Kotka I–V

20 years of expert consultations on global forest resources assessments

Metla, FAO and UNECE

2007

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METLA

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Contents

Metla/Essi Puranen

ACRONYMS AND ABBREVIATIONS

ACTO	Amazon Cooperation Treaty Organization
CBD	Convention on Biological Diversity
CIFOR	Center for International Forestry Research
COFO	Committee on Forestry
CPF	Collaborative Partnership on Forests
FAO	Food and Agriculture Organization of the United Nations
FINNIDA	Finnish International Development Agency
FRA	Forest Resources Assessment
GEF	Global Environmental Facility
ICRAF	World Agroforestry Centre
INBAR	International Network on Bamboo and Rattan
IPCC	Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
IUFRO	International Union of Forest Research Organizations
MCPFE	Ministerial Conference on the Protection of Forests in Europe
METLA	The Finnish Forest Research Institute
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNEP-WCMC	World Conservation Monitoring Centre
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
WB	World Bank

Foreword and acknowledgements

In order to provide guidance and support for the development of future global forest resources assessments, FAO, UNECE and Metla (the Finnish Forest Research Institute) have jointly organized five expert consultations. These have all been held in the city of Kotka in Finland; hence the consultations are called Kotka I–V. The first consultation was held in 1987 and the latest in 2006.

The founding fathers of the Kotka process were Jean-Paul Lanly, K.D. Singh and Philip Wardle of the FAO and Tim Peck of the UNECE. Several other experts from these two organizations have made considerable contributions to the programme of meetings over the years.

Late Aarne Nyyssönen of Metla further promoted the idea to gather experts from different countries to discuss worldwide data comparability and offered to organize a meeting in Kotka in 1987. Aarne Nyssönen also chaired the first three Kotka consultations.

All five Kotka meetings have been held in the same building, now called the Wood Technology Unit of the Kymenlaakso University of Applied Sciences. The role of the Director of the Unit, Kauko Yläsaari, has been decisive in making the same meeting venue available for all five consultations.

The financial contributions of the Finnish Government have made the meetings possible. The Ministry of Foreign Affairs supported the participation of representatives from developing countries and provided assistance for the arrangements of the first two meetings. The Ministry of Agriculture and Forestry covered a major part of the organizational costs of all five meetings and provided assistance for delegates coming from countries in transition.

The generous in-kind contribution of Metla's personnel to the practical arrangements of the meetings has been instrumental for the success of the Kotka consultations. Anne Luhtala and her colleagues have done an exemplary job in taking care of thousands of big and small things including typing of handwritten manuscripts for the first meetings, locating dietary African food, as well as searching for missing passports, keys, spectacles and participants.

In my capacity as chair of the Kotka IV and V consultations I wish to express the appreciation of the whole global forest community for the path-breaking work of the forest inventory specialists who have participated in the consultations. Unfortunately, in this short foreword it is not possible to list the names of all those participating experts who have contributed to the Kotka process.

This publication has been compiled by a team consisting of Anne Luhtala, Risto Seppälä and Ari Turunen from Metla, and Mette Løyche Wilkie, Lars Gunnar Marklund and Örjan Jonsson from FAO with inputs from Alexander Korotkov and Christopher Prins of the UNECE. The photographs have been taken by Erkki Oksanen from Metla, unless otherwise mentioned. Formatting and layout were done by Essi Puranen of Metla.

Risto Seppälä
Chair of the Kotka IV and V consultations


Metla/Essi Puranen

Preface

Forests are crucial for the well-being of humanity. They provide foundations for life on Earth through ecological functions, by regulating the climate and water resources and by serving as habitats for plants and animals. Forests also furnish a wide range of essential goods such as wood, food, fodder and medicines, in addition to opportunities for recreation, spiritual renewal, and other socio-cultural and environmental services.

The future of the world's forests and trees is at the centre of several major environmental and development issues including conservation of biological diversity, climate change, food security, sustainable livelihoods, and recreation for enhanced quality of life. A considerable amount of both public interest and political will—locally, nationally, regionally and internationally—is directed towards the conservation and sustainable use of forests. At the same time, forests are affected by fire, air pollution, pests and invasive species, and are the primary targets in many countries for agricultural and urban expansion. Competing interests for the benefits of forest resources and forest land are omnipresent, and the need for a sound basis for analysis and conflict resolution has never been greater. This requires ongoing monitoring and assessment of trends that can measure progress in protecting, conserving and using forest resources in a wise and sustainable manner.

Global forest assessments provide information on status, changes and development in forests for national and international decision-making. For this purpose it is not enough to quantify forest resources; assessments increasingly aim to address all benefits from forests – ie. multiple use of forest resources.

The Food and Agriculture Organization of the United Nations (FAO) has the international mandate to assess the world's forest resources and since it was established in 1945, global and regional assessments have been carried out at periodic intervals. The Global Forest Resources Assessment 2005 (FRA 2005), is the latest and most comprehensive assessment of forests and forestry to date. It examines the current status and recent trends for about 40 variables related to the extent, uses, and values of the forest resources.

The purpose of this publication is to review and summarize the past 20 years of the Kotka process. No assessment of the Kotka process could fail to appreciate and applaud the pioneering and cutting-edge work of participating forest inventory specialists whose work has led to changes in the way we monitor our forests and significant contributions to our knowledge about the world's forests and forestry.

