td>
<td>6,148,379</td>
<td>12,218,587</td>
<td>88</td>
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<tr>
<td>Industry</td>
<td>11,673</td>
<td>1,050,174</td>
<td>1,061,847</td>
<td>8</td>
</tr>
<tr>
<td>Commercial and Services</td>
<td>283,899</td>
<td>10,736</td>
<td>294,635</td>
<td>2</td>
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<tr>
<td>Quranic Schools</td>
<td>0</td>
<td>209,044</td>
<td>209,044</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>6,365,780</td>
<td>7,418,333</td>
<td>13,784,113</td>
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</tr>
<tr>
<td>National per Capita</td>
<td>0.30 m³</td>
<td>0.35 m³</td>
<td>0.64 m³</td>
<td></td>
</tr>
</tbody>
</table>

- Includes dukhan wood (local sauna wood)

Appendix 10: Northern Sudan: Summary of Woodfuel Consumption in 1994, (in m³ roundwood equivalent)

<table>
<thead>
<tr>
<th>Category</th>
<th>Per Capita</th>
<th>Total Sudan</th>
</tr>
</thead>
<tbody>
<tr>
<td>National per capita.</td>
<td>0.64</td>
<td>13800000</td>
</tr>
<tr>
<td>Within household per capita</td>
<td>0.56</td>
<td>12200000</td>
</tr>
<tr>
<td>Industrial use per national caput</td>
<td>0.05</td>
<td>1060000</td>
</tr>
<tr>
<td>Commercial and Services sector/caput</td>
<td>0.01</td>
<td>315535</td>
</tr>
<tr>
<td>Quranic Schools per national caput</td>
<td>0.01</td>
<td>209044</td>
</tr>
</tbody>
</table>

Population: Northern Sudan 1993  21.6 million

---

1 Per capita consumption has changed over time as follows:

<table>
<thead>
<tr>
<th>Reference Year</th>
<th>Firewood</th>
<th>Charcoal</th>
<th>Total</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>1956</td>
<td>1.05</td>
<td>0.40</td>
<td>1.45</td>
<td>Jackson (1960)</td>
</tr>
<tr>
<td>1962</td>
<td>0.97</td>
<td>0.68</td>
<td>1.65</td>
<td>Saini (1964)</td>
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<tr>
<td>1980</td>
<td>0.60</td>
<td>1.02</td>
<td>1.62</td>
<td>National Energy Adm. (1990)</td>
</tr>
<tr>
<td>1983</td>
<td>0.73</td>
<td>1.29</td>
<td>2.04</td>
<td>World Bank (1986)</td>
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<tr>
<td>1988</td>
<td>-</td>
<td>-</td>
<td>0.97</td>
<td>Hunter (1989)</td>
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</table>
### Appendix 11: Northern Sudan: Total Consumption of Poles and Sawlogs in Construction by Sectors, 1994, (m³ roundwood)

<table>
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<tr>
<th>Sector</th>
<th>Construction</th>
<th>Total</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Building and others</td>
<td>Furniture</td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td>1686174</td>
<td>201768</td>
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<tr>
<td>Industrial</td>
<td>2485</td>
<td>1359</td>
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<tr>
<td>Commercial/Service</td>
<td>39456</td>
<td>34837</td>
<td>74293</td>
</tr>
<tr>
<td>Quranic School</td>
<td>393</td>
<td>0</td>
<td>393</td>
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<tr>
<td>N. Sudan</td>
<td>1728508</td>
<td>237964</td>
<td>1966472</td>
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<tr>
<td>Share (%)</td>
<td>87.89</td>
<td>12.10</td>
<td>100</td>
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<tr>
<td>Per Capita</td>
<td>0.08</td>
<td>0.01</td>
<td>0.09</td>
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</table>

Forests National Corporation, Khartoum.

### Appendix 12: Sudan: Projected Wood Consumption: Year 2000, (in million m³)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Level</th>
<th>Fuelwood</th>
<th>Poles and Sawlog</th>
<th>Total</th>
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<tbody>
<tr>
<td>Household</td>
<td>High</td>
<td>17.824</td>
<td>2.289</td>
<td>20.113</td>
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<tr>
<td></td>
<td>Low</td>
<td>10.778</td>
<td>2.064</td>
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<tr>
<td>Industry</td>
<td>High</td>
<td>1.375</td>
<td>0.020</td>
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</tr>
<tr>
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<td>Low</td>
<td>1.232</td>
<td>0.018</td>
<td>1.250</td>
</tr>
<tr>
<td>Services</td>
<td>High</td>
<td>0.662</td>
<td>0.097</td>
<td>0.759</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>0.525</td>
<td>0.087</td>
<td>0.612</td>
</tr>
<tr>
<td>Total</td>
<td>High</td>
<td>19.861</td>
<td>2.406</td>
<td>22.267</td>
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<td>Low</td>
<td>12.535</td>
<td>2.169</td>
<td>14.704</td>
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</table>

Forests National Corporation, Khartoum.

Notes: 1. Fuelwood includes firewood, charcoal and dukhan wood.
2. Consumption in Services include consumption of wood by Quranic schools.
THAILAND - CASE STUDY ON NATIONAL FORESTRY STATISTICS

by Pairote Niwaswat and Bhadharajaya Rajani
Information Office, Royal Forestry Department, Bangkok, Thailand

INTRODUCTION

Thailand is located in Southeast Asia with her total area of 513,115 square kilometres which, in 1994, inhabits 59.1 million population. The majority are Thai. The minority less than 5 percent, compose of Chinese, Cambodian, Laotian, Malaysian, Burmese, Vietnamese, and some small groups of hilltribes. The country is under the tropical monsoon weathering condition with the southwestern prevailing monsoon bringing high humidity from the Indian Ocean during the rainy season, ranging from May to October. It causes heavy rain in the peninsular area and along the western side of the country (over 2,000 mm/annum). The amount of rainfall gradually tapers off in the hinterland far from the coastal areas (less than 1,200 mm. in certain spots) The irregular typhoons and depressions from the South China Sea sometimes cause flash floods and crop destruction. The northeastern wind brings coldness and drought from mainland China during the dry season (November-February). Northern and northeastern parts of the country will be affected distinctly. The air temperature will drop below 10 degrees celsius in some areas during December and January; the weather in these two regions is then cooler than other parts of the country during this period. Hot season (March-April) is very dry and hot. The average temperature is relatively high (30-40 degrees celsius) and uncomfortable. The average weather temperature throughout the country thus varies in a wide range from 10 to 35 degrees celsius, in relation to season, topography, and location.

Topographically, the country area can be divided into 5 regions, viz, peninsular or southern region, central alluvial plain or central region, northern mountainous or northern region, southeastern or eastern region and northern high plateau.

As mentioned above, the country's climatic condition varies from very wet along the coast to comparatively dry further in inland. Thailand is consequently covered with heterogeneous forest types depending on the combination of air humidity and topographic conditions. They can be grouped into two main forest types - evergreen forest and deciduous forest. Ecologically, soil humidity, soil structure and elevation seem to play the major roles in governing vegetation development and forest composition.

DATA CONTENT

The evergreen forests naturally exists along valleys, ravines, streams, creeks or river banks, coastal areas and peninsular regions where soils are saturated with high water content. Deciduous forests appear in drier areas, such as mountainous slopes or far up inland where the soils are relatively dry. The existing forest and its periodic change between 1982-1993 in Thailand can be classified as in Table 1.

Forest land and Land Uses

Latest information of land classification (1991) shows that forest land area covered 136,698 square kilometres or 26.64 percent of the entire kingdom. The remaining part of the country fell into other land uses as shown in Table 2.
Table 1: Existing forest area in Thailand (1993 = 26.02% of the country’s area)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>169,644.288</td>
<td>111,983</td>
<td>87,756</td>
<td>84,126</td>
<td>80,402</td>
<td>80,222</td>
<td>77,143</td>
<td>75,231</td>
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<td>East</td>
<td>36,502.500</td>
<td>14,475</td>
<td>8,000</td>
<td>7,990</td>
<td>7,834</td>
<td>7,786</td>
<td>7,691</td>
<td>7,634</td>
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<td>Central</td>
<td>67,398.703</td>
<td>20,414</td>
<td>18,516</td>
<td>17,685</td>
<td>17,244</td>
<td>17,223</td>
<td>16,616</td>
<td>16,375</td>
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<tr>
<td>South</td>
<td>70,715.187</td>
<td>28,183</td>
<td>16,442</td>
<td>15,485</td>
<td>14,630</td>
<td>14,600</td>
<td>13,449</td>
<td>12,808</td>
</tr>
<tr>
<td>Kingdom</td>
<td>513,115.011</td>
<td>230,186</td>
<td>156,600</td>
<td>150,866</td>
<td>143,803</td>
<td>143,417</td>
<td>136,698</td>
<td>133,521</td>
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</tbody>
</table>

Table 2: Land Uses and Forests in Thailand (1991)

<table>
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<tr>
<th>Type</th>
<th>Area (sq.km)</th>
<th>Percent</th>
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<tr>
<td>Forest land</td>
<td>136,698.0</td>
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<td>Residential</td>
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<tr>
<td>Paddy Field</td>
<td>110,900.5</td>
<td>21.61</td>
</tr>
<tr>
<td>Cash Crops Area</td>
<td>53,629.5</td>
<td>10.45</td>
</tr>
<tr>
<td>Tree &amp; Fruit Orchard</td>
<td>32,157.2</td>
<td>6.27</td>
</tr>
<tr>
<td>Horticulture</td>
<td>1,373.3</td>
<td>0.27</td>
</tr>
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<td>Pasture</td>
<td>1,130.6</td>
<td>0.22</td>
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<tr>
<td>Wasteland</td>
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<td>163,495.4</td>
<td>31.86</td>
</tr>
<tr>
<td>Total</td>
<td>513,115.0</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Timber Production

There are many forest types in Thailand and each type composed of numerous tree species; more than 150 tree species with commercial value being harvested annually. There are a number of untouched or lesser used species. Selection cutting system seems to be the most appropriate harvesting method for tropical forest consisting of thousands of tree species. Those trees with circumference larger than the allowable cutting limit will be harvested.

The most common harvesting tree species are teak (*Tectona grandis*), *Dipterocarpus spp.*, *Irvingia malayana*, *Anisoptera glaba*, *Rhizophora mucronata*, *R. apiculata*, *Michelia champaka*, *Xylica kerri*, *Hopea odorata*, *H. ferrea*, *Shorea gratissima*, *S. obtusa*, *Mesua ferrea*, *Pterocarpus*
macrocarpus, Dipterocarpus tuberculatus, D. obtusifolius, D. grandiflorus, Afzelia xylocarpa, Syzygium cuminin, Dellenia spp., etc.

The annual timber production in the last 9 years is shown below in Table 3.

Thailand has been under a developing period since the early 1970s. Construction projects especially for housing development are commonly seen throughout the country. Consequently domestic wood consumption increased beyond normal local timber production and increasingly resulted in the import of timbers from neighbouring countries. Once a timber exporting country, Thailand had to import timbers to feed demand. The amount of importation sharply increased not only because of the rapidly forest reduction but also the immediate cessation of the forest concessions throughout the country. The amount of imported timber is shown in Table 4. The countries which supply timbers to Thailand are Burma, Laos, Indonesia, Malaysia, Vietnam, Singapore, Cambodia, and United States. Besides log and sawn timber, Thailand also imported large amounts of pulp and paper to feed her local market. The major sources are countries of temperate areas such as Sweden, Norway, Finland, Canada, Japan, China, and United States.

Table 3: Timber Production in Thailand (1979-1994)

<table>
<thead>
<tr>
<th>Year</th>
<th>Teak</th>
<th>Non-Teak</th>
<th>Non Reserved Species</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>179.5</td>
<td>2,589.4</td>
<td>331.8</td>
<td>3,100.7</td>
</tr>
<tr>
<td>1980</td>
<td>97.3</td>
<td>2,199.8</td>
<td>247.1</td>
<td>2,544.2</td>
</tr>
<tr>
<td>1981</td>
<td>73.3</td>
<td>1,564.6</td>
<td>160.7</td>
<td>1,798.6</td>
</tr>
<tr>
<td>1982</td>
<td>58.1</td>
<td>1,604.3</td>
<td>107.0</td>
<td>1,769.4</td>
</tr>
<tr>
<td>1983</td>
<td>58.1</td>
<td>1,678.9</td>
<td>82.7</td>
<td>1,819.7</td>
</tr>
<tr>
<td>1984</td>
<td>48.2</td>
<td>1,910.8</td>
<td>72.7</td>
<td>2,031.7</td>
</tr>
<tr>
<td>1985</td>
<td>39.2</td>
<td>1,786.1</td>
<td>57.3</td>
<td>1,882.6</td>
</tr>
<tr>
<td>1986</td>
<td>67.6</td>
<td>1,902.0</td>
<td>45.1</td>
<td>2,014.7</td>
</tr>
<tr>
<td>1987</td>
<td>38.1</td>
<td>2,058.0</td>
<td>52.9</td>
<td>2,149.0</td>
</tr>
<tr>
<td>1988</td>
<td>46.9</td>
<td>1,936.4</td>
<td>64.8</td>
<td>2,048.1</td>
</tr>
<tr>
<td>1989</td>
<td>26.2</td>
<td>823.5</td>
<td>60.3</td>
<td>919.0</td>
</tr>
<tr>
<td>1990</td>
<td>17.6</td>
<td>423.8</td>
<td>50.2</td>
<td>491.6</td>
</tr>
<tr>
<td>1991</td>
<td>2.8</td>
<td>209.1</td>
<td>19.6</td>
<td>231.5</td>
</tr>
<tr>
<td>1992</td>
<td>1.2</td>
<td>80.0</td>
<td>38.2</td>
<td>119.4</td>
</tr>
<tr>
<td>1993</td>
<td>6.2</td>
<td>20.3</td>
<td>38.4</td>
<td>64.9</td>
</tr>
<tr>
<td>1994</td>
<td>5.8</td>
<td>24.5</td>
<td>32.0</td>
<td>62.3</td>
</tr>
</tbody>
</table>

Note: The production of other species in the year 1989 was sharply reduced because of the stoppage of concessional operations throughout the country.
Table 4: Imported Log and Sawn Timber (1978-1994)

<table>
<thead>
<tr>
<th>Year</th>
<th>Logs</th>
<th>Sawn Timber</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>169,250</td>
<td>345,767</td>
<td>515,017</td>
</tr>
<tr>
<td>1979</td>
<td>227,031</td>
<td>806,079</td>
<td>1,033,110</td>
</tr>
<tr>
<td>1980</td>
<td>92,094</td>
<td>342,257</td>
<td>434,351</td>
</tr>
<tr>
<td>1981</td>
<td>151,649</td>
<td>423,927</td>
<td>575,576</td>
</tr>
<tr>
<td>1982</td>
<td>141,639</td>
<td>346,813</td>
<td>488,452</td>
</tr>
<tr>
<td>1983</td>
<td>231,784</td>
<td>398,591</td>
<td>630,375</td>
</tr>
<tr>
<td>1984</td>
<td>199,458</td>
<td>382,032</td>
<td>581,490</td>
</tr>
<tr>
<td>1985</td>
<td>172,100</td>
<td>246,140</td>
<td>418,240</td>
</tr>
<tr>
<td>1986</td>
<td>152,714</td>
<td>195,937</td>
<td>348,651</td>
</tr>
<tr>
<td>1987</td>
<td>282,928</td>
<td>442,292</td>
<td>725,220</td>
</tr>
<tr>
<td>1988</td>
<td>446,780</td>
<td>676,563</td>
<td>1,123,343</td>
</tr>
<tr>
<td>1989</td>
<td>1,193,340</td>
<td>1,314,684</td>
<td>2,508,024</td>
</tr>
<tr>
<td>1990</td>
<td>1,847,392</td>
<td>1,493,573</td>
<td>3,340,965</td>
</tr>
<tr>
<td>1991</td>
<td>1,747,201</td>
<td>1,533,611</td>
<td>3,280,812</td>
</tr>
<tr>
<td>1992</td>
<td>2,036,090</td>
<td>1,778,349</td>
<td>3,814,439</td>
</tr>
<tr>
<td>1993</td>
<td>1,365,043</td>
<td>1,845,661</td>
<td>3,210,704</td>
</tr>
<tr>
<td>1994</td>
<td>1,548,899</td>
<td>2,516,847</td>
<td>4,065,746</td>
</tr>
</tbody>
</table>

Natural and Wildlife Conservation

Usually, natural scenic beauties and wildlife resource fall within the forests throughout the country. At present there are 79 established national parks, located in every region of the kingdom. Besides national parks, a part of scenic and forested area is reserved as wildlife sanctuaries, forest parks and arboreta for local people. There are 42 forest parks and 44 arboreta within Thailand. To safeguard the existence of wildlife, 81 forested areas have been set aside as 37 wildlife sanctuaries and 44 non-hunting areas.
Table 5: Natural Conservation and Recreation in 1994

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
<th>Area (sq.km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Park</td>
<td>79</td>
<td>40,216.15</td>
</tr>
<tr>
<td>Forest Park</td>
<td>42</td>
<td>527.46</td>
</tr>
<tr>
<td>Wildlife Sanctuary</td>
<td>37</td>
<td>28,608.63</td>
</tr>
<tr>
<td>Non-hunting Area</td>
<td>44</td>
<td>3,206.19</td>
</tr>
<tr>
<td>Botanical Garden</td>
<td>13</td>
<td>20.40</td>
</tr>
<tr>
<td>Arboretum</td>
<td>44</td>
<td>27.07</td>
</tr>
</tbody>
</table>

Forest Products

Local Thai people tend their lives strictly with forest products, especially firewood for their daily cooking which consumes a high amount of forest productivity per annum. Furthermore, other forest products people buy out from the jungles including bamboo and shoots, rattans, barks, tars, charcoal, etc. The following table shows the production per annum of the major forest products brought out by local Thai people.

Table 6: Production of Major Forest Products

<table>
<thead>
<tr>
<th>Year</th>
<th>Firewood (1,000 m³)</th>
<th>Charcoal (1,000 m³)</th>
<th>Wood Tar (1,000 liter)</th>
<th>Barks (Ton)</th>
<th>Rattans (Ton)</th>
<th>Bamboos (Mil. Pcs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>690.6</td>
<td>363.9</td>
<td>909.2</td>
<td>630.6</td>
<td>2,528.16</td>
<td>34.4</td>
</tr>
<tr>
<td>1986</td>
<td>437.9</td>
<td>348.8</td>
<td>682.4</td>
<td>201.0</td>
<td>3,146.9</td>
<td>37.9</td>
</tr>
<tr>
<td>1987</td>
<td>873.7</td>
<td>463.9</td>
<td>661.0</td>
<td>232.3</td>
<td>5,960.0</td>
<td>40.7</td>
</tr>
<tr>
<td>1988</td>
<td>588.5</td>
<td>561.1</td>
<td>533.8</td>
<td>62.1</td>
<td>3,358.0</td>
<td>60.8</td>
</tr>
<tr>
<td>1989</td>
<td>426.0</td>
<td>325.5</td>
<td>639.5</td>
<td>55.6</td>
<td>1,234.9</td>
<td>54.3</td>
</tr>
<tr>
<td>1990</td>
<td>390.1</td>
<td>274.5</td>
<td>292.6</td>
<td>42.7</td>
<td>1,097.6</td>
<td>48.3</td>
</tr>
<tr>
<td>1991</td>
<td>409.4</td>
<td>225.2</td>
<td>254.5</td>
<td>23.8</td>
<td>867.9</td>
<td>51.8</td>
</tr>
<tr>
<td>1992</td>
<td>289.0</td>
<td>145.2</td>
<td>43.6</td>
<td>0.0</td>
<td>417.1</td>
<td>56.5</td>
</tr>
<tr>
<td>1993</td>
<td>267.9</td>
<td>123.9</td>
<td>56.4</td>
<td>0.0</td>
<td>329.5</td>
<td>37.1</td>
</tr>
<tr>
<td>1994</td>
<td>173.1</td>
<td>122.0</td>
<td>14.2</td>
<td>0.0</td>
<td>544.7</td>
<td>14.2</td>
</tr>
</tbody>
</table>

Wood Industry

Thailand has sawmills and wood products factories located in every corner of the kingdom. However, government policy has been legislated to limit the number of sawmills while trying to improve the quality standards of sawmill products. The effort is not to stop the development of the country’s sawmills but to ensure the sufficient feeding of raw materials to the mills. Because of the sharp decrease of timber supply to feed all wood industries, modernization of other types of forest production is not enough strongly enhanced by the government in cooperation with private sector. The attempts fall in different categories of wood-based industries, for example, plywood, pulp &
paper, fibreboard, particle-board, wood working factories with less timber losses, etc. The following table shows different types of factories being operated in the country.