Forest resource assessments

Sustainably managed forests have multiple environmental and socio-economic functions important at global, national and local scales, and they play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources and the changes over time—not only on forest area, but also on variables such as growing stock, wood and non-wood products, carbon levels, protected areas, use of forests for recreation and other services, biological diversity, and forests' contribution to national economies—are crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

National Forest Inventories

People have been making estimates of the extent of forest resources since they first started staying in one place and staking out territorial claims to the land. They wanted to know whether the lands could supply their needs for game, fuel, and building materials, and what areas were most suitable for converting to agriculture. Because of the vastness of the timber resource, people believed forests to be limitless. Exploitation, extensive clear cutting, and conversion of forests to agricultural land have been common in many areas of the world. Eventually, people gradually realized that there is a limit to forest resources.

The earliest forest inventories were carried out to find out how much wood was available. No other benefits from or uses of forests were considered.

In the 1890s, foresters in Switzerland and France determined incremental forest exploitation by comparing two periodic inventories plus records of removed volume. This early work

FAO/C.J. Carle

gave rise to continuous forest inventories. Information gathered included volume and incremental changes, but as the inventories were not based on statistical sampling, reliability estimates of the inventories could not be done.

Norway began a national forest inventory in 1919, but the first statistically-based national forest inventory was completed in Finland between 1921–1924. In addition to being able to calculate the reliability of the surveys, inventory planners could, for the first time, use statistics to design data collection efforts to achieve predetermined allowable sampling errors. By the 1920s, most Nordic countries had some type of national inventory program in place. One explanatory factor was that these countries feared a shortage of wood and they had both resources and a political will to initialize a national forest inventory.

Since the pioneering inventories, many countries have launched statistically-designed national inventories. The United States, for example, launched its first statistically-designed inventories to provide state and national statistics in 1930.

National forest assessments have gradually become more complex, incorporating more forest benefits. Ideally, a forest assessment should address all benefits from forests, ranging from biological diversity to pulpwood. In addition, the inventory should take account of the full range of beneficiaries, ranging from local land users to government decision-makers. The forest assessment can therefore be defined as a process of monitoring the value of all forest benefits for all beneficiaries, including past trends and projections into the future concerning these benefits.

Still today, very few countries have established a national forest inventory system which can provide comprehensive and comparable information on their forest resources at regular intervals. Securing the political will and resources to invest in regular field-based forest inventories is a key challenge for many countries.

Global and regional forest resources assessments carried out by FAO

1948	Forest resources of the world
1953, 1958 & 1963	World forest inventories
1970s	Regional forest resources assessments
1982	Tropical forest resources assessment
1988	Interim assessment – Developing countries
1993	Forest resources assessment 1990 – Tropical countries
1995	Forest resources assessment 1990 – Global synthesis
1997	Interim assessment 1995
2001	Global forest resources assessment 2000
2006	Global forest resources assessment 2005

Global Forest Resources Assessments

In 1910, the United States Forest Service prepared a report on the world's forest resources. This was the earliest attempt to make a comprehensive presentation of the world's forests.

FAO was founded on 16 October 1945. At the first session of the Conference of FAO, the need for up-to-date information on forest resources of the world was highlighted. This reflected concern for a possible future lack of timber, not least of all due to the needs for reconstruction after the Second World War and for support to development in tropical countries. It was recommended, therefore, that a global forest resources inventory should be undertaken as soon as possible.

In May 1946, the Forestry and Forest Products Division was founded. One of the main reasons for establishing the Division was the need for carrying out an assessment of the world's forests. The European Timber Conference held in 1948 in Marianske Lazne (former Czechoslovakia), founded the FAO European Forestry Commission and the UNECE Timber Committee, thus responding to the UN General Assembly Resolution on "Reconstruction of countries members of the United Nations devastated by war". These newly established bodies specifically addressed the issue of data collection on forests.

FAO's first World Forest Inventory (WFI) was carried out from 1947 to 1948. After reviewing

The thematic elements of sustainable forest management

1. Extent of forest resources and their contribution to the global carbon cycle
2. Forest health and vitality
3. Forest biological diversity
4. Productive functions of forests
5. Protective functions of forests
6. Socio-economic functions of forests
7. Legal, policy and institutional framework related to forests

the results of this assessment, the sixth session of the FAO Conference recommended that the Organization "maintain a permanent capability to provide information on the state of forest resources worldwide on a continuing basis" (FAO, 1951). Since that time, regional and global surveys have been conducted every five to ten years. Each has taken a somewhat different form reflecting the concerns of the time.

Initially, the assessments were focused on data collection regarding existing capacity and potential of forests to supply timber. This was motivated by the need for timber and wood products for the reconstruction of Europe after the World War II, and the need for defining national forest policies. The "World Forest Inventory 1958" stated in this respect that the formulation of a sound national forest policy required a precise knowledge of wood resources.

Statistics released by FAO on world forest area from 1948 through 1963 were largely collected through questionnaires sent to the countries. The "World Forest Inventory 1963" had already assessed a number of important parameters: forest area (productive and protective), ownership and management status, species composition (softwoods and hardwoods), growing stock and removals. The increasing importance of forests as a source for environmental and other non-wood goods and services was stated in the forest resources assessments of the 1980s.

FAO

The FAO Forestry Department helps nations manage their forests in a sustainable way. The Organization's approach balances social, economic and environmental objectives so that present generations can reap the benefits of the Earth's forest resources while preserving them to meet the needs of future generations.

In assisting member countries to conserve and utilize their forest and tree resources sustainably, FAO works in partnership with governments, international organizations and agencies, non-governmental groups, the private sector, communities and individuals. FAO works with its member countries through its headquarters in Rome; through a network of decentralized but closely coordinated offices at the country, subregional and regional levels; and through field projects.

The core of FAO's work in forestry is direct technical support offered to countries to help them conserve and manage their forests, keep them healthy, harvest them wisely, market their products, and make sure that the people reap the benefits equitably. FAO helps countries to develop economically viable approaches to the sustainable use of forest products and services, and to account for the economic and environmental benefits that forests provide. FAO assists member countries with national forest policy formulation and the strengthening of forest-related institutions, including support for extension and community forestry. The Organization assists countries with their national forest programmes and offers assistance in planning, financing and training for sustainable forest management and use.