Table 7: Sawmills and Wood-based Factories (1994)

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Mills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawmills</td>
<td>720</td>
</tr>
<tr>
<td>Sawn-timber by Man-power</td>
<td>90</td>
</tr>
<tr>
<td>Plywood Factories</td>
<td>26</td>
</tr>
<tr>
<td>Veneer Factories</td>
<td>14</td>
</tr>
<tr>
<td>Fibreboard Factories</td>
<td>5</td>
</tr>
<tr>
<td>Particle Board Factories</td>
<td>7</td>
</tr>
<tr>
<td>Woodworking by Man-power</td>
<td>783</td>
</tr>
<tr>
<td>Pulp and Paper Mills</td>
<td>63</td>
</tr>
<tr>
<td>Sawn Timber Shops</td>
<td>4,055</td>
</tr>
<tr>
<td>Wood Products Shops</td>
<td>4,621</td>
</tr>
</tbody>
</table>

Wood Products Trading

Price of timber surveyed from the markets within the Bangkok vicinity has dramatically increased, nearly three-fold during the years 1985 to 1993. The sawn yang(Dipterocarpus spp.), being used as a price indicator, is revealing example of the trend. Table 8 below is shown to display such dynamism of timber prices in Thailand.

Table 8: Timber Price in Bangkok and Sub-urban Area (Baht/cu.ft.)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yang sawn:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall</td>
<td>247</td>
<td>256</td>
<td>287</td>
<td>283</td>
<td>289</td>
<td>330</td>
<td>350</td>
</tr>
<tr>
<td>Lath</td>
<td>185</td>
<td>195</td>
<td>210</td>
<td>210</td>
<td>209</td>
<td>280</td>
<td>315</td>
</tr>
<tr>
<td>Floorings</td>
<td>222</td>
<td>228</td>
<td>280</td>
<td>280</td>
<td>251</td>
<td>295</td>
<td>330</td>
</tr>
<tr>
<td>Scantlings</td>
<td>175</td>
<td>203</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>190</td>
<td>205</td>
</tr>
<tr>
<td>Post</td>
<td>208</td>
<td>220</td>
<td>240</td>
<td>249</td>
<td>262</td>
<td>315</td>
<td>335</td>
</tr>
<tr>
<td>Mixed Hardwood sawn:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floorings</td>
<td>188</td>
<td>235</td>
<td>280</td>
<td>280</td>
<td>241</td>
<td>275</td>
<td>320</td>
</tr>
<tr>
<td>Plank</td>
<td>361</td>
<td>393</td>
<td>470</td>
<td>470</td>
<td>289</td>
<td>335</td>
<td>700</td>
</tr>
<tr>
<td>Teak sawn:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scantlings</td>
<td>354</td>
<td>397</td>
<td>464</td>
<td>474</td>
<td>492</td>
<td>510</td>
<td>510</td>
</tr>
<tr>
<td>Boards</td>
<td>645</td>
<td>718</td>
<td>807</td>
<td>807</td>
<td>888</td>
<td>1,020</td>
<td>1,220</td>
</tr>
</tbody>
</table>
METHODOLOGIES USED FOR COLLECTING THE DATA

The Forest Statistical Techniques Sub-division of the Data Centre of the Royal Forest Department in Bangkok is responsible for central collection of all aspects of forestry statistical data, and publication for public use. The Sub-division is currently developing a more reliable data collection and consequent presentation as shown in the following Diagram 1, and Diagram 2.

Diagram 1: The Data Collection

<table>
<thead>
<tr>
<th>WHO</th>
<th>Collect WHAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provincial Forest Office (75 offices)</td>
<td>1.1 Production of timber, fuelwood and charcoal, major forest products</td>
</tr>
<tr>
<td>2. Regional Forest Office (21 offices)</td>
<td>1.2 Sawmills and wood product factories</td>
</tr>
<tr>
<td>3. Forest Research Office</td>
<td>1.3 Revenue of RFD</td>
</tr>
<tr>
<td>4. Reforestation Office</td>
<td>1.4 Forest products prices</td>
</tr>
<tr>
<td>5. Permission Division</td>
<td>2.1 Production of timber</td>
</tr>
<tr>
<td>6. Personnel Division</td>
<td>3.1 Existing forest areas</td>
</tr>
<tr>
<td>7. Planning Division</td>
<td>3.2 Existing mangrove areas</td>
</tr>
<tr>
<td>8. Finance Division</td>
<td>3.3 Production of timber</td>
</tr>
<tr>
<td>9. Natural Resources Conservation Office</td>
<td>4.1 Forest Plantation of the governmental and private sector</td>
</tr>
<tr>
<td>10. Business Economics Department of the Ministry of Commerce</td>
<td>5.1 Wood industries</td>
</tr>
<tr>
<td>11. Office of the Agricultural Economics</td>
<td>6.1 Data on manpower</td>
</tr>
<tr>
<td>12. Local Administration Department of the Interior Ministry</td>
<td>7.1 RFD's budgeting data</td>
</tr>
<tr>
<td>13. Bank of Thailand Office of the National Economic and Social Development Board</td>
<td>8.1 RFD's revenue</td>
</tr>
<tr>
<td>14. Department of Business Economics, Customs Department</td>
<td>9.1 Nature conservation and recreation</td>
</tr>
<tr>
<td>15. Thailand Paper Industrial Association</td>
<td>10.1 Timber construction price in Bangkok and sub-urban areas</td>
</tr>
<tr>
<td></td>
<td>11.1 Land utilization data</td>
</tr>
<tr>
<td></td>
<td>12.1 Population and their localities</td>
</tr>
<tr>
<td></td>
<td>13.1 General data on the country's economy</td>
</tr>
<tr>
<td></td>
<td>14.1 Data on imports and exports</td>
</tr>
<tr>
<td></td>
<td>15.1 Domestic production of paper</td>
</tr>
</tbody>
</table>
Diagram 2: The Process of Data Presentation

External Agencies
75 Provincial Forest Offices
All RFD Divisions
21 Regional Forest Offices
Forest Statistical Techniques Sub-division
Data Centre
Royal Forest Department
Data Gathering
Data Processing
Analysis of Data
Tabulating
Publishing

EXISTING INSTITUTIONAL INFRASTRUCTURES INVOLVED IN DATA COLLECTION

The majority of collected data is usually from the registration system of 75 provincial forest offices and 21 regional forest offices, which from time to time deliver their reports containing forest statistical data supplies, to the Forest Statistical Techniques Sub-division. Furthermore, 5 RFD offices and 7 divisions in Bangkok also supply statistical data under their responsibility, to the Sub-division mostly the data are normally tabulated. Other important statistical data comes from different outside agencies, for example, data on imports and exports of forest products comes from the Customs Department of the Finance Ministry, and land-use data from the Office of Agricultural Economics, etc. The Sub-division also initiate a system of collecting statistical data, sampling survey, which will help cover effective data processing for the whole country. However, the sampling technique cannot be perfectly done due to insufficient budget support and a technically imperfect sampling frame which produces a wide-range of results of the estimation. The staff intends to adjust the reliability of the report and further improve of the more perfect and more updated data to serve immediate uses.

Products from Informal Sector

Charcoal Production

The most recent statistical data collection of charcoal production in Thailand is the result of the 1983 technical assistance USAID gave to the Thai government. The collection covers a survey on charcoal production, distribution, and consumption - under the Thailand Non-Conventional
Rent

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diatc coal niker,
ere

Lareirtii,.biained In samplin, techniques, questioning and evaluating.

Non-wood Forest Products

The statistical data collection of other forest products; for example, rattans, resin, bamboos,
etc. originates within questionnaires filled by forest provincial offices for formulating by the Forest
Statistical Techniques Sub-division. The formulation does not exactly represent the ongoing situation,
since data collection cannot cover the majority of illegal forest products, obtained by poor rural
people. Furthermore, the invalidity of data comes from incomplete data supply since forest products
collected outside proclaimed forest reserves, have not been authoritatively included in the process of
RFD data collection.

Products from Technologically advanced Sector

The statistical data collection of forest industry production for each major industrial products,
i.e. sawnwood, roundwood, plywood, particle & fibreboard, pulp & paper is collected directly from
sawmills and factories. Because the mill and the factory entrepreneurs are scared of high taxes and
competition with other mills and factories, the annual supply of data is thus not perfectly reliable and
the figures are much lower than reality.

Product: Industrial Roundwood
Definition: Wood in the rough, wood in its natural state as felled or otherwise harvested, with or
without bark, round, split roughly squared or other forms. Commodities included are sawlogs and
veneer logs, pulpwood, other industrial roundwood (including pitprops) and fuelwood.
Measurement Units: Cubic meter
Method of Survey and Coverage: The provincial forest officers collect directly from sawmills and
factories.
Frequency: Monthly
Office Responsible: Provincial forest offices deliver their collection of data to Bangkok Forest
Statistical Techniques Sub-division.
Publication: Published annually for public use in Forestry Statistics of Thailand Journal.

Product: Sawnwood
Definition: Plain sawnwood from sawmills
Measurement Units: Cubic meter
Method of survey and coverage: Annual questionnaires are sent out to provincial forest offices who
collect data from primary sources (sawmills) and report to the RFD.
Frequency: Annually
Office Responsible: RFD
Publication: No publication pending the improvement of reliable data and collection methodology.

Product: Plywood
Definition: Plywood, veneer plywood, core plywood, including veneered wood, and blockboard
Measurement Units: Cubic meter
Method of Survey and Coverage: By questionnaires with official letter delivery directly to factories.
Frequency: Once only in 1984
Office Responsible: Forest Statistical Techniques Sub-division
Publication: Published in 1985 as "Report on Production of Plywood, Veneer, Particle board, and
Fibreboard in 1981-1983"
**Product: Particle board**

**Definition:** A sheet material manufactured from small pieces of wood or other ligno-cellulosic materials (e.g. chips, flakes, splinters, strands, shreds, shives, etc.) agglomerated by use of an organic binder together with one or more of the following agents: heat, pressure, humidity, a catalyst, etc.

**Measurement Units:** Cubic meter

**Method of survey and coverage:** By questionnaires with official letter delivery directly to factories

**Frequency:** Once only in 1984

**Office Responsible:** Forest Statistical Techniques Sub-division

**Publication:** Published in 1985 as named "Report on Production of Plywood, Veneer, Particle board, and Fibreboard in 1981-1983"

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**Product: Fibreboard**

**Definition:** A panel manufactured from fibres of wood of other ligno-cellulosic materials with the primary bond deriving from the felting of the fibres and their inherent adhesive properties. Bonding materials and/or additives may be added.

**Measurement Units:** Cubic meter

**Method of Survey and Coverage:** By questionnaires with official letter delivery directly to factories

**Frequency:** Once only in 1984

**Office Responsible:** Forest Statistical Techniques Sub-division

**Publication:** Published in 1985 as named "Report on Production of Plywood, Veneer, Particle board, and Fibreboard in 1981-1983"

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**Product: Pulp**

**Definition:** Pulp is produced from wood and/or bamboo chips, non-wood raw materials and wastes which have cellulosic fibres.

**Measurement Units:** Metric ton

**Method of Survey and Coverage:** Interviewing the pulp factory-owners by The Thailand Paper Industrial Association.

**Frequency:** Once a year

**Office Responsible:** Thailand Paper Industrial Association and Bank of Thailand

**Publication:** Published in the Bank of Thailand Journal

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**Product: Paper and Paperboard**

**Definition:** The following commodities are included in this aggregate printing and writing paper, kraft paper, paper board, and packaging paper, household and sanitary paper.

**Measurement Units:** Metric ton

**Method of Survey and Coverage:** Interviewing the paper factories by the Thailand Paper Industrial Association

**Frequency:** Once a year

**Office Responsible:** Thailand Paper Industrial Association and Bank of Thailand

**Publication:** Published in the Bank of Thailand Journal

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**Trade**

Data on imports and exports were drawn from the Customs Department of the Finance Ministry. From the computerized memories of the Customs Department's computer system. The Business Economics Department(BED) picks them up for processing and tabulating into forms that can be easily used by the general public. The RFD revises the already tabulated statistical forms in order to make it conformable with RFD use. The revision has to be done by RFD not because of the
BED incompetency, but because the RFD needs to fit the data for RFD use, and can then be processed quickly as the RFD demand.

The national trade statistics for forest products are as follows:

1. Imports of logs and sawn timbers
2. Imports of wood products such as plywood, veneer sheet, blockboard, particle board, wood chips and particles, veneered panels, fibreboard, fuelwood, wood charcoal, parquet, wooden furniture, and other wood products
3. Imports of paper and paperboard
4. Imports of wood pulp and non-wood pulp
5. Exports of logs and sawn timber
6. Exports of wood products
7. Exports of paper and paperboard
8. Exports of wood pulp and non-wood pulp
9. Imports and exports of some forest products

The Customs Department is responsible for publishing the annual official report. Its address is Archnarong Road, Klong Toey, Bangkok 10110, Thailand.

The main products imported are:

1. Logs
2. Sawntimber
3. Paper and paperboard
4. Wood pulp and non-wood pulp

The main products exported are:

1. Sawntimber
2. Wooden furniture
3. Paper and paperboard

The major trading partners are:

1. Malaysia
2. Indonesia
3. Myanmar
4. Laos
5. Japan
6. Canada
7. U.S.A.

The international coding system presently used in national trade is the Harmonized System.
Measurement Units in Trade

<table>
<thead>
<tr>
<th>Products</th>
<th>Units of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial roundwood</td>
<td>Cubic meter</td>
</tr>
<tr>
<td>Logs</td>
<td>Cubic meter</td>
</tr>
<tr>
<td>Pulpwood</td>
<td>Metric ton</td>
</tr>
<tr>
<td>Chips</td>
<td>Kilogramme</td>
</tr>
<tr>
<td>Sawnwood</td>
<td>Cubic meter</td>
</tr>
<tr>
<td>Plywood</td>
<td>Kilogramme</td>
</tr>
<tr>
<td>Pulp</td>
<td>Metric ton</td>
</tr>
<tr>
<td>Paper</td>
<td>Metric ton</td>
</tr>
</tbody>
</table>

Forest Product Prices

Some price data are drawn from the Business Economics Department (BED). Usually the forest product prices from RFD provincial forest offices are not reliable because the different localities of forest products make for fluctuating and different price levels. RFD has not evaluated the different potens yet. This must be improved by setting a par price for reference.

STATISTICAL DATA VALIDATION METHODOLOGIES

The Royal Forest Department is the only unit which conducts forest statistics for compilation and analysis. Therefore, the data collected should not be compared with other government agencies at all. We used to analyze the mean of deviation in the past but due to the above mentioned criteria will not meet our required standard. In the future, when our computer networks are established throughout the country, we assure that data deviation will be taken into consideration.

INFORMATION TECHNOLOGY AVAILABLE TO THE ROYAL FOREST DEPARTMENT

Our past data collection has been insufficient for those high-ranking officers in the Department to make decisions. The Royal Forest Department plans to establish a Data Bank in the Department in order to supply information covering operators, middle and top level personnel as a whole. The project aims to develop major guidelines as follows:

1. Data flow from original source through the data processing system, at every level of work which can be applied and shared common data in a punctual and precise way.

2. To facilitate every users in the Department with efficient applications which reach proper decision making for all kinds of activities.

3. To establish a data bank with various interrelated databases in order to supply, control and assess the possibility of action plans.
The project is based on current policy of the Department which needs further development as follows:

1. To establish good methods utilizing data direct from original source, in order to manipulate, analyze, retrieve, display, report and disseminate to the various parties concerned.

2. To support the basis of management information system in order to control the principle programme and various subprogramme to attain set goals.

3. To study and determine the feasibility of computer applications in order to train interrelating personnel and meet the requirements of the organization.

4. To establish a computer unit attached to the Information Office of the Royal Forest Department, in order to serve as a Data Centre to link up local and regional networks.

5. To stimulate better understanding among those common users to emphasize the importance of the relational database management system.

We decided to have a system, based on a centralized database system used in the Department as shown below.

<table>
<thead>
<tr>
<th>Information User</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top level</td>
<td>Information</td>
</tr>
<tr>
<td></td>
<td>Macro</td>
</tr>
<tr>
<td></td>
<td>Sector</td>
</tr>
<tr>
<td>Middle level</td>
<td>Decision maker</td>
</tr>
<tr>
<td></td>
<td>Statistics</td>
</tr>
<tr>
<td>Operator level</td>
<td></td>
</tr>
</tbody>
</table>

Model of Database Inter-relation

In conjunction with the above diagram we have divided into 5 distinct phases the forest information development. It will lead to correct collection of data and better management; i.e. in the period of 4 1/2 years (1995-1999).

1. System planning
2. Sub-system and small scale development
3. Information system development
4. Information on network expansion
5. System enhancement
USERS OF THE FORESTRY STATISTICS

In the past, the Royal Forest Department manually provided a yearly publication on "Forestry Statistics of Thailand" including forest area, reforestation, wood production and domestic consumption, imports and exports, wood industry, revenue and budget of Royal Forest Department, manpower, and even some other statistical data relating to forestry in Thailand. In this context, we also recorded the previous five years of statistical data, hence the users can compare the differing figures from year to year. Some 2,000 published copies are printed every year to disseminate to various groups of users; for example, regional, provincial and district forest offices, universities and school libraries, other relevant governmental agencies, private sector, international organizations and many others. However, we need further improvements in table, data content, and update information in order to cope with the unavailable information.

MAJOR IMPROVEMENTS AND EXPANSION OF EXISTING DATA COLLECTION, ANALYSIS AND DISSEMINATION

In the past, we provided a yearly statistics book which all data derived from original source located nationwide. Often we had to delay publication of the book due to the complexities of collecting all relevant data. Now we study the varying requirements of the various forest offices throughout the country, we have found that the database system are required in many areas; i.e.:

1. National forest reserves
2. National park and recreations
3. Forest land-use planning
4. Community forest
5. Wildlife census
6. Forest research publication
7. Budgeting and accounting
8. Vehicles and transport
9. Personnel and manpower
10. Wood industries and manufactures

In connection with these database development, the application of computer technology will play a vital role to launch data communication and network in the near future. The master plan of computer based information system came into beings, and the full scale operation will be completed by the end of 1999.

PRIORITIES FOR IMPROVING CAPACITY BUILDING

According to the Master Plan, we have set priorities to the information system development as follows:

1. Database system in order to provide data structure, data requirement, information building and database management system
2. Software, software specification, operating software and software application
3. Hardware, computer machine, microcomputer
4. Data communication and network
5. People

However, the information system is rather technical, the application of computer science needs common interest among the users not only operators but also all high-ranking officers, in order to
understand the system in order to facilitate their jobs. Training programmes are badly needed at the moment, a substantial investment should be employed to educate personnel in using computer machine. It will functionally interrelate hardware, software and operation in the same direction, of course, it will take time to accomplish.

**SUMMARY CONCLUSIONS AND RECOMMENDATIONS**

Major problems of national statistics of forest sector are identified as follows:

1. No computer system to effectively collect and tabulate data.

2. Data collection process consumes times to produce effective tabulation which means out-of-dated publication. The slow process occurs not only from data collection personnel in provincial forest offices but also from not enough competent statisticians causing over workload to authorized personnel who are responsible for the whole country data system.

3. Data collected from fields cannot match with prescribed questionnaires or with the needs of Forest Statistical Techniques Sub-division. Moreover, there are some sensitive and secret information that cannot be released, and of course illegal activities, that are not recorded.

4. Forest Acts presently being enforced cause day-by-day activities concerning production of forest commodities of most Thais illegal. These result in several sawmill and/or factory entrepreneurs and poor rural people avoiding cooperation with RFD personnel in producing effective statistical data on forestry affairs.

Major priorities for development can be identified as follows:

1. The RFD will improve the statistical data collection system coupled with the monitoring mechanism that can effective help in the updating of reports.

2. The RFD will add the data sampling survey technique to reduce workload on reporting.

3. The RFD will organize a training programme for producing statistical technicians to tackle the current ineffective and out-of-dated forest statistics.

4. The RFD is now undertaking the revision of ineffective and outdated laws and regulations that would help strengthen the strong cooperation with public as a whole. This would indirectly improve the effective collection of statistical information whenever people are willing to cooperate.
**INTRODUCTION**

As the 20th century draws to a close, increasing public attention is being paid to a variety of global environmental issues. Climate change, ozone depletion, and loss of biological diversity are now familiar topics. In addition to these truly global problems, many countries also face regional and local environmental problems with transboundary—and therefore international—implications. These include, for example, issues such as the impacts of industrial pollution and the contribution to social and economic development of production and trade based on natural resources.

Forestry issues illustrate these developments and concerns, especially the heightened interest in global conditions. In large part, this is the result of the fact that nearly all of the large-scale, prominent issues of the global environment involve forests: deforestation contributes to loss of species and accumulation of atmospheric carbon; commodities from forests support economic growth and social development; the distribution and character of forests are likely to be affected by significant climate change; reforestation and afforestation may mitigate global warming. Forests currently cover one third of the earth's land area and play a critical role in sustaining global environmental systems; at the same time, forests have a direct role in sustaining human communities by providing fuel, food, commodities, and income. Therefore, it is neither surprising nor inappropriate that forests are receiving unprecedented attention in international environmental debates. The importance of forests has never been more widely recognized, and the challenges for developing public policies have never been greater.