FAO serves as a neutral forum, bringing countries together to discuss technical and policy issues related to forestry. The Organization provides information and advice on forestry, and gathering, analysing and disseminating forest-related information of all kinds.

Assessments since 1980 have taken a more solid technical form, being based on analysis of country references supported by expert judgements, remote sensing, and statistical modelling.

Today, the assessments have a much wider scope, providing a holistic perspective on global forest resources, their management and uses. By addressing seven broad topics aimed at monitoring progress towards sustainable forest management, the Global Forest Resources Assessments provide valuable information to policy-makers in individual countries, to international negotiations, and arrangements related to forests and to the general public.

For the continued provision of timely and reliable data on forest resources, their management and use, FAO relies on the collective efforts of a global network of forest inventory specialists, usually based in national government agencies or public and private research institutions.

UNECE

The strong and close cooperation between UNECE (Geneva) and FAO (Rome) in the implementation of the global FRA Programme and regional FRA- and FRA-related activities had been established from the very beginning of the collection of Forest Resources data in the UNECE region, i.e. for already some 60 years.

The UNECE Timber Division in Geneva had initially started the work on collecting forest inventory information on a world-wide level, which was later transferred to the Forestry Department in Rome, while UNECE retained the responsibility for assessment of boreal and temperate forest resources, which in fact constitute about half of the world's forests.

The enormous changes, not only those on the geographic or political map of the globe, but also economic, social and ecological (climatic), which human societies have witnessed during the 60-year span, have been very impressive. Obviously, needs of different regions and individual countries, as well as human society as a whole, in good and services provided by forests have been evolving significantly over the years. The objectives, scope and coverage of UNECE regional and FAO global forest resources assessments have evolved correspondingly.

Metla/Essi Puranen

The Kotka consultations

History

To help design and implement the global forest resources assessments, FAO and UNECE have regularly sought broad guidance from a large number of national and international experts and agencies. The discussions have been decisive for the development of the assessments.

During mid-80s, one of the main activities of FAO Forestry Departments was the Global Outlook studies and the strong need for a global and comparable set of data on supply-side forest resources. Jean-Paul Lanly and Philip Wardle of the FAO and Tim Peck of the UNECE discussed the issue of worldwide data comparability and suggested that it should be further discussed with experts from different parts of the globe. Professor Aarne Nyyssönen, Director General of Metla, the Finnish Forest Research Institute, offered one full week in the city of Kotka in Finland where experts could work together to resolve comparability problems and provide a global framework for a "global synthesis." These meetings were repeated later again in the same location in Kotka, and therefore, they gradually received the name "Kotka consultations."

The Kotka consultations are part of the process of designing future assessment as well as evaluating the assessments carried out. All five expert consultations have been jointly organised by FAO, UNECE and Metla. In addition, UNEP was a co-organiser of Kotka III, and the Forestry Training Programme (FTP) of the Finnish International Development Agency (FINNIDA) was both sponsor and co-organiser of Kotka I and II. Each of these consultations has had a slightly different focus reflecting the issues of the time and the evolution of technologies and methodologies for forest resources assessments.

In addition to chairing the meetings, Metla has been actively involved in the technical ar-

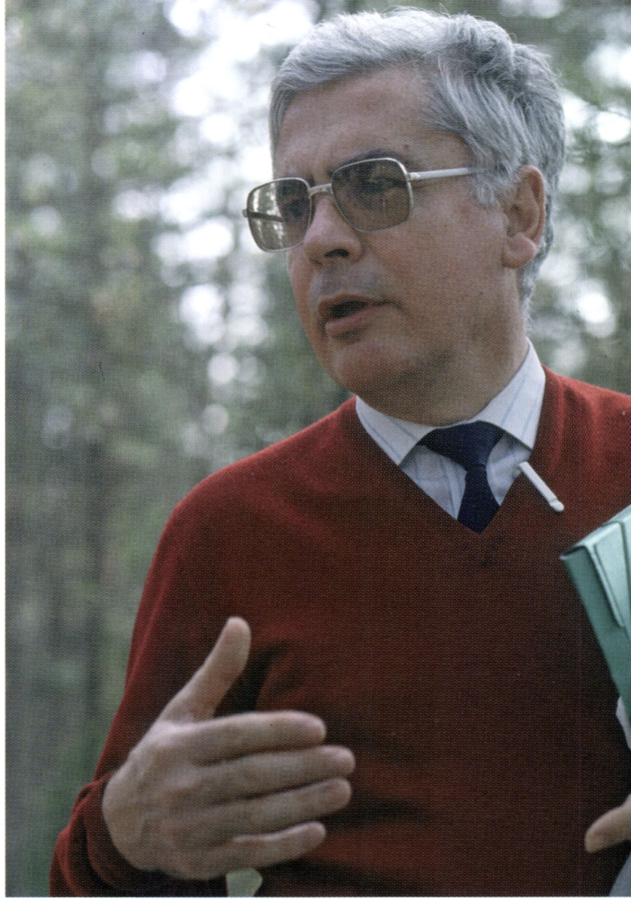
Metla

The Finnish Forest Research Institute, Metla, is an independent, governmental research organization. Metla employs 900 people, of whom 300 are researchers. Metla has nine regional research units that form a nation-wide network. Metla is responsible for carrying out and developing the Finnish National Forest Inventory. The method involves the use of satellite imagery data and digital mapping data, and ground measurements.

The chairman of the first three Kotka meetings was Professor Aarne Nyyssönen, Director General of Metla and a renowned specialist in forest inventory.

rangements of the Kotka meetings. The in-kind assistance of Metla's personnel for the organization and administration of the meetings has been instrumental for the success of the Kotka consultations.

Since the first Kotka meeting the Finnish government has provided generous financial contributions to these meetings. The Finnish Ministry for Foreign Affairs has supported the participation and travels of more than one hundred representatives from developing countries in the five meetings held to date. Also the Finnish Ministry for Agriculture and Forestry has especially supported the participation of delegates from countries with economies in transition. In addition, it has covered a major part of the costs for the technical arrangements of the meetings as well as the costs for the publishing of the proceedings.

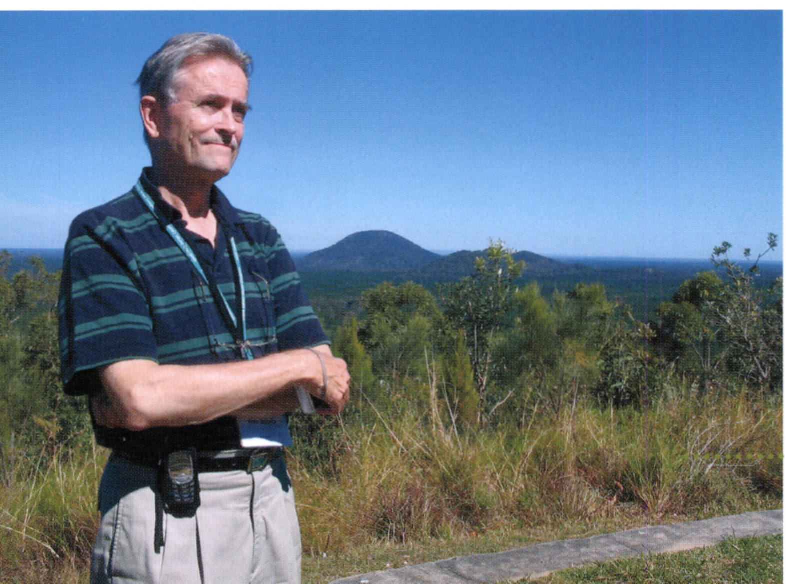


Why Kotka?

The Finnish Ministry of Foreign Affairs channeled its funding for the first Kotka meetings through the Forestry Training Programme (FTP) of the Finnish International Development Agency, FINNIDA. As the FTP had its International Training Centre in the city of Kotka, it was a natural recommendation for the venue.

Kotka is located in southeast Finland on the Gulf of Finland about 150 km east of Helsinki. The city was founded in 1878 and the population is now about 56,000. Kotka has traditionally been important to the Finnish forest industry. There are several forest industry units in this region and Kotka is the biggest export port for the forest industry in Finland.

The name of the venue of the Kotka meetings has changed within the past twenty years. All the Kotka meetings were, however, held in the same building, now called the University of Applied Sciences in Kotka, Forestry and Wood Technology Unit. The school is located approximately 15 km from the city centre and offers peaceful surroundings for the intensive and labour-consuming consultations. The Director of the Forestry and Wood Technology Unit, Mr. Kauko Yläsaari, has been decisive in choosing and re-choosing the meeting venue.



The chair of the two most recent consultations (Kotka IV and Kotka V) was Metla's professor Risto Seppälä, President of the International Union of Forest Research Organizations (IUFRO) during 2001–2005.

KOTKA I, 1987: The assessment of change

The purpose of the first expert consultation on forest resource assessment was to plan the FRA 1990. The meetings resulted in the practical proposal of the concept and methodology. The global FRA was expected to provide relevant estimates of the current status of the world's forest resources as well as the magnitude of change over time.

Objectives

At the time of the first Kotka meeting, the most recent global forest resources assessment was 24 years old (undertaken in 1963). Since then a number of regional assessments had been undertaken during the 1970s and in the early 1980s culminating in a main report for all tropical forests published in 1982. Information on the industrialized countries was collated by UNECE in Geneva and published in 1985. The forest definition varied among the two groups of countries—specifically for crown cover thresholds—as did the parameters collected, making it impossible to obtain a consistent picture of the situation at the global level.

The main objective of this first expert consultation (Kotka I) was thus to agree on the parameters, definitions and approach to be

Tania Brühl

used for a global forest resources assessment scheduled for 1990.

Recommendations

Establishing the framework for a global assessment

In addition to the use of different parameters and definitions in the past, a key concern was the availability and allocation of resources for a global assessment. The collection, processing, and dissemination of information on forests require the deployment of competent staff, the performance of appropriate surveys, remote sensing, aerial photography, ground surveys, and the associated organisation of survey teams, interpretation, mapping and data analysis. It requires significant investment in people, facilities, and equipment.

It was suggested that the programme must be tailored to deliver priority information for policy formulation and management. The main components were identified as a listing of topics recommended for consideration in national assessments covering environmental and social consideration; timber; agreed definitions of the components of the global assessment; and, an agreed approach to the global assessment, including a timetable and the roles of participating countries and international organisations.

The assessment of forest resources

The participants recommended that the assessment should cover the areas of the following forest and tree formation or "types": closed forest, open woodland, scrub, forest with shifting cultivation and trees outside the forest because of the importance for production, for rural communities and for the environment.

The assessment of change

The monitoring of change had long been considered the most important, but also

Metla/Essi Puranen

the most difficult part of the forest resource assessments. For the social and environmental topics relating to the forest as well as for the commercial production, the global forest resource assessment were expected to provide relevant estimates of the current status, as well as the magnitude of change over time.