Contributing to the challenges for policy and decision making is the fact that problems are complex and, in many cases, poorly understood by both the general public and by policy makers. For a number of contemporary forestry issues, the absence of reliable information and clear, timely, and impartial analysis is a particular problem at both the national and the international level. In the absence of information, opinions proliferate and dominate policy debates. And because these are important issues, positions and opinions are strongly held, and it is difficult to find room for compromises. Scarce resources, increasing and competing demands, and uncertainty about the nature of problems and the consequences of alternative actions define the challenges facing forest policy makers.

By collecting and disseminating internationally-comparable data, and by undertaking analytical studies, FAO plays an important, perhaps a critical role in shaping perceptions and influencing policy and management decisions. However, the contribution of the forestry and forest sector data compiled and published by FAO over the past 50 years may be undervalued by national governments and the international community. Therefore, sustaining this effort will be increasingly challenged. In addition, contemporary issues can be addressed only by policy and analytical studies that will require a greater quantity of higher quality, more complex data than are currently available. The prospective demand for reliable, internationally-comparable forestry data has never been greater; translating this prospective demand into support for the activities that are necessary, at both the national and international level, in order to supply this information is a challenge shared by national governments and all organizations that wish to contribute to protection and management of the world's forests.
UNCED AND BEYOND

The United Nations Conference on Environment and Development (UNCED) held in Rio De Janeiro, Brazil, in June 1992, and its accompanying preparatory discussions, were landmark events in the emergence of forest issues in international environmental debates. The importance of forest issues was demonstrated by efforts to develop an international agreement on forests for signing at UNCED. The complexity of forest issues was demonstrated by the fact that this effort was unsuccessful. Nevertheless, forest issues are reflected in three products of the UNCED meeting: the acceptance of a report on forest conditions with an assessment of threats to forests (United Nations 1992); adoption by consensus of an approach to integrate national actions and international cooperation to combat deforestation (Agenda 21, Chapter 11); and adoption by consensus of a statement of "forest principles."

Agenda 21, Chapter 11 identifies four broad programme areas for collective action to address the protection and enhancement of the environmental, social, and economic functions of forests. The need for better information, including both data and analysis, is a critical element of all four programme areas: sustaining the multiple roles and functions of forests; enhancing the protection, sustainable management, and conservation of forests; promoting assessment and efficient utilization of goods and services provided by forests; and establishing and/or strengthening capacities for planning and assessment related to forests.

Agenda 21 explicitly recognizes that the ability of countries to participate in formulating domestic as well as international policy on forests depends on an understanding of domestic and global forestry conditions and issues. In particular, this must include an understanding of conditions in each country, as well as these conditions relative those in other countries. In addition, it is necessary to understand the biological, economic, and social factors that determine these conditions. Therefore, a critical requirement to ensure the success of the forestry agreements of UNCED is the existence of reliable, comparable data that provide relevant information on the world's forests.

Following UNCED, the fact that forests have remained on the global political agenda is reflected in ministerial meetings that document continuing discussions of broadly-based commitments to efforts to define and measure progress toward sustainable management of the world's temperate, boreal, and tropical forests. But although these discussions are increasingly specific, there has been very little effort to implement the content of the agreements through collecting and reporting data.

CONTEMPORARY ISSUES IN FOREST POLICY AND PLANNING

The scope and content of contemporary forest policy and planning reflect the intensity of current interest in forest issues, and the recognition that forest policy debates—like most environmental debates—are increasingly complex and challenging. Changes in five broad areas characterize this increasing complexity: increasing attention to issues defined at larger spatial scales; changing boundaries of problems; increasing concern for the importance of interactions; the use of broader definitions of "sustainability"; and increases in the variety and the complexity of participants in planning and policy-making processes. These developments can be used to illustrate some of the data and information that must eventually be compiled, analyzed, and distributed in order to support the objectives of UNCED and subsequent processes.

Attention to larger scales

Forestry planning is traditionally done at relatively small scales; the unit of analysis is often the forest stand, and management planning is based on decisions made at this scale. Of course, some planning objectives, such as total harvest, have been stated for larger scales (such as forests and
regions), but these are derived from a simple process of adding up. Increasingly, however, there is a desire to formulate objectives that are relevant only at the larger scale. These objectives include, for example, consideration of the spatial pattern of changes brought about by management, and concern for consequences that cumulate over time and area. Thus, there are efforts to conduct "landscape" analysis and planning, and more recently, regional analysis and planning for forest management.

The challenges presented by this development are not simply analytical and data-related, although these can be considerable. Perhaps the greatest challenge is understanding how to formulate management objectives that are clear and implementable. Then, once (if) these broad objectives are stated and there is some basis for determining that they can be achieved in the aggregate, there is the challenge of translating them into actions at the operational scale. For regional and national planning, however, there is the more fundamental problem of defining what measures—and therefore, what data—are relevant to the effort to understand and monitor changes in forest condition at larger scales.

**Changing boundaries**

The term "boundary" has two meanings here. The first is in reference to the description of the limits (or content) of areas being analyzed. We have traditionally used property boundaries, and geopolitical boundaries as the basis for planning and policy making, primarily because these are the operative boundaries for implementing decisions. However, in part as a result of attention to larger scale issues, and in part as a consequence of the types of issues being considered, demarcations based on political and management institutions are no longer as useful. Therefore, biophysical boundaries are being used in order to enable planning to address biological and ecological issues. Examples of these boundaries include watersheds—from small drainages to large river basins, and vegetation zones (ecoregions).

This effort to shift boundaries is a natural consequence of greater consideration of ecological issues in planning and policy making. However, it introduces nearly as many problems at it addresses. For example, we can more easily see that the old boundaries are inadequate than we can identify a universally-useful new set of boundaries. And while the use of biophysical boundaries may enable us to address ecological questions (if we are able to convert, or collect the necessary data), these new boundaries are less helpful in addressing a wide range of emerging social and economic questions.

Another, closely related meaning of the term boundary is in reference to the context of planning and policy making. As the issues under consideration are increasingly complex—or as we recognize them to be—it follows that planning processes must expand to include consideration of topics and information that were previously "outside" the boundary of the inquiry. It is now widely recognized that future developments in forests are determined, in part, by what happens in other sectors, especially the agricultural and energy sectors. Therefore, it is not appropriate to examine forest policies—and the forest sector—in isolation. In turn, we also recognize that forest policies can effect other sectors.

The implications for planning, policy making, and data collection are, at first, staggering. At one extreme we face the prospect of incorporating complete information on other sectors—some larger and more complex than the forest sector—simply in order to properly undertake forestry planning. In practice, however, the challenges are somewhat less daunting. First, it is necessary to determine, on a case-by-case basis, the magnitude and the extent of cross-sectoral interactions. Although sectoral interactions (and other complexities of this type) exist to one degree or another in nearly all countries, the degree of importance must be the basis for determining the magnitude of the effort to collect data and incorporate these issues in forestry planning and analysis. Second, where
these interactions are important, some (perhaps much) of the necessary data may already exist at the national or even international level.

**Interactions**

Related to both increasing scales of analysis, and changing boundaries, is the increasing recognition of the importance of a wide variety of interactions. Attention to dynamics and interactions is not new to forestry, but the scope and complexity of the interactions being considered are new. We are trying to assess the consequences of management and policies using longer time scales, larger spatial scales (including consideration of spatial pattern), in a larger context that includes climate change, biodiversity, and economic and social development. Forests play a role in these larger contexts, but many other factors also must be considered. Therefore, our ability to successfully evaluate forestry policies under these circumstances depends on our ability to understand and explain the interactions of a complex set of biophysical, social, and economic systems. Unfortunately, we know less than we would wish about interactions within any of these systems, and even less about interactions among systems.

**Sustainability**

Sustainability is a concept that is widely—and firmly—embraced, but is seldom defined. This lack of specificity may contribute to its popularity. There is one, quite narrow meaning of sustainability that is part of the tradition of forest management and regulation: sustained yield. Yield usually refers to wood fibre, but it also has been used in reference to other resources. The strength of this tradition in forestry, the absence of clarity in the contemporary use of the phrase, and the intensity of criticism of forest management combined to produce a number of years of non-productive policy debates over "sustainable forest management." It seems quite clear now that whatever is meant by sustainable forest management, it is more complex than sustained fibre production. Unfortunately, although there are competing attempts to articulate the concept further (see table 1, for example), no one of them has sustained a hold on popular opinion or policy making. Therefore, planning and policy making must simultaneously respond to, and shape this ongoing debate.

The challenges of such an effort do not require description. As a practical matter, however, there will be increasing demand for information that is consistent with broadly-held views on measurable indicators of current forest and forest sector conditions, and changes in these conditions. Political processes are beginning to define the lists of items that might be measured (see table 2, for example), although much of the data are not in hand, and the necessary framework for understanding what the data mean has not yet been defined.

**Participants**

Finally, they process of planning and policy making is made even more complex and difficult by the number and variety of individuals and interest groups that are now engaged in trying to influence management and policy decisions. At every level—local, regional, national, and global—there are more issues to be considered, and a more complicated set of participants to consider them with. Participatory planning processes now have something of a tradition in forestry planning in a number of countries, but in many respects the process is getting more difficult with experience, rather than less so.

One of the consequences of increased international attention to the broad questions of forest use and condition has been a merging of domestic and global policy issues. The rhetoric and content of policy debates at the national level in many countries is now strongly influenced by debates in the global arena. This is, in some respects, and extension of the process of nationalizing what were once
local debates. Recognition of problems that are large-scale, widespread, or whose solutions are simply beyond the means of local, regional, or national governments, leads to a broadening of policy processes. Identification of global forestry issues takes the process one step further: as a result, forest resource use and management in all countries is now a legitimate subject for international discussions.

The difficulties inherent when considering complex, technical problems are compounded by a lack of clarity in objectives for management, and a lack of clarity in objectives for participation. Recognition of increasingly scarce resources and enduring inequities in resource allocation may be intensified, rather than resolved by participation in planning. As is the case with biophysical and economic issues, forestry planning must place itself in a broader social context, but this is not always recognized, or possible.

POLICY ANALYSIS AND DATA

Clearly, the prospective value of the contribution quantitative policy analysis can make to the international forestry debate is considerable. Quantitative policy analysis is simply the process of identifying specific policy questions and, using reliable data and replicable methods, addressing a sequence of questions: Does the problem exist? What is the magnitude of the problem? What is the direction of change, if any? What has caused the problem? What are the consequences of inaction? What are the consequences of alternative actions? Policy analysis is more useful because it relies on data and quantitative methods; and data are valuable because they contribute to our ability to evaluate and make decisions. Beyond that, however, a good database shared in common among participants in policy and planning processes can help to reduce false disputation (arguing over misunderstandings of what the issues or conditions are). In this context, characteristics of "good" data are: accuracy, comprehensiveness, timeliness, continuity, and cost-effectiveness. Although these require little explanation, in this rather obvious list are some important caveats to keep in mind as we consider new demands for international forestry data.

It should go without saying that accuracy is a necessary characteristic of good data. However, in large-scale data collection efforts the desire to be complete may override established standards for accuracy. In addition to the obvious problem of providing false indications, such data also may mislead us to think that reliable data can be had for less effort and expense than is actually required. The meaning and importance of comprehensiveness also needs little comment: we want to collect all data that are necessary. In practice, though, we collect the subset of possible data that we can afford to collect. Here, too, we should regularly examine our data sets to be sure that they will tell us what we need to know, within the limits of practicability.

Timeliness, too, is an important characteristic of data. Although this is more an issue of reporting than collecting, it is indisputable that policy debates and management decisions take place within a finite time frame. Therefore, the search for perfectly accurate and comprehensive data must be tempered by the recognition that the value of even the best data begins to decay, sometimes rather rapidly. Of course, all data are not collected for short-term decision making; international forest data such as those reported by FAO have a longer "shelf life" than most. Nevertheless, data are not collected merely for the sake of collection, and it is important to keep in mind the timing of the variety of decision-making processes that comprise a large part of the justification for the effort.

Forestry planning typically has a time horizon of 20 or more years; therefore, it is ideal to base supporting analyses on data that span an equivalent length of time. Of course, this is not possible or even desirable for all data (and it is important to keep in mind that long time series can confound us as well as inform us). Nevertheless, continuity in data are an important contribution to the sense of perspective and history that are invaluable in planning. The difficulty here is that an exaggerated emphasis on continuity may cause us to be reluctant to abandon the collection of some
data, even when they provide very little information that has contemporary (or prospective future) relevance. And our ability to expand data efforts to address contemporary issues is limited by the fact that available resources are consumed doing what has always been done.

Finally, the question of cost-effectiveness is both inevitable and important. It is inevitable because resources for data collection and analysis always will be limited. And it is an important consideration because all information is not equally, or infinitely valuable. Unfortunately, some scientists and analysts succumb to the temptation to argue that in order to make the best possible decisions, all possible data must be collected. This is both foolish and counter-productive. It is foolish because it doesn't take much experience to learn that all data are not equally valuable; nor are they infinitely valuable. And the failure to set priorities is counter-productive because one contribution of quantitative analysis is to focus attention on the most important pieces of information. Good analysis requires the setting of priorities, even if limited budgets did not.

Cost effectiveness is relevant in times of static activities and comfortable budgets; it takes on added importance in times, such as the present, when budgets are shrinking and expectations are increasing. Efforts to expand or modify widely-used data sets must be based on an explicit identification of priorities: What information is required? and What is the next most valuable piece of information? The implication here is that the design of the data collection effort cannot be completely independent of the context, if not the framework of the analysis the data will support. The value of a common database in providing a factual basis for a consistent understanding of forest and forest sector conditions also argues for pooling of resources among organizations and policy processes, to allow for better utilization of scarce resources.

EXPANDING THE SCOPE OF INTERNATIONAL FORESTRY DATA

FAO currently compiles and reports forest resource data on a periodic basis, and production and trade data for industrial timber products (logs, sawnwood, wood-based panels, and pulp and paper products) and fuelwood on an annual basis. Production and trade data are used to calculate apparent consumption. Other data that are systematically collected include capacities in the pulp and paper industry, and prices for selected forest products. The current database provides a continuous record of production and trade for important commodities, but it is clearly not adequate to support the emerging needs and demands of the international community for international forestry data.

Timber-based commodities continue to be the most highly-valued commodities removed from forests, but they no longer provide a sufficient description of the uses made of forests, or even the contributions of forests to economic development and trade. Therefore, the scope of data collected, compiled and reported must be expanded. Expansion in four areas, if successful, will address important gaps in our knowledge: forest commodities other than timber, spending on forests, production and trade in timber-based manufactures, and indicators of management. A brief description is provided for each of these.

Forest commodities other than timber

Two examples of the importance and the potential value and use of these data come to mind. First, it is widely argued that forests are undervalued by policy makers and decision makers as a consequence of failing to take into account the full array of commodities and services provided by forests to local and regional communities and economies. Although increasing attention is being given to non-timber commodities, they still are given considerably less attention than timber products. For example, for most countries it is not possible to estimate the value of production or trade in non-timber commodities on a basis that can be compared to values reported for timber-based commodities.
Nevertheless, anecdotal evidence for a number of countries suggests that the value is not insignificant in absolute terms (values in the hundreds of millions of dollars).

Second, some analysts go even further to argue that forest commodities other than timber may be capable of providing an economic basis for sustainable management of some forests. These commodities are especially attractive because their production does not require removal of the forest canopy. The evidence for the economic as well as the ecological benefits of production of forest commodities other than timber is more anecdotal than systematic. However, neither of these broad arguments can be fully evaluated in the absence of better data. Although systematic, comprehensive data may be elusive, at least at first—because of the variety and complexity of these commodities, and the likely difficulties in defining and collecting data—improvements are unlikely to be forthcoming in the absence of effort. Therefore, this expansion of the scope of the FONS database can provide support for an important area of discussion and interest in the international forestry debate.

**Spending on forests**

This also might be termed "forestry investment." Agenda 21 provides a strong argument in support of this area of data work. The cost of implementing the four programme areas of Chapter 11 of Agenda 21 has been estimated at more than $30 billion. However, it is difficult to assess the magnitude of the suggested programme relative to current efforts because there are no systematic, comprehensive data on current national and international spending on forests. Therefore, there are a variety of data that may be relevant and useful in support of Agenda 21, as well as other analytical needs.

Examples of data that might be collected and compiled include: multilateral and bilateral funding targeted at the forest sector, public and private expenditures on forest management (including stand management and planning), public sector budgets for resource management and protection, spending on forestry research, public and private investment in forest sector infrastructure, and private investment in production facilities. As countries increase their efforts to assess sectoral performance, and to compare conditions across countries and regions, these data can supply valuable information on the type and magnitude of efforts that produce different results.

**Timber-based manufactures**

These are industrial wood products requiring a higher degree of processing than sawnwood and wood-based panels. Increasingly, countries are producing and trading products for which these "traditional" commodities are inputs to production. As a result, by focusing on the traditional commodities, we are less able to identify developments that may have important implications for forest sector development. For example, increasing apparent consumption of sawnwood may be a result of direct, domestic consumption (in the construction sector, for example), or it may be a consequence of the development of industries producing manufactured goods (for consumption or export). Declining trade in sawnwood may be the consequence of declining competitiveness in international sawnwood markets, or it may be the consequence of domestic manufacturing industries, and competitiveness in international markets for millwork, doors and windows, and wooden furniture. If we rely on data currently collected ("traditional" commodities) we may reach incorrect conclusions.

Therefore, FAO should add collection of data on timber-based manufactures to their systematic effort to compile information on production, consumption, and international trade. In order to do this, however, FAO must work cooperatively with other organization currently active in this area. This includes UNIDO, UNCTAD, ITTO, and ITC (and perhaps others). Examples of the type of data that should be collected are included in periodic reports published by UNCTAD/GATT.
Databases linked to criteria and indicators for sustainable forest management

Finally, a fourth area for expansion of the scope of the international forestry database is in direct support of international efforts to define criteria and indicators of sustainable use and management of forests (C&I). If the international processes to define and implement indicators of sustainability are to be successful, data requirements must eventually be incorporated in an ongoing, systematic data collection and reporting process. FAO can, and should play a role, such as compiling indicators reported by national governments, once relevant indicators have been established by agreements. FAO can neither decide what data ought to be collected, nor can it collect the data. However, FAO's expertise in compiling and reporting national data would be a valuable contribution to the eventual use of indicators to measure conditions and management practices. One particular challenge will be the need to coordinate this effort across divisions, as the indicators will include indicators of resource condition (data that have been developed and published by FOR) as well as indicators of use (forest commodity production and consumption; data compiled by FONS), and social and economic indicators. Through an effort coordinated across Divisions, the Department should continue to monitor, advise, guide and, eventually implement these efforts.

SUMMARY

Even a brief review of global forestry debates leads quickly to the conclusion that current discussions and processes will benefit from improved data. Data must be improved in terms of their quality, quantity, and scope. The objective must be to (1) produce on a periodic basis a comprehensive description of the state of forests, with increased an increasing ability to address contemporary and emerging issues; and (2) produce on a continuing (annual) basis an effective characterization of the multiple economic and social contributions of forests. Without presuming to judge the specific outcome of debates over the meaning and appropriate measurement of sustainability FAO must contribute to these debates by working cooperatively to expand the data and analysis that can be brought to bear.
Table 1: Proposed indicators of biogeophysical sustainability (forests)

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape composition and pattern</td>
<td>Spatial variation of vegetation types; patchiness (gaps); structure</td>
</tr>
<tr>
<td>Production of goods and services</td>
<td>Timber and non-timber products yield; recreation use</td>
</tr>
<tr>
<td>Biological diversity</td>
<td>Richness and diversity indicators (indicator groups and keystone species); population trends</td>
</tr>
<tr>
<td>Water quality and quantity</td>
<td>Precipitation patterns; water flows (by watershed); sediment loads; pollution concentration</td>
</tr>
<tr>
<td>Soil properties</td>
<td>Nutrient content; physical condition</td>
</tr>
<tr>
<td>Energy and nutrient flows</td>
<td>Primary productivity</td>
</tr>
<tr>
<td>Ecosystem processes</td>
<td>Disturbance and recovery rates</td>
</tr>
</tbody>
</table>

Adapted from Munasinghe and Shearer (1995), and Franklin (1995)
Table 2: Santiago Declaration "(a) list" indicators

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>forest area by type relative to total forest area</td>
<td>(3.1)</td>
</tr>
<tr>
<td>2.</td>
<td>area in protected categories, by forest type</td>
<td>(3.1)</td>
</tr>
<tr>
<td>3.</td>
<td>status of forest-dependent species at risk</td>
<td>(3.1)</td>
</tr>
<tr>
<td>4.</td>
<td>area (and net area) of forest available for timber production</td>
<td>(3.2)</td>
</tr>
<tr>
<td>5.</td>
<td>total growing stock (merchantable and non-merchantable) on land available for timber production</td>
<td>(3.2)</td>
</tr>
<tr>
<td>6.</td>
<td>area and growing stock of plantations of native and exotic species</td>
<td>(3.2)</td>
</tr>
<tr>
<td>7.</td>
<td>area and percent of forest land managed for protective functions</td>
<td>(3.4)</td>
</tr>
<tr>
<td>8.</td>
<td>value and volume of wood and wood products production</td>
<td>(3.6)</td>
</tr>
<tr>
<td>9.</td>
<td>supply and consumption of wood products</td>
<td>(3.6)</td>
</tr>
<tr>
<td>10.</td>
<td>value of wood (and non-wood) products as a percentage of GDP</td>
<td>(3.6)</td>
</tr>
<tr>
<td>11.</td>
<td>degree of recycling of forest products</td>
<td>(3.6)</td>
</tr>
<tr>
<td>12.</td>
<td>area and percentage of forest land managed for general recreation and tourism</td>
<td>(3.6)</td>
</tr>
<tr>
<td>13.</td>
<td>number and type of facilities available for general recreation and tourism</td>
<td>(3.6)</td>
</tr>
<tr>
<td>14.</td>
<td>value of investment in the forest sector</td>
<td>(3.6)</td>
</tr>
<tr>
<td>15.</td>
<td>direct and indirect employment in the forest sector (total and share of total employment)</td>
<td>(3.6)</td>
</tr>
<tr>
<td>16.</td>
<td>average wage rates in the forest sector</td>
<td>(3.6)</td>
</tr>
</tbody>
</table>
USERS OF FORESTRY STATISTICS AND THEIR REQUIREMENTS

by Susan Iremonger, World Conservation Monitoring Centre, 219 Huntingdon Road, Cambridge, U.K. and Michael Ibach, Centre for International Forestry Research, Jalan Gunung Batu 5, Bogor, Indonesia

INTRODUCTION

Forestry statistics made available by FAO in the global Forest Resources Assessment (FRA) publications (e.g., FAO, 1995) are used by national and international organizations. National organizations can use them for comparing their country's forestry activities with other countries, both regionally or on other continents. Regional organizations can use them to assess the importance of regional forestry activities within the regional economy, or to relate them to the production in other regions. Globally they can be used to assess the state of forestry worldwide, and to pinpoint areas with more successful forestry activities or places which are in need of technical support, for example. Perhaps the most basic questions that the Forest Resources Assessment should answer are:

- what is the timber production in each country, and
- what is the forest cover in each country.

These can then be grouped up to a regional or global picture. But are these and the other statistics provided in the FRA being used to their fullest extent, and should the FRA provide a wider variety of statistics than what it currently provides?

To answer these questions we need to look at the current and potential users of the FRA. The World Conservation Monitoring Centre (WCMC) has some experience of conducting users' analyses for international projects. For example, WCMC did the feasibility study for the TREES II project of the European Union, along with Earth Observation Sciences (EOS and WCMC, 1993). Part of this was specifically a users' needs analysis. This focused on making enquiries of users of the TREES I data, which provided mapped global tropical moist forest cover using AVHRR imagery.

First the users were identified and divided into groups, a survey questionnaire was designed, and the responses were analyzed in the light of the different user groups. This exercise proved very profitable because in addition to finding out which groups were most interested in using the data that the TREES project could provide, many of the organizations surveyed specified their interest in becoming involved with the project, via data validation and exchange. This expands the user community for the TREES data and provides additional quality control ensuring the best data quality possible.

There were nine different user groups targeted, shown in Table 1 with their percentage response rates.
Highest percentage response rate was from groups A, E and H. Although Group B had a low response rate at 14 percent, those that did respond emphasised the need for the Tropical Forest Information System (TFIS), which houses the TREES data. Response was lowest from the timber traders’ group, indicating that this group was not particularly interested in the TREES data, but also this result could reflect the relatively low number of organizations in this category that were surveyed. Some patterns emerged in the analysis of the responses which could give pointers for a more user-friendly TREES project. For example, as regards data format, only 4 percent requested raw satellite data, the preferred options being paper maps 19 percent, reports 20 percent, digital format 17 percent (Figure 1). There is clearly a need for centralised processing of satellite-derived forest data and its provision in appropriate formats. There appears to be a higher incidence in use of GIS in the global change (73 percent) and forest research communities (77 percent) compared with other user groups (51 percent total). An interesting pattern was that national organizations in tropical forested countries with GIS capabilities were not particularly interested in an on-line service, whereas the global change community preferred this as a method of data delivery.

Questions were also asked about scale and resolution of the requirements, by user group and by subject. For example, Figure 2 shows the differences in resolution of data required in the different subject areas of biomass, timber volume, forest types and areas of high biodiversity. For all four subject areas demand was greatest for high resolution data, and lowest for low-resolution data. An analysis of the requirements by organization grouping showed that UN organizations and international NGOs had higher requirements than other user groups for low-resolution data, whereas national forestry departments, national NGOs and the forestry research community required more local and sub-national high-resolution data.
Figure 1 Information Format Requirements

Figure 2 Resolution required by information type
DEFINITION OF "FOREST"

It is important for these data on national or international forest cover to stipulate very specifically what they mean by forest cover. An ecologist will want to know if the data include forestry monoculture plantations for example, because their systems are so different from mixed natural forests. For example in Ireland there has been a net increase in "forest" cover over the last few years (COFORD, 1994). But when you look more closely you find that it is monoculture tree crops that have increased due to an intensive planting programme by the national forestry agency Coillte. So the definition of "forest" is important, and the user of forestry statistics should check that he/she is not making assumptions that may not hold true. This type of misinterpretation accounts for the many vastly different figures that are quoted for annual rate of deforestation in a country. Alan Eyre examined the different figures for annual deforestation in Jamaica (Eyre, 1987), which ranged from 0.5 percent to 3.3 percent, and at the same time the head of the Forest Industries Development Company stated that in fact forest cover in Jamaica had increased. Evidently there is a need to define what constitutes "forest cover" when constructing these statistics.

STATISTICAL ANALYSIS OF MAPPED DATA

In terms of conservation of biodiversity and natural systems there are so many pressures on land that it is essential to know what are the most important areas to manage for conservation. These data are needed by national government agencies as well as NGOs, both national and international, so that they can target their efforts to be most cost-effective. To help this effort on a global level for tropical forests WCMC has carried out an analysis by looking at FAO's ecolfloristic zones, matching that up with our global data set of tropical forest cover, and finally overlaying protected areas data to give a picture of what ecolfloristic zones that are still under tropical forest cover are actually in the global protected areas system, and which are not (Murray et al., 1995). This type of information can guide governments in designing their protected areas system to be most efficient in terms of covering the an adequate diversity of forest systems. Furthermore, on a regional and even global scale this shows the relative proportions of each zone under protection in each country of a region, so that if it is adequately protected in one country a neighbouring country can emphasise the protection of a different forest system, so that the region as a whole will be protecting a representative proportion of all of its forest types.

For example, the data from South East Asia show that EFZ 12, Deciduous forest, sclerophyllous thickets, only occur in Indonesia. The zone covers 1,046,880 ha, but only less than 0.1 percent of it is under protection. Conversely if you look at EFZs 14 and 16, Tropical montane forest 1400m - 2400m and Tropical montane thicket 2400-4000m, both of these have good coverage in both Indonesia and in Papua New Guinea. However the percentage of them that are under protection in PNG is small, 10,182 ha and 224 ha respectively, whereas in Indonesia the coverage is good, at 788,839 ha and 687,458 ha respectively. In light of this PNG may decide to concentrate its efforts on increasing the protected area of a rarer Ecolfloristic Zone, e.g. zone 17, Alpine grassland and scrub, of which 85 percent of global cover occurs in PNG but none of it is protected there. These data strengthen the movement to protect certain lands by providing sound scientific details as to the conservation value of the lands on a large scale.

NON-TIMBER FOREST PRODUCTS (NTFP)

Besides the rapid increase of interest recently in biodiversity and its relations to forest type, there has been an increase of interest in NTFPs. These subjects are linked through the question of how to maintain biodiversity in forests utilized by people. A commercial timber crop from a monoculture plantation may have many financial benefits for a contracting company, but for the people who live in the vicinity of the forest, a mixed natural stand may be more useful (Peters,
Gentry and Mendelsohn, 1989), providing foods, craft materials and bush medicines. These items are
grouped under the title of NTFPs. Dealing with this multi-faceted and interdisciplinary subject is
daunting for many, but at least in this information age, scientists are greatly helped by the great
number and accessibility of data sources. Not least of these is the large number of computerized
scientific databases, holding information ranging from species-specific taxonomy and specimen
locations to uses of organisms, geographic distribution and endangerment status. Through the Internet
the transfer of data from a database to a user even on a different continent is becoming a daily event.
However in order to access the data to feed your study you still have to discover where the most
useful data sources are. NTFPs are a good example of this, as information on NTFPs seems to be
very fragmented and diffuse. To help with accessibility of these data, the Centre for International
Forestry Research (CIFOR) did a survey of NTFP databases. The objectives were to:

- provide an overview of existing sources of information, e.g., publications by FAO, PROSEA,
  OFI, Kew Gardens, ICRAF, Universities.
- bring key organizations to discuss their work and identify areas of possible collaboration.
- make steps towards an agreement on common products and services, e.g., harmonized
databases.

Institutions with relevant databases were identified and sent questionnaires - a total of 57.
Nearly 50 percent of these were completed and returned covering 45 individual databases. A
preliminary analysis showed that there were more databases established in the last five years than in
the five years preceding this. A select number of the database institutions will be attending a
workshop in Bogor in December. Based on the survey and workshop results there will be a
publication which will describe the databases and identify areas for cooperation and further action.
Groups which were listed as being users of the databases were researchers in NTFPs, researchers in
other disciplines, policy makers and planners, donors, extension officers and private sector industries.
This early in the project it is difficult to identify patterns, but the survey questionnaire design is worth
mentioning.

**DESIGN OF THE QUESTIONNAIRE**

The questionnaire was divided into six sections.

**Section 1** addressed the databases format, with questions such as type of electronically
available databases, linkages, system requirements, data models and database features, in
addition to development status of the database.

**Section 2** addressed the data content and type, e.g. bibliographic, descriptive or numeric.
Respondents had to select issues covered from a set of 12 issue categories such as
Biology/Ecology, Production or Trade Statistics and provide data on products from 13
different product categories, e.g., fruits, gums or medicinal plants. This section also
addressed regional coverage, the total number of records, individual fields in the database and
the frequency of updates.

**Section 3** addressed data sources with questions on the content of primary and secondary
information and their sources.

**Section 4** addressed data publication, asking the respondent to describe the media chosen for
publishing as well as charges for end-users.

**Section 5** addressed users of the database and database maintenance. Respondents were asked
to rank users according to (a) frequency of use, (b) type of access to the database, e.g., at
the database centre with or without technical assistance or interaction with database staff, or through computer networks. Respondents also provided data on the average number of users in a given period, restrictions on the user capacity and the number of person-months per year spent on the maintenance of the database.

Section 6 addressed issues of links to networks and the potential interest of the individual institutions in linking with other institutions or networks.

**USERS’ NEEDS OF THE GLOBAL FRA 2000**

The increase in awareness about the importance of NTFPs reflects an increasing tendency to take a more holistic view of the interactions between people and the natural environment. There are now a number of protected areas in the world which allow human activities and indeed have people living inside their boundaries. The challenge is to enable the people in these communities to raise their standards of living in a way that is compatible with the health of the natural systems where they live. In light of the rise of interest in NTFPs which is apparent from the increase in numbers of databases on the subject in recent years, we suggest that the FRA 2000 will need to place some not insignificant emphasis upon non-timber aspects of the forest system. Not only in terms of recording numbers of plants used and the different parts of them that are used but also how important they are to the people living in and around the forests. In theory these forest products are of value in terms of their direct use by people who collect them but also they bring economic benefits to these people through being sold, which in turn brings their direct benefits to a wider user pool. Groups which will need these forestry statistics are the planners, economists and biophysical and social scientists, who will be increasing their interdisciplinary work in order to find a way forward for forest systems. However, as forest researchers who will be assembling the data for the FRA, we have a further duty in the light of dwindling global natural forest cover, and new initiatives to encourage sustainable use of the forest resource. Instead of just surveying the users to discover what they perceive their needs to be, we have a responsibility to ensure that they are aware of information on forest systems which they may not notice. At the 20th IUFRO congress in Finland in August this was echoed from many different quarters - that as scientific researchers we have a duty to ensure that what we know reaches a wider audience than it currently does. In terms of the FRA report this means presenting the data in an accessible form, and ensuring that non-traditional forestry research data are given adequate coverage.

REFERENCES

PAN-EUROPEAN CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT AND THEIR IMPLICATIONS FOR THE FUTURE OF NATIONAL AND INTERNATIONAL FORESTRY STATISTICS

by Pekka Patosaari, Director, Ministry of Agriculture and Forestry, Department of Forest Policy Helsinki, Finland

BACKGROUND OF THE HELSINKI PROCESS

The Second Ministerial Conference on the Protection of Forests in Europe (Helsinki, June 1993) confirmed the commitment of the European forest ministers to continue their cooperation in promoting the protection of forests in Europe under the dynamic process initiated in the Strasbourg Conference in 1990. In Helsinki, the scope of cooperation was extended to reflect the new emerging needs and developments, in particular the outcome of the UNCED. The Helsinki Declaration and four Resolutions of the Helsinki Ministerial Conference picked up on the Forest Principles of the UNCED with the aim of implementing them at national level and improving upon them as a basis for further regional and international cooperation.

In the Follow-up process of the Helsinki Conference, particular emphasis has been given to Resolutions H1 and H2. Sustainable management of forests has been defined for the purpose of the Resolution H1, and it means "the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems."

The Follow-up of the Second Ministerial Conference during these two and half years has been interactive, participatory and transparent. It has been a political engine for European countries in the continuous process of managing and protecting their forests. The Helsinki Resolutions are now being implemented in national forestry policies and practices, and progress is monitored as part of the follow-up process both at national and at international levels. The Helsinki process has proved to be a real pan-European exercise creating important collaboration and tangible results especially on development of criteria and indicators for sustainable forest management.

THE KEY ELEMENTS OF THE PAN-EUROPEAN CRITERIA AND INDICATORS

Concepts related to the pan-European criteria and indicators

The pan-European criteria and measurable indicators for sustainable forest management have been developed in order to be able to evaluate how different countries have progressed in their efforts to implement the guidelines of sustainable forest management (Resolution H1) and conservation of biodiversity (Resolution H2). The core set of 6 criteria and 27 most suitable quantitative indicators for sustainable forest management in Europe was adopted in the First Expert Level Follow-up Meeting in Geneva in 1994. In addition descriptive indicators for assessing policy instruments, which are used to enhance sustainable forest management, namely regulatory framework, institutional mechanisms, financial incentives and informational means have been developed. The descriptive indicators are intended as examples to assist in the further development of national criteria and indicators. (The complete list of the criteria and indicators is shown in the Appendix 1.)
A criterion describes the different sides of sustainability on a conceptual level. It is a distinguishing element or set of conditions or processes by which a forest characteristic or management measure is judged. To be able to measure sustainability both quantitatively and qualitatively, criteria have been operationalised by using indicators. The indicators show changes over time for each criterion and demonstrate how well each criterion reaches the objectives set for it. A typical indicator in the Helsinki Process is the quantitative measure of change. Measurements are already available for some of the indicators and others can easily be measured; yet some indicators require more research work - even basic research. An important part of the Ministerial Conference follow-up process has also been the elaboration of terms and definitions concerning sustainability and biodiversity.

Figure 1. Concepts related to sustainable forest management

The six European criteria for sustainable forest management are as follows:

1. Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles
2. Maintenance of forest ecosystem health and vitality
3. Maintenance and encouragement of the productive functions of forests (wood and non-wood)
4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems
5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)
6. Maintenance of other socio-economic functions and conditions
The pan-European criteria and indicators for sustainable forest management are useful as a guide for government action when defining and developing forest policy, and also as a demonstration to the national and international publics as to the extent to which the proclaimed objectives of the sustainable forestry of the society are being met. Criteria and indicators are also a means of informing the consumers and the general public about the sustainability of forest management on the national level. The following features were stressed when adopting the pan-European criteria and quantitative indicators:

* The criteria are the same for all European countries. They are based on scientific information, and they are measurable, unambiguous, available to the public and open for discussion. They are intended for evaluation at the national level, not at the local forestry level.
* The criteria are defined in such a way that it is easy to follow their implementation and, with them as the basis, information can be gathered.
* The criteria are directly linked to the General Guidelines for the Sustainable Management of Forests in Europe (Resolution H1) and to the General Guidelines for the Conservation of the Biodiversity of the European Forests (Resolution H2), and the given indicator demonstrates conformity with the criterion in question.
* The list of criteria covers all major aspects but is short enough so that a set of indicators should in itself provide a clear picture of the extent to which the guidelines are being applied.
* Since the indicators are ways of measuring achievements built in criteria, and thus translate the criteria into more direct operational tools, they support the reporting process, and make the reporting internationally credible.
* The quantitative and descriptive indicators are interdependent and jointly provide a full picture of the state of forests and forest management in a country.
* The indicators are neither final nor totally comprehensive since forests have multiple functions, some of which might not be adequately covered. These most suitable quantitative indicators represent the first step in which the aim has been to provide a choice of indicators that are scientifically valid, technically feasible and cost-effective.
* The quantitative and descriptive indicators will be analyzed and further developed during the ongoing Helsinki process.

Applicability of the quantitative pan-European criteria and indicators for sustainable forest management

A questionnaire to collect information regarding the applicability of measures for the quantitative indicators for sustainable forest management and, to obtain a picture of the present status of forests and forestry in European countries was sent out to 39 European countries in September 1994.

Although the response rate to the questionnaire was quite high, the countries were not able to answer all questions. Differences between countries in providing information were significant. Lack of response is mainly due to the lack of data available but also due to questions and/or guidelines not properly formulated or followed by countries. During the development of indicators, it was realised that in some cases data may not be yet available but such information is essential in order to describe sustainability in the European forests. This also indicates directly the need of continuing the development of data collection methods, procedures and statistical systems on issues related to sustainable forest management both at national and at international levels. There is also a need to consider the desirability and possibilities of converging data collecting methods including the terminology and definitions used on a voluntary basis.

Based on the experience with the questionnaire, it appears that, with some improvements in the questions and definitions of terms (see Appendix 2.) and classifications, and the data collection
methods, the questionnaire is an appropriate means of monitoring the quantitative indicators of sustainable forest management. (See more detailed analysis of applicability of the questionnaire in the Appendix 3.)

Thus, basically, the politically agreed upon criteria are feasible and indicators operational although it is recognised that they need to be continually revised and new indicators added as new scientific information and technical expertise become available. Particular emphasis should be put on the further development of indicators under the criterion 4 "Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems" and under the criterion 6 "Maintenance of other socio-economic functions and conditions".

Future actions

The criteria and indicators were recently discussed at the pan-European Round Table Meeting in Brussels on November 13-14, 1995. It is planned that discussion on the progress made in the Helsinki Follow-up with special emphasis on the agreed European criteria and indicators for sustainable forest management, and national reporting will continued at the Expert-level Follow-up meeting (May 30-31, 1996). The meeting will also discuss the preparations for the Third Ministerial Conference which is to be co-chaired by Portugal and Austria. Portugal has accepted to host the Conference in spring 1998 in Lisbon.

Many European countries have developed or are in the process of developing their own specific criteria and indicators for sustainable forest management as a part of their own national process. In the Helsinki Follow-up process reporting will also be focused on the experiences on formulating and using national level criteria and indicators.

Besides the Helsinki Process, criteria and indicators for sustainable forest management has been developed within the other regional initiatives such as the Montreal Process, ITTO, and the Amazonian (or the Tarapoto) Process. These initiatives contribute significantly to the development and implementation of sustainable forest management in their respective regions.

The establishment of the open-ended Intergovernmental Panel on Forests (IPF) under the aegis of the Commission on Sustainable Development (CSD) is an important step forward in international forest cooperation. One category of the Programme of Work deals with scientific research and forest assessment (item III.1.), and criteria and indicators for sustainable forest management (item III.2.).

The following priorities are mutually supported both in the Pan-European Follow-up Process (the Helsinki process) and in the Programme of Work of the IPF:

- Develop periodic assessment and evaluation on the progress made in the implementation of the UNCED outcome and Helsinki Resolutions through national reporting

- Develop guidelines for forest strategies and national forest action plans and programmes, and strengthen capacity building

- Define further the conceptual basis of sustainability, while pursuing a balanced approach between environmental and development functions of forests. To that end, prepare for consensus on scientifically based and internationally agreed criteria and indicators for sustainable forest management by bringing together initiatives on criteria and indicators. In addition, seek to develop a degree of comparability between the existing four processes (Helsinki, Montreal, ITTO and Amazon)
- Encourage countries and regions, respectively, not yet involved to develop criteria and indicators for sustainable forest management.

- Develop assessment, monitoring and measurement schemes of the agreed indicators for management, conservation and sustainable development of all types of forests, including all multiple benefits of forests.

- Assess methodologies for the full social, economic, ecological and cultural valuation of wood and non-wood products and measurement of benefits at local, national, regional and global levels as well their inclusion in national accounts.