Deforestation—the clearance of forest and the conversion of the land to other uses—and forest degradation due to overexploitation have consequences not only for the stock, increment, and availability of forest products. Such changes also have consequences for species composition, genetic conservation, the availability of products other than wood such as fruit and foliage, and the habitat of wildlife. Damage to the forest due to air pollution, fire, pest and diseases or wind was also considered to be significant causes of change.

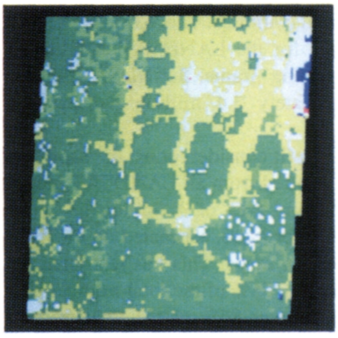
The participants recognised that the continued evolution of survey methodologies, classifications and definitions, and the imperfection of their application, successive assessments were rarely comparable and, unless specifically designed to provide an estimate of change rates, could not be used for that purpose. It was suggested that the assessment of change required a separate remote sensing survey taking account of specific physiographic and ecological conditions in different regions. More precise estimation of the impact of degradation also required a special survey.

The productive potential of forests

Participants also suggested that the assessment of forest types should be in sufficient detail to permit estimation of the resource and its capacity for production. Commercial

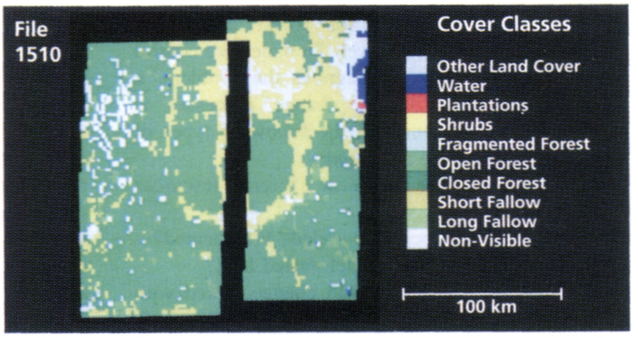
Maps derived from interpretation of satellite images of sample no. 1510

RECENT IMAGE



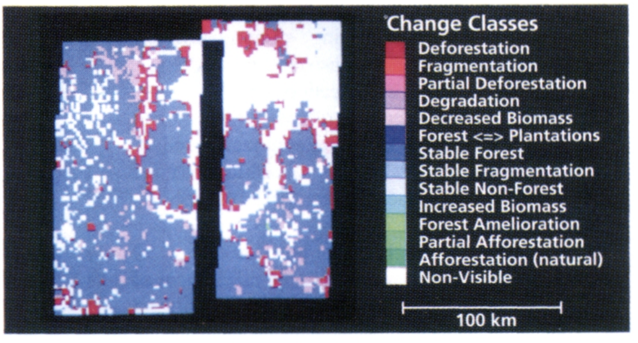
04/07/1989

HISTORICAL IMAGES (common areas)



13/06/81 20/07/79

Change maps produced by comparison of common areas of recent and historical images. The 100 possible class combinations (10x10) have been reduced to 14 change classes for display purposes.



changes (1981-89) changes (1979-89)

Pan-tropical area transition matrix for the standard period 1980–1990[1]

	Closed forest	Open forest	Long fallow	Fragm. forest	Shrub	Short fallow	Other land cover	Water	Planta-tions	million ha	%
Closed forest	1275.91	8.97	9.27	9.17	2.53	21.57	34.79	1.78	3.95	1367.96	44.6
Open forest	0.86	283.31	1.30	5.18	1.46	2.40	10.18	0.05	0.21	304.94	9.9
Long fallow	1.10	0.26	48.61	1.08	0.79	2.35	2.27	0.05	0.01	56.54	1.8
Fragm. forest	0.58	0.63	0.63	159.33	0.45	1.41	11.40	0.25	0.39	175.06	5.7
Shrubs	0.15	0.20	0.26	0.14	152.69	0.34	19.17	0.19	0.15	173.30	5.6
Short fallow	0.56	0.29	0.46	0.39	0.16	119.79	7.30	0.19	0.17	129.31	4.2
Other land cover	0.71	0.70	0.26	1.35	1.94	2.03	834.23	1.58	0.44	843.26	27.5
Water	0.14	0.02	0.01	0.05	0.01	0.07	1.46	0.00[2]	0.02	1.78	0.1
Plantation	0.05	0.03	0.00	0.00	0.00	0.01	0.11	0.00	15.68	15.88	0.5
Total 1990 *million ha*	**1280.06**	**294.41**	**60.81**	**176.69**	**160.03**	**149,97**	**920.91**	**4.09**	**21.03**	**3068.01**	
%	*41.7*	*9.6*	*2.0*	*5.8*	*5.2*	*4.9*	*30.0*	*0.1*	*0.7*		*100.0*

[1] Results based on visible common area between recent and historical satellite images.
[2] Stable water (oceans, lakes, etc) has been excluded from the analysis of changes.

volume, incremental changes and drainage were considered essential parameters in order to assess the immediate commercial potential of the forest, and it was also suggested to include total biomass.

Other important parameters

Ownership, legal status and management control were also considered to be important parameters to be included in the 1990 global assessment.

It was further suggested to include the area of forest serving different functions such as production, soil and watershed protection, prevention of desertification, biological conservation, range, hunting, recreation and landscape.

FRA 1990

Based on recommendations from the Kotka I consultation, the Global Forest Resources Assessment 1990 (FRA 1990) was designed and carried out. FRA 1990 covered all developing and industrialized countries and was distinguished by two innovations:

- development and use of a computerized 'deforestation model', which was applied to the developing country data in order to project forest area statistics to a common reference year; and,
- an independent, pan-tropical remote sensing survey of forest change based on high-resolution remote sensing data.

Assessment of forest area and forest area change

FRA 1990 sought to improve forest area estimates by eliminating the bias in expert opinions through a statistical model for predicting forest area loss. The model was based on forest area change derived from the few comparable multi-date assessments available. Deforestation rates were then regressed against independent variables to determine the rate of forest loss relative to changes in population densities within specific ecological zones. Forest area change rates were obtained by applying the model to available baseline statistics for the countries.

The advantages of the 1990 method were the near-uniformity achieved by applying the model equally to almost all developing countries and the ability to streamline the production of statistics using computer routines. Two different models were used – one for the tropics and one for subtropical areas. Other differences among countries included the lack of baseline data in some countries and a lack of a uniform ecological map and comparable multi-date observations. The disadvantages were the low number of variables used in the deforestation algorithm and the low number of observations used to construct the model, introducing a relatively high random error (i.e. low precision) in country estimates.

The use of remote sensing

Because of the many uncertainties involved in working with existing national data, FRA 1990 implemented a remote sensing survey to provide a quality-controlled set of statistics on forest resources. The use of statistical sampling combined with a uniform data source (satellite imagery) and standard data-collection methods were important tools in providing a set of statistics to compare with the country data.

The survey relied on statistical sampling (10 percent) of the world's tropical forests through 117 sample units distributed throughout the tropics. Based on the sampling, estimates were produced of the status of and changes in tropical forests at regional, ecological and pan-tropical levels (but not at the national level). Each of the sample units consisted of multi-date, Landsat satellite images, which provided the raw material for producing statistics on forest and other land cover changes from 1980 to 1990.

FAO/Ö. Jonsson

FAO used an interdependent, manual interpretation of satellite scenes at a scale of 1:250 000, conducted by local professionals, where possible, and internationally experienced professionals in other areas. Multi-date image interpretations were manually compared to one another. Ground information was incorporated into about 50 percent of the interpretations. In some areas, ground truthing was not necessary, owing to the large and consistent amount of forest. In other locations, especially where the composition of the landscape was highly fragmented, it was found to be very valuable.

The principal output of the remote sensing survey was a change matrix that illustrated and quantified the forest and landscape change over time. The forest and land cover classification scheme of the remote sensing survey was linked closely to the FRA classes for global reporting by countries.

Global estimates

Different definitions of forests for developing and industrialized countries limited the utility of the final global synthesis, as did the absence of change information on forests in industrialized countries. Only changes in the area of forest, combined with other wooded land, were assessed (the definition of forest was again set at 20 percent crown cover density for industrialized countries and 10 percent for developing countries).

Other parameters included

The assessment covered the parameters of volume, biomass, annual harvesting (tropics), and plantations. Brief summaries were also prepared on conservation, forest management and biological diversity.

Key Findings of FRA 1990

- Total forest area (global) 1990: 3.4 billion hectares
- Net forest change (tropical developing countries) 1980–1990: -13.6 million hectares per year
- Net forest change (global) 1980–1990: -9.9 million hectares per year (forest and other wooded land combined)
- Total growing stock: 384 billion m^3 over bark or 114 m^3/ha
- Total roundwood consumption: 3.4 billion m^3per year
- Carbon stock change: 0.9 ± 0.4 Gt per annum (Special study by Dixon et al., 1994)
- The area of tropical forests managed: 60 million hectares
- Number of protected areas of at least 1000 hectares: 8 619 – equivalent to 792 million hectares (not all forested) (Special study by WCMC, 1993)

KOTKA II, 1993: Common definitions and a focus on environmental aspects

This expert consultation emphasized environmental parameters for the future global forest assessment. It also recommended updating the forest resource database and regular remote sensing monitoring.

Objectives

This Consultation took place after the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992, and, as a result, environmental aspects were high on the agenda.

FAO/L. Ferroukhi

The objectives of this consultation were to obtain agreement on:

- a revision of top-level definitions and classifications to achieve more consistent information at regional and global levels;
- the incorporation of additional environmental parameters in global assessments, on the basis of the work achieved and of the conclusions of the UNEP/FAO expert consultation on environmental parameters for future global forest assessments held in Nairobi in December the previous year; and,
- the technical modalities for building developing countries' national capabilities in order for them to contribute increasingly to the accumulation of knowledge at the world level, and to strengthen the "bottom-up" component of the global exercise.

Recommendations

Consistency and comparability

Participants at Kotka II stressed the need for revising top level definitions (including the need for a common, global definition of forest) and classifications for a better consistency of the information at regional and global levels. They further recommended that care should be taken when introducing new definitions and parameters in existing data bases so that time series data were disturbed as little as possible.

Coordinated action

National and international organizations engaged in forest resource assessment should coordinate their activities and cooperate with each other in order to avoid any duplication and minimize the reporting burden on national correspondents and institutions.

Ecofloristic zones and national assessments of forest biodiversity

It was noted that the FRA methodology could make a large contribution to the knowledge of forest-related biodiversity at the national and ecosystem levels. Since ecofloristic zones had already been defined for the tropical regions to provide the global network, it was suggested that this concept should be extended to the temperate and boreal regions.

Participants recommended that additional data should be gathered and analyzed at national and sub-national levels with the view to prepare national reports on biodiversity with special reference to forest ecosystems and thereby contribute to global and regional reports on the status and trends in forest-related biodiversity.

The following specific activities were recommended:

- preparation of ecofloristic zones at the global level;
- compilation of updated national vegetation maps at suitable scales, taking into account the capability of remote sensing and formulated vegetation schemes;
- development of appropriate data bases for the protection, conservation and production forest areas, expanded to include particularly

forest reserves in tropical, temperate and boreal countries; and,

- extension of these data bases to include information on actual management, the vegetation content, and the condition of these protection and production forest areas.