An Intergovernmental Seminar on Criteria and Indicators for Sustainable Forest Management (ISCI), related to the work of the Intergovernmental Panel on Forests, will be organised in Finland in August, 1996. The scope of the Seminar is based on the Programme of Work of the Panel. The Seminar promotes and encourages national implementation of criteria and indicators for sustainable forest management and studies the feasibility for further development of internationally agreed upon criteria and indicators. The seminar would thus support national and regional objectives with respect to the rural sector, to the environment and to economic growth, trade and sustainable development.

**IMPLICATIONS OF THE PAN-EUROPEAN CRITERIA AND INDICATORS IN THE RELATED STATISTICS**

Development of the concept of sustainable forest management, and further, its implementation have greatly increased the demand for information on the state and evolution of forests and forest management. More information is needed for all economic, ecological and social functions of forests. On the other hand, advanced techniques (e.g. remote sensing) have brought new aspects to the provision of information for forest statistics and their users. In this respect it is important that the recent achievements in the political processes on criteria and indicators for sustainable forest management should be take into account.

**Forestry and related statistics and the pan-European criteria and indicators**

It would be ideal if the existing statistics and systems could provide the information needed when evaluating the state of forest and forestry by the adopted pan-European criteria and indicators. However, there are elements related to providing information that need to be further developed. National forest inventories and monitoring systems should be developed in such way that they would be able to provide data related to all aspects on sustainable forest ecosystem management and conservation in order to serve for the evaluation of sustainability of forest management. This would require the further development of measurement methods not only for the productive functions of forests but for the ecological and social aspects of forests.

*Figure 2. Scope of statistics in relation to criteria and indicators.*
The following evaluation is based on experiences of the enquiry on pan-European criteria and indicators for sustainable forest management. According to the pan-European exercise, Criterion 2 (Maintenance of forest ecosystem health and vitality) received the fewest responses and Criterion 3 (Maintenance and encouragement of the productive functions of forests (wood and non-wood)) the most responses.

*Figure 3. Relative number of questions answered by each criterion*

**Availability of information criterion by criterion**

**CRITERION 1.** Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles

Forest resources, in general, are well known. This is particularly the case in the countries where forestry has an important role in the economy. At the European level, generally compatible, and sufficiently detailed data on growing stock, increment and removals are found in UN/FAO Forest Resources Assessment (FRA). Land use data are probably the most commonly found data in the different databases. It has been noted that if information will be collected in the future by the pan-European enquiry the classifications need to be more specific.

All European countries have their own system of forest inventories to collect data on forests, growing stock, increment and removals. National statistics were generally available when collecting data on forest resources.

In the enquiry it was requested that information on the contribution of forest resources to global carbon cycles be provided through the submission of biomass calculations for forest resources which are based on the calculation models elaborated by the Intergovernmental Panel on Climate Change (IPCC).
CRITERION 2. Maintenance of forest ecosystem health and vitality

This criterion received the fewest responses. In general, health and vitality of forests ecosystems is under active research and development, but so far the emphasis has largely been on factors affecting trees rather than entire forest ecosystem.

In order to contribute to a better understanding of the impact of air pollution and other factors which may influence forest ecosystems, large scale systematic sampling has been extended by the intensive and continuous monitoring of forest ecosystems within the International Cooperative Programme on the Assessment and monitoring of Air Pollution Effects on Forests of UN/ECE (ICP Forests).

Reporting on depositions of air pollutants (assessed in permanent plots) was based on existing national methods, but in the future, the European Union regulations would be used as standards.

CRITERION 3. Maintenance and encouragement of the productive functions of forests (wood and non-wood)

Wood production is generally well covered by national forest inventories and in forest statistics. Although the concept and application of multiple function forestry are certainly not new, management objectives have tended to be mainly directed to the wood-producing role with the assumption that non-wood products and benefits from forests are produced 'automatically' just as by-products of health stable stands. Exceptions are found in the regions which focus on special products (e.g. cork).

Attempts to collect data on non-wood production at international level were made by ECE UN/FAO in the 1980's (published in 1986 in the study "European Timber Trends and Prospects to the Year 2000 and Beyond") and in 1990 (published in 1993 as second volume of "The Forest Resources of the Temperate Zones").

It would be beneficial to find out what kind of information is available and reliable in different European countries. In the enquiry data were most commonly available for game, berries and mushrooms. It seems, however, rather impossible to express exact numbers and values on non-wood forest products. Instead, trends can be expressed.

CRITERION 4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems

Information on biodiversity, e.g. for threatened species, was not well available. In some countries the statistics are for all species (not specifically for forest related species), while in other the numbers refer only to forest related plants and do not include animals not other organisms.

At the global level, information need for biodiversity appears to be the greatest. There has been no real means of evaluating pattern, structure, or other important aspects of biodiversity. Biological diversity is one of the main areas that requires basic research in order to have appropriate measurements.

At the pan-European level there may also be need to develop indicators to measure biodiversity in production forests. Also terms and definitions related to protected forests need to be clarified and further developed. In this connection the IUCN classification could be used.
CRITERION 5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)

Soil and water measurements are often rather scattered and have not been adequately incorporated into forest ecosystems assessments. These measurements and, thus, the importance of the specific questions related to soil and water conditions at European level, vary between the different countries.

CRITERION 6. Maintenance of other socio-economic functions and conditions

Some of the socio-economic aspects are generally well covered within national monitoring programmes. However, the interaction between socio-economic need and ecological needs is probably less well covered. Many areas related to socio-economic benefits remain uncertain, particularly in relation to the economic valuation of different social and ecological benefits.

In the Pan-European exercise, there are only three indicators to cover the other socio-economic functions and conditions of forests. Indicators under this criterion, together with indicators under the criterion 4 (biodiversity) are the ones that have the most need to be developed in the future.

A few notes on the use and availability of the information related to the pan-European criteria and indicators for sustainable forest management

According to experiences with the use of pan-European criteria and indicators to describe sustainable forest management, the information available at national level differs to some extent between the countries. In general, all countries are not able to provide detailed information because classifications and definitions used in forest inventories often differ from country to country, since they are designed to satisfy specific national or local needs. It is also worthwhile to note that some countries may have insufficient institutional capacity to collect and analyze data on a continuous basis, and thus they are not able to respond to the international requirements on comparability of forest resources data. At European scale, relatively complete information on the public forests is available but in many countries such statistical information is lacking for the private forests, especially for the very small forest properties. These facts stress the importance of identifying and further formulating relatively few parameters, which would cover the most important aspects of the sustainability, and from which the different countries could all provide comparable and reliable data, when evaluating the sustainable forest management.

In the global forest dialogue the harmonisation of criteria and indicators developed within the different processes has been discussed. It has been concluded that it would be advisable to promote the convergence and comparability in the criteria. Difficulty in the provision of detailed information at the country level also indicates that global harmonisation of criteria and indicators would meet serious problems already at the technical level, since the measurement methods do not provide comparable information.

The interactions between data gathered at different spatial scales (e.g., local vs. national) are problematic. The development of a suitable means for information transfer from the local to the national scale is important. Better use of geographic information systems and suitable information technology may provide a means of solving these scale and other problems.

Due to long-term nature of forestry, forest assessments should provide consistent and comparable information over time. According to results of the pan-European enquiry, most of the data provided related to the status in the 1990’s. Data for the 1980’s was less available, especially concerning Criterion 4 (biodiversity). The provision of information on trends for the past 50 years
has been more difficult. This is obvious because of the changes in measurement methods and also because information needs have been focused on different aspects over time.

New assessment methodologies are required for the provision of transparent, comprehensive and timely national databases as well as for international comparison of databases. Also, access to different databases and sources should be facilitated in order to ensure the best possible use of existing sources of forest-related information.

The interpretation of the changes in forest products use and management on a more sustainable way needs the integration of the descriptive indicators to the quantitative ones. Also forests statistics should be developed with the view to taking account of descriptive indicators (i.e. legal/regulatory, institutional, financial instruments/economic policy framework and informational means) which describe the policy instruments used to enhance the sustainable management of forests. At the moment this kind of information can not be easily found. There may also be a need for basic research in this respect.

There is a need to further strengthen data collection such as national forest inventories towards the monitoring of the whole ecosystem, and to integrate the environmental aspects and socio-economic data in to the forest statistics. It seems, in general, that in many countries efforts are being made to include features related to sustainable management of forests in the national forest inventories and statistics are being developed to serve the demand for information on sustainability. It is obvious, however, that this kind of development can not happen very fast as it takes time to develop new measurement methods and techniques. This trend should be contributed to and strengthened by appropriate policy instruments.

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Appendix 1

MINISTERIAL CONFERENCE ON THE PROTECTION OF FORESTS IN EUROPE

EUROPEAN CRITERIA AND INDICATORS
FOR SUSTAINABLE FOREST MANAGEMENT

ADOPTED BY THE EXPERT LEVEL FOLLOW-UP MEETINGS OF THE HELSINKI
CONFERENCE
in GENEVA, June 24, 1994 and in ANTALYA, January 23, 1995

CRITERION 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

CONCEPT AREA: GENERAL CAPACITY

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * provides an overall policy framework for conservation and sustainable management of forests

2 Existence and capacity of an institutional framework to:
   * provide guidelines for national plans or programmes

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * permits the flow of capital in and out of the forest sector in response to market signals and public policy decisions

4 Existence of informational means to implement the policy framework, and the capacity to:
   * recognise the full range of forest values and potentials with periodic forest-related planning and assessment of national forest resources

CONCEPT AREA: LAND USE AND FOREST AREA

Quantitative indicator:

1.1. Area of forest and other wooded land and changes in area (classified, if appropriate, according to forest and vegetation type, ownership structure, age structure, origin of forest)

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * maintains forest resources and prevents forest degradation;
   * clarifies property rights and provides for appropriate land tenure arrangements

2 Existence and capacity of an institutional framework to:
   * carry out integration between land-use planning and forest management
3. Existence of economic policy framework and financial instruments, and the extent to which it:
* supports mechanisms promoting integration between land-use planning and forest management planning

4. Existence of informational means to implement the policy framework, and the capacity to:
* conduct and apply management guidelines for land-use planning in relation to forest resources
* enhance conversion of agricultural and other treeless land to forest land by afforestation

CONCEPT AREA: GROWING STOCK

Quantitative indicator:

1.2. Changes in: (a) total volume of the growing stock; (b) mean volume of the growing stock on forest land (classified, if appropriate, according to different vegetation zones or site classes); and (c) age structure or appropriate diameter distribution classes

Descriptive indicators (examples):

1. Existence of a legal/regulatory framework, and the extent to which it:
* supports sustainable management while increasing the growing stock of both merchantable and non-merchantable tree species on forest land available for timber production

2. Existence and capacity of an institutional framework to:
* undertake and develop regular assessment of forest resources

3. Existence of economic policy framework and financial instruments, and the extent to which it:
* provides appropriate incentives to support forest policy aiming at bigger growing stock

4. Existence of informational means to implement the policy framework, and the capacity to:
* improve execution of forest resources assessment by acknowledged research institution or other similar organisations

CONCEPT AREA: CARBON BALANCE

Quantitative indicator:

1. Total carbon storage and, changes in the storage in forest stands

Descriptive indicators (examples):

1. Existence of a legal/regulatory framework, and the extent to which it:
* clarifies policies for enhancing the use of forest products for energy

2. Existence and capacity of an institutional framework to:
* develop programmes for enhancing the use of forest products for energy

3. Existence of economic policy framework and financial instruments, and the extent to which it:
* provides subventions for the use of wood for energy

4. Existence of informational means to implement the policy framework, and the capacity to:
* enhance studies on the length of the life cycle of wood products
* enhance effectively organised collection of waste paper
CRITERION 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

Quantitative indicators:

2.1. Total amount of and, changes over the past 5 years in depositions of air pollutants (assessed in permanent plots).

2.2. Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification (classes 2, 3, and 4) over the past 5 years.

2.3. Serious damage caused by biotic or abiotic agents: (a) severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth; (b) annual area of burnt forest and other wooded land; (c) annual area affected by storm damage and volume harvested from these areas; and (d) proportion of regeneration area seriously damaged by game and other animals or by grazing.

2.4. Changes in nutrient balance and acidity over the past 10 years (pH and CEC); level of saturation of CEC on the plots of the European network or of an equivalent national network

Descriptive indicators (examples):

1. Existence of a legal/regulatory framework, and the extent to which it:
   * enforces laws and policies related to maintaining forest health and vitality

2. Existence and capacity of an institutional framework to:
   * develop mechanisms for controlling the occurrence of serious damages / damage agents

3. Existence of economic policy framework and financial instruments, and the extent to which it:
   * creates appropriate incentives to prevent extreme disruption of ecological processes

4. Existence of informational means to implement the policy framework, and the capacity to:
   * strengthen regular field monitoring on forest health status and inventories of soil acidification
   * prevent serious damage caused by machinery and forestry operations: compaction of soil, injuries into standing trees, etc.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

CONCEPT AREA: WOOD PRODUCTION

Quantitative indicators:

3.1. Balance between growth and removals of wood over the past 10 years

3.2. Percentage of forest area managed according to a management plan or management guidelines.

Descriptive indicators (examples):

1. Existence of a legal/regulatory framework, and the extent to which it:
   * encourages forest owners to practice environmentally sound forestry based on a forest management plan or equivalent guidelines
2 Existence and capacity of an institutional framework to:
* develop institutions and mechanisms advocating economic, environmental and social factors as essential elements in wood production
* develop and maintain efficient physical infrastructure to facilitate the delivery of forest products and services

3 Existence of economic policy framework and financial instruments, and the extent to which it:
* supports investment and taxation policies which recognise the long-term nature of investments in forestry
* supports non-discriminatory trade policies for forest products

4 Existence of informational means to implement the policy framework, and the capacity to:
* improve technologies and plans based on proper forest inventories

CONCEPT AREA: NON-WOOD PRODUCTS

Quantitative indicator:

3.3. Total amount of and changes in the value and/or quantity of non-wood forest products (e.g., hunting and game, cork, berries, mushrooms, etc.)

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides legal instruments to regulate forest management practices for recreation and the harvesting of important non-wood forest products

2 Existence and capacity of an institutional framework to:
* support appropriate organisations for extension services on non-wood benefits

3 Existence of economic policy framework and financial instruments, and the extent to which it:
* enables the implementation of guidelines for management of non-wood benefits

4 Existence of informational means to implement the policy framework, and the capacity to:
* develop management plans for non-wood benefits

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

CONCEPT AREA: GENERAL CONDITIONS

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* clarifies the concept of management, conservation and sustainable development of forest
* provides for national adherence to international legal instruments

2 Existence and capacity of an institutional framework to:
* maintain, conserve and appropriately enhance biological diversity at the ecosystem, species and genetic levels
* identify economic value in forests whose management is adjusted in favour of maintaining biological diversity
3 Existence of economic policy framework and financial instruments, and the extent to which it:
* creates new resources and incentives to enhance the mechanisms for predicting impacts of human interventions on forests
* supports economic value in forests whose management is adjusted in favour of maintaining biological diversity

4 Existence of informational means to implement the policy framework, and the capacity to:
* develop new inventories and ecological impact assessments on biological diversity
* develop tools to assess the effects of forest management on biological diversity

CONCEPT AREA: **REPRESENTATIVE, RARE AND VULNERABLE FOREST ECOSYSTEMS**

**Quantitative** indicator:

4.1. Changes in the area of: (a) natural and ancient seminatural forest types; (b) strictly protected forest reserves; and (c) forests protected by special management regime.

**Descriptive** indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides for legal instruments to protect representative, rare or vulnerable forest ecosystems

2 Existence and capacity of an institutional framework to:
* develop and maintain institutional capacity and distribution of responsibilities related to protected areas
* maintain degree of implementation of confirmed national forest conservation programmes

3 Existence of economic policy framework and financial instruments, and the extent to which it:
* supports the representativeness of protected forests in relation to ecological and regional distribution

4 Existence of informational means to implement the policy framework, and the capacity to:
* enhance measures to re-establish the endemic biological diversity in forests managed for production
* apply measures for rehabilitation of degraded forest areas

**CONCEPT AREA: THREATENED SPECIES**

**Quantitative** indicator:

4.2. Changes in the number and percentage of threatened species in relation to total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)

**Descriptive** indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides for legal instruments to protect threatened species

2 Existence and capacity of an institutional framework to:
* develop and maintain institutional instruments to protect threatened species
3 Existence of economic policy framework and financial instruments, and the extent to which it:
* supports implementation of management guidelines to take into account threatened species

4 Existence of informational means to implement the policy framework, and the capacity to:
* construct periodically reviewed lists of threatened forest species
* enhance level of knowledge on threatened species / assessments, inventories or research on threatened species

CONCEPT AREA: BIOLOGICAL DIVERSITY IN PRODUCTION FORESTS

Quantitative indicators:

4.3. Changes in the proportions of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species

4.4. Changes in the proportions of mixed stands of 2-3 tree species

4.5. In relation to total area regenerated, proportions of annual area of natural regeneration

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides for legal instruments to ensure regeneration of managed forests

2 Existence and capacity of an institutional framework to:
* develop and maintain institutional instruments to ensure regeneration of managed forests
* conduct inventories on proportion of area covered by trees significantly older than the acceptable age of exploitation currently used

3 Existence of economic policy framework and financial instruments, and the extent to which it:
* provides for economic incentives for taking account of environmental issues in management planning
* conducts inventories/assessments on bioindicators

4 Existence of informational means to implement the policy framework, and the capacity to:
* take measures to maintain or to re-establish biological diversity in old forests
* monitor changes in the proportions of afforested or reforested areas covered by indigenous and introduced species, conifer and deciduous species

CRITERION 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)

CONCEPT AREA: GENERAL PROTECTION

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides for legal instruments to regulate or limit forest management practices in forests protected for infrastructure/protection forests
2 Existence and capacity of an institutional framework to:
   * develop and maintain institutional instruments to regulate or limit forest management practices
   in forests protected for infrastructure / protection forests

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * supports the preparation of management guidelines for infrastructure and protection forests

4 Existence of informational means to implement the policy framework, and the capacity to:
   * conduct research on infrastructure and protection forests in relation to land use practices / forest
   management

CONCEPT AREA: SOIL EROSION

Quantitative indicator:

5.1. Proportion of forest area managed primarily for soil protection

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * provides for legal instruments to regulate or limit forest management practices in areas with
   vulnerable soils

2 Existence and capacity of an institutional framework to:
   * strengthen institutional instruments to regulate or limit forest management practices in areas
   with vulnerable soils

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * supports the preparation of management guidelines for areas with vulnerable soils

4 Existence of informational means to implement the policy framework, and the capacity to:
   * conduct inventories and research on soil erosion

CONCEPT AREA: WATER CONSERVATION IN FORESTS

Quantitative indicator:

5.2. Proportion of forest area managed primarily for water protection

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * provides for legal instruments to regulate or limit forest management practices in favour of
   water conservation or protection of water resources

2 Existence and capacity of an institutional framework to:
   * develop and maintain institutional instruments to regulate or limit forest management practices
   in favour of water conservation or protection of water resources

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * supports the preparation of management guidelines for taking into consideration water
   conservation in forest management practices
4. Existence of informational means to implement the policy framework, and the capacity to:
   * conduct inventories and research on water quality and flow characteristics in relation to land use practices / forest management

**CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS**

**CONCEPT AREA: SIGNIFICANCE OF THE FOREST SECTOR**

Quantitative indicator:

6.1. Share of the forest sector from the gross national product

**Descriptive indicators (examples):**

1. Existence of a legal/regulatory framework, and the extent to which it:
   * provides for legal instruments to ensure development of the forest sector

2. Existence and capacity of an institutional framework to:
   * develop and maintain efficient physical infrastructure to facilitate the supply of forest products

3. Existence of economic policy framework and financial instruments, and the extent to which it:
   * ensures new investments in the forest sector to meet future demands

4. Existence of informational means to implement the policy framework, and the capacity to:
   * develop and put into practice new improved technology
   * conduct market analysis to better fulfil the needs of society

**CONCEPT AREA: RECREATIONAL SERVICES**

Quantitative indicator:

6.2. Provision of recreation: area of forest with access per inhabitant, % of total forest area

**Descriptive indicators (examples):**

1. Existence of a legal/regulatory framework, and the extent to which it:
   * recognises customary and traditional rights of indigenous people, and provides means of resolving access disputes

2. Existence and capacity of an institutional framework to:
   * undertake planning and assessment in recreational services on forestry

3. Existence of economic policy framework and financial instruments, and the extent to which it:
   * supports forestry constituencies to conserve special environmental, cultural, social and scientific values in relation to recreational services

4. Existence of informational means to implement the policy framework, and the capacity to:
   * conduct assessment on recreation
CONCEPT AREA: PROVISION OF EMPLOYMENT

Quantitative indicator:

6.3. Changes in the rate of employment in forestry, notably in rural areas (persons employed in forestry, logging, forest industry)

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * provides legal instruments for securing income levels in forest sector

2 Existence and capacity of an institutional framework to:
   * develop and maintain human resource skills in all relevant tasks

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * supports programmes to ensure employment in rural areas in relation to forestry

4 Existence of informational means to implement the policy framework, and the capacity to:
   * secure a fair share of income from non-wood products coming from rural sources of income