Forest biomass monitoring

Because of the importance of changes in forest biomass in the carbon budget and climate change, FAO and UNEP were encouraged to prepare jointly a project proposal for global forest biomass monitoring as part of the FRA process.

Forest health assessment

The participants recommended that future temperate zone assessments also incorporate information on forest fires and forest health.

Remote sensing processing and archiving systems

Recognising the need for timely and reliable information on forest resources obtained in a cost effective way on a regular basis, the participants supported the proposed initiative to develop and maintain a global network of remote sensing processing and archiving systems. These systems would provide optimized remote sensing data to strengthen the capacity of countries to assess and monitor their own forest resources as well as assist the FRA process. The participants also suggested that the need for a remote sensing satellite dedicated to global forest monitoring be examined.

A common global database

The participants recommended that a common global data base be established to incorporate data from tropical, industrialized and non-tropical developing countries, to provide a regularly updated, single, world-wide source of data on the forest resource. They noted that before this recommendation could be implemented, it would be necessary to address a number of issues, notably the form of input required, the classifications to be applied, the adjustments necessary to convert national information to a harmonized format, the updating procedure, and reference to source materials.

An international panel

The meeting suggested that FAO, UNECE and UNEP study the feasibility of establishing an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inter-governmental panel of experts in forest resources assessment and monitoring to advise these organizations on how best to carry out their work.

Capacity building

Participants also stressed the need for enhancing the capabilities of national institutions in developing countries, notably as regards construction of national data bases, training the staff and acquiring necessary equipment, in order for them to contribute increasingly to the building up of knowledge at the global level and to strengthen the "bottom-up" component of the global exercise.

FRA 1995

The key recommendations from Kotka II were aimed at the next full-scale global forest resources assessment scheduled for year 2000.

However, an interim 1995 assessment was published in State of the World's Forests 1997 (FAO, 1997). This report published new statistics on forest area status and change for all countries with a reference year of 1995, and a change interval from 1991–1995. The definition of forest set canopy closure thresholds at 20 percent for industrialized countries and 10 percent for developing countries.

The baseline information was drawn, with a minimum of updating, from FRA 1990 data and had an average reference year of 1983. Although FAO contacted all developing countries and requested their latest inventory reports, updated information was submitted and used only for Brazil, Bolivia, Cambodia, Côte d'Ivoire, Guinea-Bissau, Mexico, Papua New Guinea, the Philippines, and Sierra Leone.

The FRA 1990 deforestation model was used to adjust developing country statistics to standard reference years (1991 and 1995). No adjustments to standard reference years were made for industrialized country statistics. Consequently, the industrialized and developing country data were not harmonized in terms of their definitions or reference year.

Key Findings

- Total forest area (global) 1995: 3.4 billion hectares
- Net forest change (tropical developing countries) 1990–1995: -12.7 million hectares per year
- Net forest change (global): -11.3 million hectares per year (total forests)

KOTKA III, 1996: INDICATORS OF SUSTAINABLE FOREST MANAGEMENT

The major outcome of this expert consultation was the global harmonization of reporting. This included methodology and modality of data acquisition and classifications and definitions to be applied.

Objectives

The main objective of Kotka III was to propose a framework for the Global Forest Resources Assessment 2000 (FRA 2000). More specifically to agree on:


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- ways in which the quality of information could be improved;
- how to respond to new information needs; and,
- data content, methods and definitions for FRA 2000.

Recommendations

The meeting took note of the importance given worldwide to the subject of global forest resources assessment. It therefore urged all governments, as well as the international organizations concerned, to give it the necessary priority by allocating sufficient means and funds, to provide the world community with the information needed on the situation, and evolution of the world's forests—in particular to ensure that the high level debate on forests be based on the best possible information.

Indicators of sustainable forest management

The meeting considered that it was important to capture as many indicators of sustainable forest management that had been identified by the on-going international processes on the formulation and application of Criteria and Indicators for Sustainable Forest Management. It identified 15 indicators relevant at the global level, which could be included in the next global assessment. The meeting noted that there was already good agreement between different sets of Criteria and Indicators, but recommended further harmonization.

Wood supply

The meeting identified the information needed to address the issue of sustainable management of forests for the supply of industrial wood and other wood, notably fuelwood. It identified suitable data acquisition methods and rated the feasibility and importance of including each new parameter.

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Biological diversity

The meeting recognised the conceptual and practical difficulties of directly measuring biological diversity, but suggested that considerable progress in understanding the current situation and recent trends could be made by including the following parameters in future assessments:

- "naturalness" (breakdown of total forest area into natural forest, semi-natural managed and used forest and plantations);
- protection status (using IUCN categories);
- fragmentation (using remote sensing); and,
- better information on forests and protected areas by ecofloristic zone (by remote sensing).

Forest degradation

The meeting identified the main factors of forest degradation (burning, overexploitation for wood, overgrazing, air pollution) and its various forms (fragmentation, reduction in crown cover, changes in species composition and stand structure) and proposed that an attempt be made to estimate burned areas and fragmentation, provided additional means could be secured.