CONCEPT AREA: RESEARCH AND PROFESSIONAL EDUCATION

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * provides for national programmes for research and professional education

2 Existence and capacity of an institutional framework to:
   * develop and maintain institutional instruments to enhance forest related research and education

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * provides public and private funding for research, educational and extension programmes

4 Existence of informational means to implement the policy framework, and the capacity to:
   * guarantee a sufficient number of people educated at different levels of forestry and cross-cutting field of education

CONCEPT AREA: PUBLIC AWARENESS

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
   * provides opportunities for public access to information

2 Existence and capacity of an institutional framework to:
   * strengthen organisations to provide extension services for general public

3 Existence of economic policy framework and financial instruments, and the extent to which it:
   * guarantees that part of forest revenues are reinvested in informing the public about forests
4 Existence of informational means to implement the policy framework, and the capacity to:
* support teaching and informing of environmental issues and other forestry related subjects

CONCEPT AREA: PUBLIC PARTICIPATION

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides opportunities for public participation in public policy and decision making on forests

2 Existence and capacity of an institutional framework to:
* enforce institutional mechanisms for the involvement of local people and NGOs in decision-making

3 Existence of economic policy framework and financial instruments, and the extent to which it:
* attracts public outreach and preparatory planning

4 Existence of informational means to implement the policy framework, and the capacity to:
* enhance public participation in decision-making processes related to implementation of forest policy

CONCEPT AREA: CULTURAL VALUES

Descriptive indicators (examples):

1 Existence of a legal/regulatory framework, and the extent to which it:
* provides for programmes and management guidelines which recognise cultural heritage in relation to forestry

2 Existence and capacity of an institutional framework to:
* develop and maintain programmes to conserve culturally valuable sites and landscapes

3 Existence of economic policy framework and financial instruments, and the extent to which it:
* provides for sufficient financial incentives for acknowledgement of cultural values in forest management planning

4 Existence of informational means to implement the policy framework, and the capacity to:
* conduct studies on proportion of culturally valuable sites and sites with special visual value
Terms and definitions used in the questionnaire for the Follow-up of the Helsinki Resolutions 
HI and H2

FOREST (1)
Land with tree crown cover (stand density) of more than about 20 percent of the area. Continuous 
forest with trees usually growing to more than about 7 m in height and able to produce wood. This 
includes both closed forest formations where trees of various layers and undergrowth cover a high 
proportion of the ground and open forest formations with a continuous grass layer in which tree 
synusia cover at least 10 percent of the ground. (14), (21)

FOREST AND OTHER WOODED LAND (1.1)
Land under natural or planted stand of trees, whether productive or not. Included are shrub land, 
savannah etc., land from which forests have been cleared but that will be reforested in the foreseeable 
future, area occupied by roads, small cleared tracts and other small open areas within the forest and 
which constitute an integral part of the forest. (4), (14), (21)

FOREST TYPE (1.1)
Classification of forest land based on the species forming a plurality of live-tree stocking. Type (e.g. 
low forest, multilayered forest, even-aged forest etc.) is determined on the basis of species plurality 
of all live trees that contribute to stocking. (19)

VEGETATION TYPE (1.1)
Mixture of vegetation covering a forest site. Used in identifying a certain forest site type (e.g. heath forest). (12)

PRODUCTIVE FOREST (1.2)
An area of forest capable of producing wood more than a certain amount, e.g. the increment in 
volume is more than 1 m³ / ha / year in the foreseeable future.

UNPRODUCTIVE FOREST (1.2)
A forest which is not regularly managed, yielding timber less than a certain amount, e.g. the 
increment in volume is less than 1 m³ / ha / year in the foreseeable future. (11)

CARBON BALANCE (1.3)
Difference between carbon flow into and out of component / reservoir. (1), (2), (14)

CARBON FLOW (1.3)
Flux of carbon from one component into another. (1), (2), (14)

CARBON SINK (1.3)
Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of 
a greenhouse gas from the atmosphere. (18)

Component, or whole reservoir, into which C flow is greater than out of it, balance positive. (1), (2), 
(14)
CARBON SOURCE (1.3)
Any process, activity or mechanism which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere. (18)
Component, or whole reservoir, into which C flow is smaller than out of it, balance negative. (1), (2), (14)

CARBON STORAGE (1.3)
Component where C is put aside from atmosphere. (1), (2), (14)

MANAGEMENT PLAN = working plan (3.2)
A written scheme of management for a particular area of forest unit, usually revised regularly, aimed at continuity of policy and practice, and controlling the treatment of the forest unit. (5), (15)

MANAGEMENT GUIDELINES (3.2)
Guides for different forest owner groups, usually without the force of law, stating operational techniques and practices to be adopted to satisfy particular objectives and forest conditions. (5), (15)

NATURAL FOREST (4.1.a)
A forest which has evolved as a sequence of natural succession but is still showing anthropogenic influences. Also, forests that have developed from unmanaged pastures or from fallow land. Often natural parks are included into this category. (6), (10), (13)

SEMI-NATURAL FOREST (4.1.a)
A stand which is composed predominantly of native trees and shrub species which have not been planted. (21) Also, a forest which has developed gradually or accidentally, as its location or site quality was not suited for intensive exploitation or production-oriented management (e.g. in mountainous regions). (13)

STRICTLY PROTECTED FOREST RESERVES = strict forest reserve = scientific forest reserve (4.1.b)
An area with specific conservation goals, of high scientific interests or of educational purposes. It is established with the general aim of giving full protection to features and / or species of flora and fauna. All disturbances and management measures to the area are prevented. (22)

VIRGIN FOREST = untouched forests (4.1)
An area that has never been disturbed by human intervention, and is showing natural development in structure and dynamics. (9) The soil, climate, entire flora and fauna and the life processes have not been disturbed or changed by timber management, cattle grazing, or other direct or indirect anthropogenic influences. (9), (10), (13)

PRIMARY, PRIMEVAL FOREST (4.1)
An area of usually old forest with natural forest structure and dynamics, lacking anthropogenic influences from the past to the present. (9), (10), (14), (13), (22)

THREATENED SPECIES (4.2)
A general term to denote species which are endangered, vulnerable, rare, indeterminate, or insufficiently known. (7)

EXTINCT
Species not definitely located in the wild during the past 50 years. (7)
ENDANGERED
Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction. Also included are taxa that may be extinct but have definitely been seen in the wild in the past 50 years. (7)

VULNERABLE
Taxa believed likely to move into the 'Endangered' category in the near future if the causal factors continue operating. Included are taxa of which most or all the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance. Taxa with populations that are still abundant but are under threat from severe adverse factors throughout their range. In practice, 'Endangered' and 'Vulnerable' categories may include, temporarily, taxa whose populations are beginning to recover as a result of remedial action, but whose recovery is insufficient to justify their transfer to another category. (7)

RARE
Taxa with small world populations that are not at present 'endangered' or 'vulnerable' but are at risk. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. (7)

INDETERMINATE
Taxa known to be 'Endangered', 'Vulnerable' or 'Rare' but where there is not enough information to say which of the three categories is appropriate. (7)

INSUFFICIENTLY KNOWN
Taxa that are suspected but not definitely known to belong to any other threatened species categories, because of lack of information. (7)

GENE RESERVE FOREST (4.3)
A native forest (stated by law) where gene conservation of forest trees is implemented. The forest has to be large enough to encompass natural genetic diversity, permit adequate internal pollination, and to allow the existence of several age classes. Natural regeneration is preferred, in some cases artificial regeneration can be used with seed from the same forest. The silvicultural measurements do not strongly disturb the evolutionary processes similar to natural conditions. (8)

INDIGENOUS SPECIES = autochthonous species = native species. (8) (4.3)
Species or genotypes which have evolved in the same area, region or biotope and are adapted to the specific predominant ecological conditions at the time of establishment. (8), (14)

INTRODUCED SPECIES = non-indigenous species = exotic species (8), (14) (4.3)
Species occurring outside their natural biotope. (8), (14)

PROVENANCE (4.3)
The geographical origin of a particular seed source. In the case of introduced species the term may be extended to the local source. (6), (17), (20)

SEED COLLECTION STAND (4.3)
A stand from where selected seed source that fulfils certain requirements can be obtained. As a rule the stand should be autochthonous, or its origin must be known, and above all it should be superior
to average stands. On occasion, non-indigenous stands showing excellent features are also chosen. Seed collection stands are accepted and registered by the national authority. (8), (14)

**MIXED FOREST / STAND (4.4)**

A stand or forest consisting of two or more tree species which influence significantly the stand ecology. (3), (14)

**NATURAL REGENERATION (4.5)**

Renewal of a forest by natural seeding (self-sown seed), sprouting, suckering or layering. (16), (18)
REFERENCES


5. 2.9.1994. Personal communication by Dr. A.J. Grayson.

6. 15.6.1994 Personal communication by J. Innes.


8. 15.6.1994 Personal communication by V. Koski.


15. 2.9.1994 Personal communication by Dr. R. Päivinen.

16. Recommended Changes in Silviculture Terminology. 1989. Prepared by the Silvicultural Instructors’s Subgroup Silviculture Working Group (D2) SAF. USA

17. 15.6.1994 Personal communication E.H. Séne, FAO.


Appendix 3

APPLICABILITY OF QUANTITATIVE INDICATORS QUESTION BY QUESTION

An examination on the applicability of the quantitative indicators and of the questionnaire based on them has been made by examining the quality of answers received question by question. In this connection the formulation of questions and the guidelines for answering the questions have also been assessed.

In the following tables the questions have been marked with letters indicator by indicator. For example, under the indicator 1.1. Area of forest and other wooded land and changes in area (classified, if appropriate, according to forest and vegetation type, ownership structure, origin of forest) the first question in the questionnaire and in the column "Data required" has been marked with 1.1.A., the second with 1.1.B., etc.

In the following table there is also a summary how countries have been able to answer to the enquiry question by question. Based on the answers received from the countries and on an independent assessment whether data exists completely or not. In the columns "number of answers; 1980's" and "number of answers; 1990's", it is marked on how many countries out of 31 countries have provided data completely.

Based on the analysis of questions and answers, the Meeting of the Scientific Advisory Group, January, 1995, commented each question of the questionnaire and classified each question into three classes according to their applicability as follows:

* Class 1 = a question is clear and applicable.

* Class 2 = output / input ratio is low (Low output / input rate means that even though the question might be clear, there is no data available or it was too difficult to obtain the data within the given time).

* Class 3 = a question is unclear.

Concerning the possible difficulties in answering the questionnaire, the comments received from the countries are summarised and presented in the following tables.
## Criterion 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>QUESTION</th>
<th>NUMBER OF ANSWERS: 1980’s</th>
<th>NUMBER OF ANSWERS: 1990’s</th>
<th>CLASS</th>
<th>COMMENTS MADE BY SAG</th>
<th>COMMENTS RECEIVED FROM COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1. Area of forest and other wooded land and changes in the area (classified, if appropriate, according to forest and vegetation type, ownership structure, age structure, origin of forest)</td>
<td>1.1.A. Area of forest and other wooded land</td>
<td>28</td>
<td>29</td>
<td>1</td>
<td>The question was clear and the rate of answers is very high. Almost all countries have provided data to all three columns.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1.B. Classified by forest/vegetation type</td>
<td>24</td>
<td>23</td>
<td>3</td>
<td>The formulation of the question was not clear. Countries have given several different classifications (e.g., high forest to low forests or conifers/deciduous). In the future more specific guidelines are needed.</td>
<td>Can be misunderstood in relation to the meaning under indicator 4.1.a (Germany). It is better to give numbers on area by main tree species (Finland). No data available on forest/vegetation types (UK).</td>
</tr>
<tr>
<td></td>
<td>1.1.C. Classified by ownership structure</td>
<td>27</td>
<td>27</td>
<td>1</td>
<td>The question was clear. However, in the future it might be better to reduce the number of ownership classes.</td>
<td>Applicable with regard to the ongoing process of ownership status restitution (Czech Rep). No data available over 10 year periods (France). Currently no inventories on ownership structure, this information is unlikely to be available for the UK until the next century (UK).</td>
</tr>
<tr>
<td></td>
<td>1.1.D. Concerning private owners</td>
<td>15</td>
<td>16</td>
<td>2</td>
<td>The data were not easily available. The size classes should be defined more specifically.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1.E. Classified by age structure</td>
<td>24</td>
<td>24</td>
<td>3</td>
<td>The formulation of the question as such was not clear. More specific classification is needed to obtain compatible data.</td>
<td>Only even aged forests, which include 44.8 percent of forests (France). Adjustments for fellings had to be made, some information available about the age class structure of privatised woodland (UK).</td>
</tr>
<tr>
<td>INDICATOR</td>
<td>QUESTION</td>
<td>NUMBER OF ANSWERS: 1980's</td>
<td>NUMBER OF ANSWERS: 1990's</td>
<td>CLASS</td>
<td>COMMENTS MADE BY SAG</td>
<td>COMMENTS RECEIVED FROM COUNTRIES</td>
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<tr>
<td></td>
<td>1.1. F.</td>
<td>Classified by origin of forests</td>
<td></td>
<td></td>
<td>The formulation of the question was found clear but the data were not easily available. More specific definitions are needed. It was also noted that the term natural forests has a different meaning in Europe as it has in North America. In this connection there is a need for European definition. Also, a linkage between points 1.1.E and 1.1.F should be made.</td>
<td>Serious difficulties in differentiation of classes - not aggregated numbers available (Czech Rep). The term man-made is misleading under European circumstances. Not all planted forests can be regarded as man-made forests in the sense of FAO definition. Delete man-made (Germany). No data available and updating not possible over 10 year periods. In Finland semi-natural includes all the naturally regenerated forests except protected forests. It might help if protected forests and commercial forests are handled separately (Finland). Only very little information available (UK).</td>
</tr>
<tr>
<td>1.2.</td>
<td>Changes in:</td>
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<tr>
<td></td>
<td>a. total volume of the growing stock</td>
<td></td>
<td></td>
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<td></td>
<td>b. mean volume of the growing stock on forest land</td>
<td></td>
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<tr>
<td></td>
<td>c. age structure or appropriate diameter distribution classes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.2.</td>
<td>A. Total volume of the growing stock</td>
<td>25</td>
<td>25</td>
<td>1</td>
<td>The question is clear.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Mean volume per vegetation zone or site class</td>
<td>20</td>
<td>21</td>
<td>3</td>
<td>The formulation of the question was unclear. Mean volume per forest type might be a better formulation.</td>
<td>Applicable in the future (Czech Rep) Mean volume in relation to vegetation zone/site class is not practicable (Germany). No data available by vegetation zones or site classes (Finland).</td>
</tr>
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<td></td>
<td>C. Age structure</td>
<td>16</td>
<td>15</td>
<td>1</td>
<td>The question was clear but more specific explanatory notes are needed</td>
<td>Not applicable by diameter distribution (Czech Rep).</td>
</tr>
<tr>
<td></td>
<td>D. Diameter distribution classes</td>
<td>9</td>
<td>10</td>
<td>1</td>
<td>The question was clear. However, this question is a complementary question to point 1.2.C and should be combined with it. Also, common explanatory notes with points 1.1.E and 1.1.F and 1.2.C and 1.2.D are needed</td>
<td>Not applicable by diameter distribution (Czech Rep).</td>
</tr>
<tr>
<td>1.3.</td>
<td>Total carbon storage and changes in the storage in forest stands</td>
<td>16</td>
<td>18</td>
<td>1</td>
<td>The question was clear. At the moment data is difficult to present. In the future the IPCC recommendations should be used.</td>
<td>IPCC recommendations should be used but the are not yet adopted (France). No data available, except approximate data for current carbon storage rates in UK woodlands (UK).</td>
</tr>
</tbody>
</table>
**Criterion 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>QUESTION</th>
<th>NUMBER OF ANSWERS; 1980's</th>
<th>NUMBER OF ANSWERS; 1990's</th>
<th>CLASS</th>
<th>COMMENTS MADE BY SAG</th>
<th>COMMENTS RECEIVED FROM COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1. Total amount of and, changes over the past 5 years in depositions of air pollutants (assessed in permanent plots).</td>
<td>2.1.A. Total amount of sulphur</td>
<td>14</td>
<td>19</td>
<td>1</td>
<td>Methods should be improved and harmonised for this type of application. The question was clear but data are not easily available. In the future the IPC-Forests Level II Handbook can be used as guidelines.</td>
<td>Depositions are measured from the permanent plots and they do not give statistically the right picture for the whole country (France).</td>
</tr>
<tr>
<td></td>
<td>2.1.B. Total amount of nitrogen</td>
<td>15</td>
<td>19</td>
<td>1</td>
<td>Methods should be improved and harmonised for this type of application. The question was clear but data are not easily available. In the future the IPC-Forests Level II Handbook can be used as guidelines.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.1.C. Total amount of ozone</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>The question was not clear. If this question will be kept the amount of ozone should be expressed as concentration (ppm)</td>
<td>Ozone is not a deposition. Delete (Germany).</td>
</tr>
<tr>
<td></td>
<td>2.1.D. Total amount of heavy metals</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>Methods should be improved and harmonised for this type of application. The question was clear but data are not easily available. In the future the IPC-Forests Level II Handbook can be used as guidelines.</td>
<td></td>
</tr>
<tr>
<td>INDICATOR</td>
<td>QUESTION</td>
<td>NUMBER OF ANSWERS; 1980's</td>
<td>NUMBER OF ANSWERS; 1990's</td>
<td>CLASS</td>
<td>COMMENTS MADE BY SAG</td>
<td>COMMENTS RECEIVED FROM COUNTRIES</td>
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<tr>
<td>2.2. Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification (classes 2, 3, and 4) over the past 5 years.</td>
<td>2.2.A. Percentage of sample trees per class - class 2 (moderate) - class 3 (severe) - class 4 (dead)</td>
<td>27</td>
<td>28</td>
<td></td>
<td>The question was clear and data is easily available.</td>
<td>The period covering temporal scale of the data is relatively short because investigations of that kind were not carried out earlier (Poland). Defoliation is a non-specific indicator of damage by all casual agents so that the data in section 2.2 are inclusive of the areas given in section 2.3. (UK).</td>
</tr>
<tr>
<td>2.3. Serious damages caused by biotic or abiotic agents: a. severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth b. annual area of burnt forest and other wooded land c. annual area affected by storm damage and volume harvested from these areas d. proportion of regeneration area seriously damaged by game and other animals or by grazing</td>
<td>2.3.A. Area seriously affected by insects and diseases</td>
<td>19</td>
<td>23</td>
<td></td>
<td>The question was clear although some information is missing. In the future seriousness should be defined.</td>
<td>A definition of seriousness needed (Germany, France). Forest districts have not yet assessed the volume of wood harvested from burnt forest areas (Poland). The forest area seriously damaged by grazing of domestic animals occurs only casually in Poland.</td>
</tr>
<tr>
<td></td>
<td>2.3.B. Burnt forest area</td>
<td>24</td>
<td>26</td>
<td></td>
<td>The question was clear.</td>
<td>In point b) the indicator concerns only area of burnt forests; why volume harvested is asked for? (France)</td>
</tr>
<tr>
<td></td>
<td>2.3.C. Volume harvested from these areas</td>
<td>11</td>
<td>13</td>
<td></td>
<td><strong>This will be deleted.</strong></td>
<td>In point c) the area is impossible to assess in practice; delete area (France).</td>
</tr>
<tr>
<td></td>
<td>2.3.D. Are seriously damaged by storms</td>
<td>17</td>
<td>18</td>
<td></td>
<td>The question was clear.</td>
<td>In point d) the indicator concerns proportion; is area needed? (France). Data available only from the latest national forest inventory, storm damaged are given only in statistics that give the amount of money paid from insurance (Finland).</td>
</tr>
<tr>
<td>INDICATOR</td>
<td>QUESTION</td>
<td>NUMBER OF ANSWERS: 1980's</td>
<td>NUMBER OF ANSWERS: 1990's</td>
<td>CLASS</td>
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<tr>
<td>2.3.E. Volume harvested from these areas</td>
<td>15</td>
<td>18</td>
<td>1</td>
<td>The question was clear. However, information on volume harvested is not available in all the countries.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.F. Total area of regeneration per year</td>
<td>18</td>
<td>18</td>
<td>1</td>
<td>This question was found clear. However, the SAG found it more interesting to ask the proportion of regeneration area per year from the total forest area instead of the present question.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.G. Area seriously damaged by game and other animals</td>
<td>14</td>
<td>16</td>
<td>1</td>
<td>The question was clear but some specifications should be done to the explanatory notes.</td>
<td></td>
<td></td>
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<tr>
<td>2.3.H. Area seriously damaged by grazing</td>
<td>11</td>
<td>14</td>
<td>1</td>
<td>The question was clear but some specifications should be done to the explanatory notes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4. Changes in nutrient balance and acidity over the past 10 years (pH and CEC); level of saturation of CEC on the plots of the European network or of an equivalent national network</td>
<td>2.4.A. Level of saturation of CEC</td>
<td>3</td>
<td>4</td>
<td>The question was found clear. At the moment data is not easily available. Guidelines should be taken from the IPC-FOREST Level II Handbook. New explanatory note should be included. The data should be expressed as areal distribution by maps.</td>
<td>Indicator is too general. It is hard to give one figure of pH for the whole country. If the questions on those indicators are to be realistic some differentiation in space and time is needed (Poland). Mean statistics for the whole country is not relevant. SAG should give a more appropriate suggestion how to collect data on this indicator (France). Insufficient guidelines (Finland).</td>
<td></td>
</tr>
<tr>
<td>2.4.B. Acidity</td>
<td>9</td>
<td>10</td>
<td>1</td>
<td>The question was found clear. At the moment data is not easily available. Guidelines should be taken from the IPC-FOREST Level II Handbook. New explanatory note should be included. The data should be expressed as areal distribution by maps.</td>
<td>Indicator is too general. It is hard to give one figure of pH for the whole country. If the questions on those indicators are to be realistic some differentiation in space and time is needed (Poland). Mean statistics for the whole country is not relevant. SAG should give a more appropriate suggestion how to collect data on this indicator (France). Insufficient guidelines (Finland).</td>
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</tr>
<tr>
<td>INDICATOR</td>
<td>QUESTION</td>
<td>NUMBER OF ANSWERS: 1980's</td>
<td>NUMBER OF ANSWERS: 1990's</td>
<td>CLASS</td>
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<tr>
<td>3.1. Balance between growth and removals of wood over the past 10 years</td>
<td>3.1.A. Annual information during the last ten year period on total growth</td>
<td>26</td>
<td>28</td>
<td>1</td>
<td>The question was clear</td>
<td>Differentiation between mortality and removals? Growth and drain are better comparative than growth and removals (Finland). Numbers only from the forest resources assessment 1990, no comparative figures from 1980 available (UK).</td>
</tr>
<tr>
<td></td>
<td>3.1.B. Annual information during the last ten year period on total removals</td>
<td>25</td>
<td>29</td>
<td>1</td>
<td>The question was clear. It might be better to provide data on total drain than total removals. In that way the mortality is also included. The difference between the terms drain and removals should be explained in the explanatory notes.</td>
<td>Differentiation between mortality and removals? Growth and drain are better comparative than growth and removals (Finland). Numbers only from the forest resources assessment 1990, no comparative figures from 1980 available (UK).</td>
</tr>
<tr>
<td>3.2. Percentage of forest area managed according to a management plan or management guidelines.</td>
<td>3.2.A. Area of forests managed according to a management plan or management guidelines</td>
<td>26</td>
<td>27</td>
<td>1</td>
<td>The question was clear</td>
<td>Differentiation between areas that are managed strictly according to a plan or more freely (France). The private woodlands figure cannot be totally reliable (UK).</td>
</tr>
<tr>
<td>3.3. Total amount of and changes in the value and/or quantity of non-wood forest products (e.g., hunting and game, cork, berries, mushrooms, etc.)</td>
<td>3.3.A. Value or quantity of e.g., berries, mushrooms, game and hunting, cork, etc.</td>
<td>20</td>
<td>26</td>
<td>1</td>
<td>This is a confusing package. In the future a menu should be provided on what kind of information is available and reliable nationally in different countries. It is possible to express trends, not exact numbers.</td>
<td>Applicable only for hunting and game (Czech rep). Data not precise because individual collectors are not registered, however they make a significant deal among all collectors. The variability of annual yield is also great, for these reasons data are assessed at their lower limit. The value expressed in monetary units can be of two kinds: paid to collectors or prices on the market. It is not clear which one should be shown here (Poland). Non-wood products difficult to calculate. What is included in hunting (equipment, licence..?) (France).</td>
</tr>
</tbody>
</table>
### Criterion 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>QUESTION</th>
<th>NUMBER OF ANSWERS; 1980's</th>
<th>NUMBER OF ANSWERS; 1990's</th>
<th>CLASS</th>
<th>COMMENTS MADE BY SAG</th>
<th>COMMENTS RECEIVED FROM COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1. Changes in the area of: a. natural and ancient semi-natural forest types b. strictly protected forest reserves c. forests protected by special management regime</td>
<td>4.1.A. Area of natural and ancient semi-natural forest types</td>
<td>19</td>
<td>20</td>
<td>1</td>
<td>The question was clear. Terms and definitions should be clarified and develop. In this connection a reference to the IUCN classification could be made. It should also be mentioned that this indicator is aimed to express the area of forests protected for the maintenance and conservation of biological diversity.</td>
<td>Serious difficulties in distinguishing the types, no aggregated numbers (Czech Rep). The term semi-natural should be redefined. It should encompass all forests/forests areas which are judged as being close to a (potential or historical) natural situation by the signatory state. European Union Member States may consider using categories of the FFH Directive here (Germany). The definition is not reasonable from the point of view of the national inventory (France).</td>
</tr>
<tr>
<td></td>
<td>4.1.B. Area of strictly protected forest reserves</td>
<td>23</td>
<td>29</td>
<td>1</td>
<td>The question was clear. Terms and definitions should be clarified and develop. In this connection a reference to the IUCN classification could be made. It should also be mentioned that this indicator is aimed to express the area of forests protected for the maintenance and conservation of biological diversity</td>
<td>The UK has no designated forest reserves, but does have scientific and nature reserves which are partially or wholly under forest. The Forestry Commission does not hold a central register of these reserves (UK).</td>
</tr>
<tr>
<td></td>
<td>4.1.C. Area of forests protected by special management regime</td>
<td>23</td>
<td>28</td>
<td>1</td>
<td>The question was clear. Terms and definitions should be clarified and develop. In this connection a reference to the IUCN classification could be made. It should also be mentioned that this indicator is aimed to express the area of forests protected for the maintenance and conservation of biological diversity.</td>
<td>Not all the forests under special management regime are managed by the Forestry Commission, therefore data is not easily available (UK).</td>
</tr>
<tr>
<td>INDICATOR</td>
<td>QUESTION</td>
<td>NUMBER OF ANSWERS; 1980's</td>
<td>NUMBER OF ANSWERS; 1990's</td>
<td>CLASS</td>
<td>COMMENTS MADE BY SAG</td>
<td>COMMENTS RECEIVED FROM COUNTRIES</td>
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<tr>
<td>4.2. Changes in the number and percentage of threatened species in relation to total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)</td>
<td>4.2. A. Total number of forest related species</td>
<td>13</td>
<td>21</td>
<td>1</td>
<td>The question was clear. The two questions (4.2. A. and 4.2. B.) should be linked together. It should be defined what species are included in forest related species.</td>
<td>Which are forest species especially in relation to animals (France).</td>
</tr>
<tr>
<td></td>
<td>4.2.B. Number of threatened forest related species</td>
<td>10</td>
<td>18</td>
<td>1</td>
<td>The question was clear. The two questions should be linked together. It should be defined what species are included in forest related species.</td>
<td>Questions are formulated in a too general way, inadequate to conditions in Poland. Figures are provided only for seed orchards (UK).</td>
</tr>
<tr>
<td></td>
<td>4.3. Changes in the proportions of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species</td>
<td>4.3. A. Total area for indigenous species</td>
<td>20</td>
<td>25</td>
<td>1</td>
<td>The question was clear. Some additional explanatory notes are needed. In the future a reference to the OECD-scheme should be made.</td>
</tr>
<tr>
<td></td>
<td>4.3.B. Total area for introduced species</td>
<td>19</td>
<td>26</td>
<td>1</td>
<td>The question was clear. Some additional explanatory notes are needed. In the future a reference to the OECD-scheme should be made.</td>
<td>Questions are formulated in a too general way, inadequate to conditions in Poland. Figures are provided only for seed orchards (UK).</td>
</tr>
<tr>
<td></td>
<td>4.4. Changes in the proportion of mixed stands of 2-3 tree species</td>
<td>4.4.A. Area of mixed stands</td>
<td>17</td>
<td>17</td>
<td>1</td>
<td>The misunderstanding was notable in the answers. More intention should be paid to the explanatory notes.</td>
</tr>
<tr>
<td></td>
<td>4.5. In relation to total area regenerated, proportion of annual area of natural regeneration</td>
<td>4.5.A. Annual area of natural regeneration</td>
<td>15</td>
<td>21</td>
<td>1</td>
<td>The question is clear but in the future also uneven aged forests should be taken into account. A differentiation between artificial and natural regeneration regimes should be made.</td>
</tr>
</tbody>
</table>
**Criterion 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>QUESTION</th>
<th>NUMBER OF ANSWERS; 1980’s</th>
<th>NUMBER OF ANSWERS; 1990’s</th>
<th>CLASS</th>
<th>COMMENTS MADE BY SAG</th>
<th>COMMENTS RECEIVED FROM COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1. Proportion of forest area managed primarily for soil protection</td>
<td>5.1.A. Area of forests managed primarily for soil protection</td>
<td>25</td>
<td>26</td>
<td>1</td>
<td>This was found clear but the danger of overlapping exists. Further clarification is needed. The indicators refer to areas protected for soil and water conservation and they are different from the areas under indicator 4.1. which relates to biological diversity. An additional indicator concerning protection areas covering the soil and water conservation is needed to fulfil the gap between these two indicators.</td>
<td>The only estimate that might be made was based on the assumption that certain areas of the state forests had originally been planted many years back to protect sand dunes from erosion. Therefore figures might give an overestimate or underestimate (UK).</td>
</tr>
<tr>
<td>5.2. Proportion of forest area managed primarily for water protection</td>
<td>5.2.A. Area of forests managed primarily for water protection</td>
<td>22</td>
<td>24</td>
<td>1</td>
<td>This was found clear but the danger of overlapping exists. Further clarification is needed. The indicators refer to areas protected for soil and water conservation and they are different from the areas under indicator 4.1. which relates to biological diversity. An additional indicator concerning protection areas covering the soil and water conservation is needed to fulfil the gap between these two indicators.</td>
<td>Difficulties to define in mountainous areas which should be included (France).</td>
</tr>
</tbody>
</table>
## Criterion 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>QUESTION</th>
<th>NUMBER OF ANSWERS; 1980's</th>
<th>NUMBER OF ANSWERS; 1990's</th>
<th>CLASS</th>
<th>COMMENTS MADE BY SAG</th>
<th>COMMENTS RECEIVED FROM COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1. Share of the forest sector from the gross national product</td>
<td>6.1.A. Share of the forest sector</td>
<td>24</td>
<td>26</td>
<td>1</td>
<td>Separation between forestry and forest industry should be made in the future.</td>
<td>It is not clear if the term forest sector encompasses the forest industry or nor (Germany). Indicator should inform on changes in the economic value of the forest sector also without relation to the GNP (Germany). Forestry and forest industry belong in Poland to two different sectors. The forestry sector does not operate with data concerning for instance the employment in forest industry. Should the data be aggregated or separately given in the questionnaire? (Poland).</td>
</tr>
<tr>
<td>6.2. Provision of recreation: area of forest with access per inhabitant, percent of total forest area</td>
<td>6.2.A. Area of accessible forest per inhabitant</td>
<td>20</td>
<td>26</td>
<td>1</td>
<td>The indicator itself should be reformulated as follows: Forest area legally accessible to inhabitants.</td>
<td>Should be limited to areas less than 100 km form cities over 200,000 inhabitants. Differentiation between areas with few forests and forested areas (France). It was not clear whether the respondent was supposed to put the response in hectares or percentages (UK).</td>
</tr>
<tr>
<td>6.3. Changes in the rate of employment in forestry, notably in rural areas (persons employed in forestry, logging, forest industry)</td>
<td>6.3.A. Number of persons employed in forestry sector</td>
<td>25</td>
<td>25</td>
<td>1</td>
<td>Separation between forestry and forest industry should be made in the future.</td>
<td>Forestry an forest industry belong in Poland to two different sectors. The forestry sector does not operate with data concerning for instance the employment in forest industry. Should the data be aggregated or separately given in the questionnaire? (Poland).</td>
</tr>
</tbody>
</table>
AREAS FOR IMPROVEMENT IN INTERNATIONAL STATISTICS - A PRIVATE SECTOR VIEW

by Antti Rytkönen
Jaakko Pöyry Consulting Oy, Finland

CLASSIFICATIONS AND DEFINITIONS

Wood raw material categories

Great improvements have been made in the coverage and quality of FAO wood raw material statistics during the past decades. Several disaggregates have been introduced based on the biological split to coniferous and non-coniferous and type of processing: roundwood, chips and residues.

The most important classification from the sector analysis point of view is often: (a) logs and (b) small sized roundwood. It is not always easy to extract this information. Disaggregation of roundwood in the trade tables would be a major contribution, it is understandable that a major effort is required to accomplish this.

CONSISTENCY IN DISAGGREGATION

Through the years, there have been changes in the treatment of some of the product categories, even for cases where technological change has not necessitated this. An example of this is sawnwood & sleepers, it is not clear how sleepers are included in coniferous and non-coniferous subcategories. For most practical purposes little harm is caused, but consistent aggregation becomes difficult.

PRODUCT AGGREGATES

FAO secretariat rightly makes a great effort to provide a consistent aggregation trail in published statistics, including NES categories. The usefulness of the aggregate product categories depends on the use, of course. An example is the Woodpulp aggregate of the Yearbook. It is consistent and correct that dissolving wood pulp is part of this category.

From the point of view of consistency check of the papermaking furnish, a category without dissolving would be more relevant. This choice of the aggregation scheme is an example of a situation where the statistics provider makes an implicit value decision that affects a statistics consumer.

PAPER CATEGORIES

The history of paper use has seen a growing importance of printing and writing papers. The parallel development in the paper making technology has made at least a 4-category classification of printing and writing papers most valuable for information users.

The two criteria that should be applied, have been present in the Capacities Survey from the beginning, but have not entered the Yearbook: (i) coating and (ii) mechanical pulp content. The national statistical base to allow this disaggregation does in most cases exist for the processing industry and trade.
COUNTRY DISAGGREGATION

Complications of the true political world, of course, are reflected in the difficulty of statistical representation. Differing from most of the other international statistics, the Yearbook does not separate China and Taiwan (China, Taipei). For example, the measurement of the developments in the Chinese paper industry becomes difficult. The latter is globally one of the forest industry sector's most important areas. The importance is due to issues in raw material supply, emission problems and industrial investment requirements.

OLD AND NEW PRODUCTS

The product mix of the forest based industries is not the most dynamic one. However, there are exceptions of global importance. Innovations such as Medium Density Fibreboard (MDF) and Oriented Strand Board (OSB) have improved the wood raw material productivity and sector's performance. They presently hold 6 percent each of the global wood panel production, and are in a rapid growth phase. They could replace compressed vs. non-compressed division of fibreboard in statistics.

STATISTICAL PRACTICES, YEARBOOK & FAOSTAT

Data gathering: FAO vs. national statistics

There are a number of cases, importantly in Asia, where the national statistics differ widely from what is published in FAO statistics. A colleague has provided a few examples which are presented in Appendix 1.

Even if the examples of Appendix 1 are not more than an arbitrary sample of cases, they might serve as an illustration of an analyst's dilemma. Quite often one faces a situation where the FAO time series arrives at a level that is consistent with alternative trade figures (alternatives 1 and 2 of appendix 1). The trend implication as well as any attempt of deeper econometric analysis would give very different results for the two series.

There are other cases where there is a tendency of deviating development of an FAO data compared to an alternative data. In a case such as alternative 3 of appendix 1 even the trends might be rather similar, but understanding of the time behaviour is very different.

Missing values

It is unavoidable that even with an efficient data gathering organization some gaps remain in the data. FAO has gone to great efforts in encouraging the corresponding organizations to provide high quality data. Efforts have been made to guarantee consistency: (i) between product categories (e.g. aggregation schemes), (ii) between countries (e.g. direction of trade), and (iii) through time (backward revision), but somewhat less in (iv) vertical consistency of raw materials and end products.

Even with these extensive efforts, missing values remain. The secretariat estimates are used as proxies, especially in the most recent years. The approach serves the book format Yearbook of Forest Products well, more problems remain in the electronic format. Lots of data gaps exist in the early years from 1961. Of course, the user might be less interested in the distant past.

The problem of missing values is aggravated if, as is the case in Faostat in many cases, one cannot differentiate between true zero values and true missing values, when 0 is being reported. In some cases the history of a data series starts smoothly and gives credibility to true zeros, in other
cases a sizeable figure suddenly appears. One can observe such cut-off points of historical horizon, quite often in year 1967, for example. Most often these discrepancies are not very serious for analysis, but need careful data work and sometimes guessing.

**Secretariat estimates**

FAO does contribute to the consistency of the information by providing secretariat estimates. In a majority of cases these are repetitions of last observed figures. Sequences of F’s (indicator of a secretariat estimate in the Yearbook) prevail, sometimes even from the 1970’s. In some situations official government sources are able to provide better data, in some other situations solid industry data sources exist.

A small example from a colleague’s recent field trip is *Mongolian coniferous sawnwood production*, where FAO reports a figure 470 (1000 metric tons) for 1972-88, but official statistics provide figures for several of those years. There seems to be further potential in tracing the data gaps through official and complementary channels (see also the examples in Appendix 1).

**Backward revision**

FAO does revise the Yearbook of forest products statistics backwards for the full published time range, and even further back for the database. This is not true for the Pulp and Paper Capacities Survey, where the base period data remains the last word.

In the electronic format distribution, the F indicator for secretariat estimates has in some cases and publication years been dropped, and then been reintroduced. This has caused a problem for a data user who aims at annually introducing only those portions of the database which contribute to updating.

**Material balance problems**

There are a number of countries and time periods where the material balances between final products and factors of production are difficult or impossible to reconcile.

One important example due to its large dimensions is *Indian papermaking and especially the furnish* component of other fibre pulp. The information has gone through several revisions, even long periods backwards, but consistency problems and steps in historical time series remain. Important logical check should allow paper to be made from the raw material base suggested. Apparent weakness of the recycled fibre data aggravates the problem further.

**Consistency of trade value and volume figures**

FAO has made great progress during the years in encouraging and capturing forest products trade data. Indeed, the trade figures have become another cornerstone (with production) in the analysis of sector’s balances. The applications include those that investigate apparent consumption and the ones analyzing the trade. The direction of trade tables have doubled as a useful tool for cross-checking.

Among the remaining problems, more often annoying rather than disastrous, are some real or seeming inconsistencies in value and volume figures. In summary, sometimes only volume but no value figure is given, in other cases the opposite is true. It is clear that most often the reason is missing basic data. The method of providing secretariat estimates is not always used here. The
problem is felt especially when average unit trade values are used as a proxy for price. In Appendix 2 an attempt has been made to illustrate the extent of this problem.

Other Statistical Publications

Pulp and Paper Capacities, survey

The above mentioned lack of backward revision of the Capacity Survey makes it difficult to construct a consistent historical time series of capacities. The potential usefulness of the survey suffers from other deficiencies as well. The data is typically created by a sequence of aggregations: the national organizations first, and then FAO as a summary.

The method is more valid for the past than for the projection period. In the future, there seems to be very little control of which are the included projects, expansions or closures which contribute to the changes. The approach typically produces exaggerated signals of future change.

Recovered Paper Data

FAO has been a forerunner in recovered paper statistics. Recycled fibre has become one of the most important issues in the sector. The economic importance and resource savings have made increased recycling a central theme both in engineering design and as a public policy concern.

Now the waste paper data has become better integrated with the rest of the FAO sector statistics. Especially the recent introduction of full waste paper data set into the Faostat database has been a major contribution. This is probably the most important area where FAO should secure its leading position. Recovered paper should enter the Yearbook of Forest Products.

A related question is if the Recovered Paper Data should follow an annual cycle instead of being produced every second year. Secondly, a proliferation of different classifications exists and some of the most important recycling countries have their own classifications.

The good news is that FAO 4-category classification can be superimposed on the German, US and most other important classifications with some effort. The bad news is that many of these classifications serve the purpose of grade definition for traders in the recycled fibre market. Statistics on traded volumes are not always easily created, so further work is needed.

A colleague recently worked out how some of the differing recovered paper classification systems can be linked. This exercise of harmonization of classifications is given in Appendix 3. Of course, some adjustment and lots of good will is needed to implement a common classification, but FAO has a long history of successful cases of such operations.

Forest Product Prices

Introduction of Forest Product Prices publication about 25 years ago was promising and did contribute to this difficult area of data gathering. The value of this price information has suffered, however, from several constraints: (i) publication is irregular, (ii) coverage is rather narrow, (iii) long delay from observation to publication and (iv) no information on what are the volumes traded at indicated price levels.

It seems that the first priority should be on reconciling the trade data to provide a consistent basis for average export and import unit values. Secondly, Forest Products Prices could be developed with a narrower scope, possibly a strong emphasis on primary forest products (fuelwood, logs and
small sized industrial wood). This could become helpful in indicating the market value of the forest resource, and thus it could contribute to better conservation and management of the resource.

**SUMMARY RESOURCE STATISTICS**

Areas such as forest inventory are excluded from the scope of this Working Group. However, a sector analyst is frequently facing a situation, where summary statistics of forestry situation is needed. The matter the backward linkage of the forest products use, supply of raw materials.

In a wider sense of the sector's material balance, natural resource accounting and sustainability assessment, summary resource statistics are needed. There seems to be a tendency now that FAO based resource summary information is becoming available mostly through second hand sources. Several other information providers include estimates of forest area and other resource indicators in their services.

**RECOMMENDATIONS**

1. FAO should continue the laborious but extremely important basic work in international forest sector statistics. The *Faostat database and the Yearbook of Forest Products* form one of the main information sources for strategic planning in the sector. The value can be further enhanced by developing the scope, examples include log vs. small sized wood separation and division of printing and writing papers to four sub-categories.

2. FAO should strengthen its position as a leading provider of forestry sector statistics by redesigning some of its information services. Examples include *summary information on forest resources, Forest Product Prices, and especially Recovered Paper Data*. In the latter field, there is a gap and urgent need for consistently structured international database. FAO has a solid classification to start from, and an excellent opportunity to be the leader.

3. Distribution has been a bottleneck in the FAO information service. *Electronic products* have already greatly improved the situation. Development towards more interactive methods, both in the collection and in the dissemination of the data, promise simultaneously better information services and improved economy. Internet is a promising arena for efficient information exchange.

4. As a complement to services from FAO data bases, encouraging progress have been made in developing and testing the distribution of *reference information*. An example is the Compendium of Computer-Based Databases of Relevance to Forest Products Marketing. Paper based information sources remain most important still, and would be worth a similar treatment. Opening up the references to presently used background sources of data, FAO could solicit feedback from user society and thus develop its own reference base.
Appendix 1  Examples of Alternative Data

Singapore, Total Paper & Paperboard, Production

<table>
<thead>
<tr>
<th>Year</th>
<th>FAO</th>
<th>Alternative 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>10</td>
<td>42.6</td>
</tr>
<tr>
<td>1986</td>
<td>10F</td>
<td>42.6</td>
</tr>
<tr>
<td>1987</td>
<td>10F</td>
<td>68.3</td>
</tr>
<tr>
<td>1988</td>
<td>10F</td>
<td>79.4</td>
</tr>
<tr>
<td>1989</td>
<td>10F</td>
<td>80.1</td>
</tr>
<tr>
<td>1990</td>
<td>80*</td>
<td>80.9</td>
</tr>
</tbody>
</table>

Thailand, Printing & Writing Paper Production

<table>
<thead>
<tr>
<th>Year</th>
<th>FAO</th>
<th>Alternative 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>103</td>
<td>95.3</td>
</tr>
<tr>
<td>1986</td>
<td>80F</td>
<td>109.4</td>
</tr>
<tr>
<td>1987</td>
<td>94</td>
<td>143.0</td>
</tr>
<tr>
<td>1988</td>
<td>94</td>
<td>153.2</td>
</tr>
<tr>
<td>1989</td>
<td>95</td>
<td>170.5</td>
</tr>
<tr>
<td>1990</td>
<td>190</td>
<td>189.9</td>
</tr>
</tbody>
</table>

The Philippines, Total Paper & Paperboard, Production

<table>
<thead>
<tr>
<th>Year</th>
<th>FAO</th>
<th>Alternative 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>268</td>
<td>268</td>
</tr>
<tr>
<td>1986</td>
<td>218</td>
<td>253</td>
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<tr>
<td>1987</td>
<td>358</td>
<td>308</td>
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<td>1988</td>
<td>314</td>
<td>341</td>
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<td>1989</td>
<td>239</td>
<td>382</td>
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<td>1990</td>
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<td>466</td>
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<td>1991</td>
<td>395</td>
<td>472</td>
</tr>
<tr>
<td>1992</td>
<td>570</td>
<td>495</td>
</tr>
<tr>
<td>1993</td>
<td>487*</td>
<td>517.5</td>
</tr>
</tbody>
</table>

1) Indonesian Paper Trade Directory, ASEAN Supplement, APPIC
2) Thai Pulp and Paper Industry Association; APPIC
3) Pulp and Paper International; Paper Asia
### Appendix 2  Consistency of Faostat Trade Data

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>1)</th>
<th>2)</th>
<th>3)</th>
<th>4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleached sulphate pulp</td>
<td>5478</td>
<td>1419</td>
<td>37</td>
<td>701</td>
<td>44</td>
</tr>
<tr>
<td>Bleached sulphite pulp</td>
<td>4554</td>
<td>1320</td>
<td>62</td>
<td>220</td>
<td>86</td>
</tr>
<tr>
<td>Chemical wood pulp</td>
<td>3795</td>
<td>124</td>
<td>50</td>
<td>31</td>
<td>40</td>
</tr>
<tr>
<td>Dissolving wood pulp</td>
<td>3894</td>
<td>913</td>
<td>144</td>
<td>445</td>
<td>85</td>
</tr>
<tr>
<td>Fibrebd compressed</td>
<td>7227</td>
<td>1995</td>
<td>572</td>
<td>513</td>
<td>110</td>
</tr>
<tr>
<td>Fibrebd n.compressed</td>
<td>6270</td>
<td>2593</td>
<td>159</td>
<td>758</td>
<td>92</td>
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<tr>
<td>Fibreboard</td>
<td>7425</td>
<td>1979</td>
<td>544</td>
<td>705</td>
<td>110</td>
</tr>
<tr>
<td>Fuelwood (C)</td>
<td>3003</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fuelwood + Charcoal</td>
<td>6963</td>
<td>745</td>
<td>190</td>
<td>636</td>
<td>57</td>
</tr>
<tr>
<td>Household + sanitary paper</td>
<td>3465</td>
<td>128</td>
<td>187</td>
<td>0</td>
<td>56</td>
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<tr>
<td>Mechanical wood pulp</td>
<td>3960</td>
<td>605</td>
<td>196</td>
<td>568</td>
<td>110</td>
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<tr>
<td>Newsprint</td>
<td>7326</td>
<td>1681</td>
<td>419</td>
<td>442</td>
<td>145</td>
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<tr>
<td>Other fibre pulp</td>
<td>4323</td>
<td>1045</td>
<td>184</td>
<td>662</td>
<td>94</td>
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<tr>
<td>Other ind. rwd.</td>
<td>5841</td>
<td>291</td>
<td>162</td>
<td>304</td>
<td>75</td>
</tr>
<tr>
<td>Other paper + paperboard</td>
<td>7953</td>
<td>1606</td>
<td>435</td>
<td>1381</td>
<td>272</td>
</tr>
<tr>
<td>Paper + paperboard</td>
<td>8085</td>
<td>1308</td>
<td>320</td>
<td>1159</td>
<td>253</td>
</tr>
<tr>
<td>Paper + paperboard nes</td>
<td>257</td>
<td>33</td>
<td>144</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td>Particle board</td>
<td>7425</td>
<td>2053</td>
<td>413</td>
<td>587</td>
<td>153</td>
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<tr>
<td>Plywood</td>
<td>7854</td>
<td>842</td>
<td>678</td>
<td>428</td>
<td>235</td>
</tr>
<tr>
<td>Printing + writing paper</td>
<td>7854</td>
<td>1703</td>
<td>439</td>
<td>982</td>
<td>222</td>
</tr>
<tr>
<td>Pulp for paper</td>
<td>5115</td>
<td>945</td>
<td>78</td>
<td>665</td>
<td>37</td>
</tr>
<tr>
<td>Pulpwood + particles</td>
<td>5577</td>
<td>1353</td>
<td>42</td>
<td>628</td>
<td>14</td>
</tr>
<tr>
<td>Roundwood</td>
<td>7821</td>
<td>739</td>
<td>319</td>
<td>755</td>
<td>142</td>
</tr>
<tr>
<td>Sawlog + veneer logs (C)</td>
<td>4785</td>
<td>172</td>
<td>146</td>
<td>97</td>
<td>83</td>
</tr>
<tr>
<td>Sawlog + veneer logs (NC)</td>
<td>5841</td>
<td>88</td>
<td>158</td>
<td>145</td>
<td>158</td>
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<tr>
<td>Sawwood (C)</td>
<td>7986</td>
<td>778</td>
<td>268</td>
<td>619</td>
<td>115</td>
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<tr>
<td>Sawwood (NC)</td>
<td>7854</td>
<td>1135</td>
<td>283</td>
<td>1231</td>
<td>195</td>
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<tr>
<td>Sawwood + sleepers</td>
<td>8052</td>
<td>413</td>
<td>301</td>
<td>775</td>
<td>225</td>
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<tr>
<td>Semi-chemical wood pulp</td>
<td>3894</td>
<td>1071</td>
<td>141</td>
<td>754</td>
<td>25</td>
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<td>Unbleached sulphate pulp</td>
<td>3762</td>
<td>540</td>
<td>105</td>
<td>431</td>
<td>57</td>
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<tr>
<td>Unbleached sulphite pulp</td>
<td>3465</td>
<td>561</td>
<td>99</td>
<td>388</td>
<td>66</td>
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<tr>
<td>Waste paper</td>
<td>6303</td>
<td>1354</td>
<td>84</td>
<td>1122</td>
<td>89</td>
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<tr>
<td>Wood based panels</td>
<td>7920</td>
<td>708</td>
<td>523</td>
<td>749</td>
<td>146</td>
</tr>
<tr>
<td>Wood pulp</td>
<td>4884</td>
<td>724</td>
<td>71</td>
<td>506</td>
<td>38</td>
</tr>
<tr>
<td>Wrapping + packg paper + board</td>
<td>4191</td>
<td>115</td>
<td>78</td>
<td>61</td>
<td>58</td>
</tr>
</tbody>
</table>

1) cases where import value zero but import volume non zero
2) cases where import volume zero but import value non zero
3) cases where export value zero but export volume non zero
4) cases where export volume zero but export value non zero
## Appendix 3  Recycled Fibre Classification Harmonised

<table>
<thead>
<tr>
<th>Grade</th>
<th>CEN</th>
<th>German</th>
<th>UK</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>A7 to A11</td>
<td>D11, D21, D29, D31, D39, E12, F12</td>
<td>Group 5</td>
<td>No. 6 to 9, 22, 24 to 27, 44, 48</td>
</tr>
<tr>
<td></td>
<td>B1, B2</td>
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<td></td>
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<tr>
<td>Group 2</td>
<td>A4 to A6</td>
<td>B19, V11, W12, W13, W41, W52, W62</td>
<td>Groups 6 to 8</td>
<td>No. 5, 11 to 13</td>
</tr>
<tr>
<td></td>
<td>D0 to D6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>B8 to B19</td>
<td>G12, K02, K12, K22, K51, K59, L11, O14, P22, P23, P32, Q14, R12, S12, T14, U31, U33</td>
<td>Groups 1 to 4</td>
<td>No. 15 to 21, 28 to 31, 33 to 43, 45 to 47, 49, 1S to 31S</td>
</tr>
<tr>
<td></td>
<td>C1 to C19</td>
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<td></td>
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<tr>
<td>Group 4</td>
<td>A0 to A3</td>
<td>A00, B10, B12, B42, C02, H12, H22, J11, J19, X09</td>
<td>Groups 9 to 11</td>
<td>No. 1, 3, 4</td>
</tr>
<tr>
<td></td>
<td>B3 to B7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B11 to B13</td>
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</tbody>
</table>
Views and Recommendations from a Private Sector User
WHAT ARE FAO STATISTICS USED FOR IN THE PRIVATE SECTOR?

• Provide convenient world totals.

• Provide a quick snapshot of a country's pulp and paper industry.

• Compliments private sector data exchanges, e.g. newsprint and market pulp.

• Provide world data for grades for which there is no established private sector data exchange.

• Outlook studies are a credible source of projections to reference in public and government relations work, and from which to base country projections.
QUALITY AND USEFULNESS OF FAO STATISTICS

- Not sufficient auditing/verification of the data to ensure errors in reporting are caught, and rules and definitions are respected.

- Missing data should be estimated using all available information.

- There should be more vetting of the projects reported to FAO, and greater tie-in between the project list and the capacity projections.

- Grade breakdowns and country groupings in the Orange and Green books should be made to match.

- Grade definitions should be reviewed and communicated to all those providing the data.
Quality and usefulness continued:

- Include a list of contacts so that users with questions about country data can go right to the source.

- Some other specifics:
  - not all countries provide a full grade breakdown even though confidentiality is not a problem
  - should the capacity survey go out five years? Most associations only project for four years.
  - in the capacity survey, it would be helpful to have regional sub-totals
  - split TMP and CTMP
DELIVERING THE PRODUCT TO THE "CUSTOMER"

- Must improve timeliness of the Orange and Green books
  - CPPA received the 1994 capacity survey in September
  - CPPA has not yet received the 1994 white book on production
  - CPPA has not yet received the 1993 Yearbook

- Should examine possibility of also providing data online or in machine readable form.

- Improve the look of the reports (e.g. the outlook studies) and their "identifiability".

- Provide users with a list of publications and publication dates.
SCOPE OF THE FAO STATISTICS

- Outlook studies are good but could be improved if the private sector could provide the resources.

- Provide more (revised) time series.
  - capacity
  - recovered paper

- Collect data on DIP capacity and production (both market and integrated).

- Fibre furnish update.
Presentation by C. Prins - ECE, Geneva

COOPERATION ON FOREST STATISTICS AMONG INTERNATIONAL ORGANISATIONS

WHY?

HOW?
WHY COOPERATE?

- Cost

- Coherence

- Potential gains from specialisation
COST OF DUPLICATION

- Enquiry design, circulation, data collection and checking

- Time of data users

- Confusion

- TIME OF RESPONDENTS
Those who are able and willing to provide information for international organisations are a scarce and valuable resource and should be cherished!
HOW??

- Exchange of plans
- Timing

- COMMON DEFINITIONS
- Common data collection
- Data sharing
On definitions:

Very often, reaching international agreement on definitions is a SEMI-POLITICAL COMPROMISE, not a technical or scientific exercise.
International organisations differ as regards:

- objectives
- resources
- methods of work
- experience
- scope (geography and product)
2 points:

- some data (e.g. detailed forest resource data) has a commercial value

- Differing needs and attitudes to data (cost, confidentiality, estimation ...) in official organisations, commercial consulting firms and universities
Intersecretariat Working Group
(ECE, FAO, EU, OECD, ITTO)

Two working principles:

- No piece of information to be requested twice from the same country

AND

- Same figure for same transaction presented by every organisation
Potential for cooperation at the international level with:

- national organisations

- NGOs

- associations

- specialised institutions
PREPARATION FOR THE FOREST RESOURCES ASSESSMENT 2000

by Klaus Janz
Forest Resources Division, FAO, Rome, Italy

FAO’S FOREST RESOURCES ASSESSMENT (FRA) PROGRAMME

The FRA programme consists of four components as recommended by the in-depth review in 1992 of the Forest Resources Assessment 1990 (FRA90) project and endorsed by COFO 1993. These components are:

1. forest resources assessment based on existing information;
2. forest resources change assessment using remote sensing by sampling, including the development of a Remote Sensing Processing and Archiving System (RESPAS);
3. inclusion of environmental parameters;
4. country capacity building.

The programme and in particular the mandate as we conceive it and the components are described in an information note of early 1994 with the title "FAO’s FOREST RESOURCES ASSESSMENT PROGRAMME - Components, activities, actors, responsibilities". The information is in all essential still valid.

Actors are FAO, Rome, for developing countries and global synthesis and FAO/ECE, Geneva, for developed countries.

DEMANDS AND RESOURCES

The FRA programme of FAO and FAO/ECE is meeting much increasing interest both from FAO’s and ECE’s parent bodies, the various recent international initiatives in the UNCED follow-up and from the scientific world. This interest is stimulating and challenging. It manifests itself also in conflicting demands. And it must be said that, unfortunately, it is not accompanied by corresponding resources.

Demands can be summarized as follows:

- more accurate core information on the regional/global level regarding in particular forest cover state and change;
- the process of regional/global FRA should be continuous;
- increased emphasis on environmental issues of international concern, i.e. biomass in the context of the carbon cycle, biological diversity, vegetation degradation, deforestation and causes of the two latter;
- a shift in emphasis towards country capacity building, including the use of forest resources and related information in strategic planning and decision making;
- standardization of definitions and classifications world-wide;
- quantification and valuation of non-wood goods and services derived from forests;
inclusion of indicators of sustainable forest management.

FRA is a prioritized programme of FAO. The resources are increasing along a long-term plan and despite FAO's difficult budget situation. Up to September 1995 FAO, Rome, had one professional officer in the Regular Programme plus one Associate Professional Officer (French Trust Fund) plus a team of 3-5 professional officers funded from external ad hoc resources. In addition to this there were funds for consultancies, secretarial assistance and FAO's management support. ECE, Geneva, had and has 1/2 professional officer. In September 1995 one additional professional officer, regular programme funded, joined FAO, Rome, and one more is foreseen for the biennium 1996-97.

Until further there is a serious discrepancy between the demands and the resources. In this situation a strict prioritization oriented to conceived user needs is necessary. Conflicts do arise over what should be prioritized, e.g. between the recommendations of expert meetings such as the FAO/ECE Working Party on Forest Economics and Statistics on one side and the demands arising from processes dominated by diplomats such as the activities of the Commission on Sustainable Development and the Intergovernmental Panel on Forestry on the other side.

USERS AND USES

An attempt has been made to explain our view on this in Unasylya 1993/3, pp. 3-9 (K. Janz: World forest Resources Assessment 1990: an overview).

CONTENT OF FRA2000

How well does FRA90 respond to the demands and what new will come in FRA2000?

- **Continuity.** No continuous assessment as yet, but: (i) it was planned to take an annual sample of high resolution satellite data covering the tropical zone. This was not possible due to lack of funding; (ii) it is planned to include new country information for developing countries in the FORIS database as it becomes available. This will make it possible to produce updates of global state and change at shorter intervals. The limiting factor is population data.

- **Environmental parameters.** Estimates of biomass, forest area change and - for tropical countries - a first step of addressing changes in plant species richness have been done in FRA90. A last major publication of FRA90 (to be given to printing in December 1995) will show for tropical countries area change matrices, i.e. direction of changes and other results of the remote sensing approach used in FRA90. Regarding biomass progress towards more accurate state estimates and change estimates is imminent. Most likely information on biological diversity on the country level can be improved. On the international level concepts are still unclear.

- **Capacity building.** This should be done "in its own right", i.e. for the purpose of serving national needs. It is expected that the regional/global FRA gains from it in the end, but this is not the primary aim. Thanks to active donor interest capacity building has got a good start. Existing and upcoming activities have in common a focus on bringing information into use. Strong country commitment required. Activities are "grafted on" ongoing projects. Presently there are: (i) forest sector development project Andhra Pradesh, India, with FRA support to development of planning tools, planning techniques, remote sensing facilities, forest inventory software (ii) training course for Laos, Cambodia and Vietnam with emphasis on assessment of environmental parameters. At least three other projects are in the pipeline.
- **Standardization of definitions worldwide.** The global synthesis of FRA90 suffered from the fact that core definitions (e.g. of forest) were not the same worldwide and that in developed countries estimates of area change were given for the total of forest and other wooded lands only and not for forest, as in developing countries. It is a must to agree, in the very near future, on standardized definitions and classifications for those variables that are to be included in a global synthesis of the FRA2000. Work on this has begun, but a number of problems remain (see below "milestones").

**METHODS FOR FRA2000**

(1) **Developed countries.** The 1990 study had weaknesses with regard to completeness and consistency and to quality widely varying between countries. The information had no common reference year and change information was not fully conclusive. Its strong side was that many important variables were covered (age class and ownership distribution of forest area, growing stock and growth, fellings and removals). However, it became apparent that the set of questions had been too complex for many.

Essentially the methods will be as in FRA90 (i.e. use of a questionnaire), but with intensified use of country correspondents. This should ensure more complete and consistent replies. For the latter cooperation should be sought with "the EFICS study" of European forest inventories. Under discussion are among others possibilities to include (i) georeferenced information and (ii) information on the environmental quality of forests. For this cooperation with other actors is being sought.

(2) **Developing countries.** Weaknesses of FRA90 were incompleteness and low quality of country data and the fact that the remote sensing approach was used in tropical countries only. The basic methods will even here be the same as in FRA90. Improvements will be due to new available information on forest cover, biomass and biological diversity and better capacity to make use of such information. Lead centres established in the course of capacity building will assist in compiling and verifying information.

**MILESTONES OF THE FRA2000 WORK PLAN**

June 1996  FAO/Finland Intergovernmental Consultation on Forest Resources Assessment, in Finland;

Dec. 1996  Production of the chapter on the state of forests for the "State of Forestry" report to be presented at COFO 1997;

Dec. 1998  Production of the chapter on the state of forests for the "State of Forestry" report to be presented at COFO 1999;


At the consultation in Finland (milestone event in June 1996) FAO and ECE will seek approval from authoritative country representatives for the essential definitions, classifications, content and methods of FRA2000. Before the consultation the FAO/ECE team of specialists on boreal and temperate forest resources assessment will meet in Geneva in April 1996, to finalize proposals on this matters. Moreover, a IUFRO workshop is planned in March 1996 in Washington D.C. to discuss "remote sensing support for the global forest resource assessment 2000".