Climate change

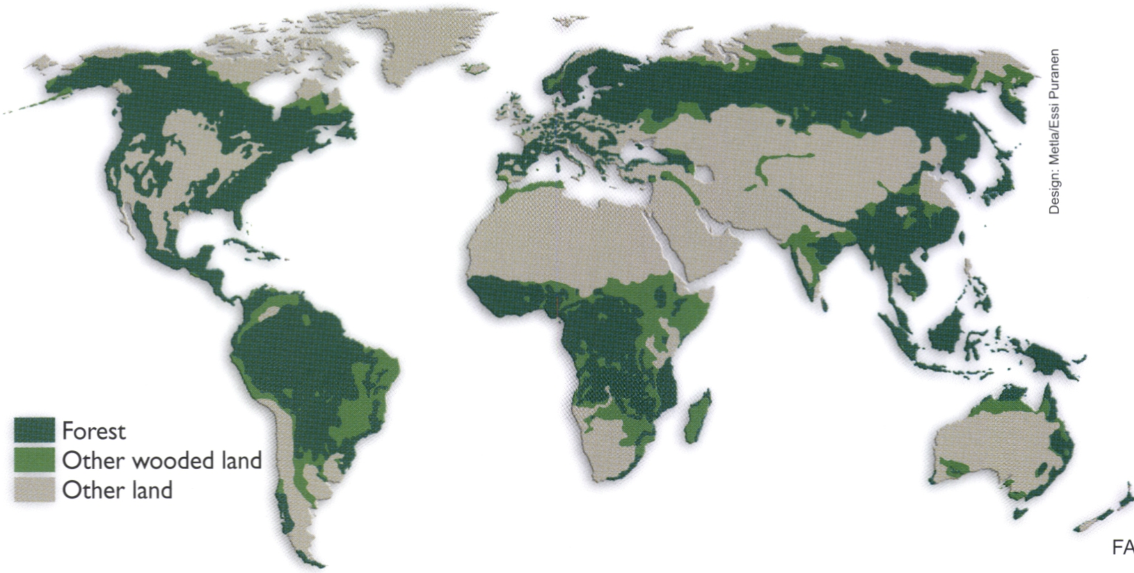
A general agreement was reached on the need to support research on assessments of volume/biomass and volume/biomass change for vegetation both above and below ground.

While remote sensing techniques alone may not be adequate for the global assessment of carbon sequestration, FAO's methodology on multi-date remote sensing techniques and field studies (applied in FRA 1990) could nevertheless be used in FRA 2000.

Non-wood goods and services

The meeting recognised the enormous difficulties of collecting global comparable information on non-wood goods and services which were often site-specific and highly diverse in their characteristics. Nevertheless, experts recommended the inclusion of information on six major groups (food and medicine, fodder and forage, industrial extracts, social and economic services, aesthetic services and cultural and spiritual services)—including indications of importance, changes in supply and demand, and indications of quantity and value.

The world's forests



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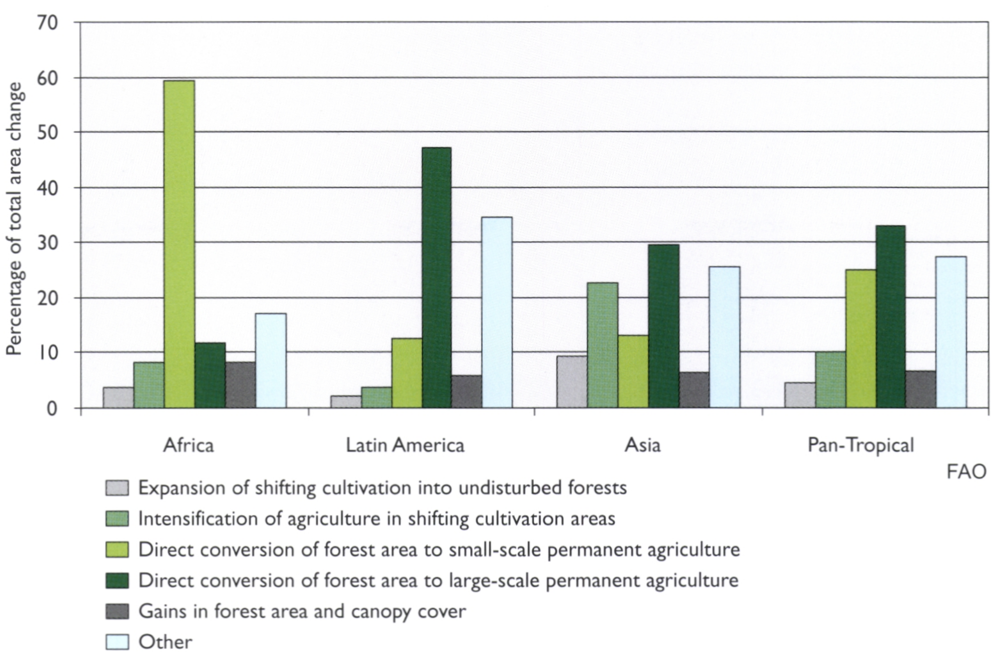
Contribution of remote sensing

The participants recommended that FAO and UNECE make use of existing digital data sets, work closely with other institutions to develop new sets, and to design and implement remote sensing programmes for estimating forest resources for FRA 2000.

Adjustment of national data

Countries should be encouraged to adjust their data to the common definitions and common reference years, describing precisely both how the data were collected and how they were adjusted. Also the source data should be available. The most recent data



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should preferably not be older than 10 years. Countries should provide an indication of the conformity of their data to the common agreed standards, which will be used in estimating the interval, and, which is likely to include the "true" value. Countries should be also encouraged to develop or modify their inventory methods so that they can provide results according to common standards.

FRA 2000

The Global Forest Resource Assessment 2000 (FRA 2000) was the most comprehensive assessment undertaken at its time in terms of the number of references used and information analysed on forest area, the condition of forests and their management, forest services and non-wood forest products (NWFPs).

FRA 2000 improved on previous assessments in several ways. It covered more countries and parameters and used a single global definition of forest.

The average national inventory year for information was closer to the global reporting year than in previous assessments. More support than in the past was given to country capacity-building; and, new technologies, such as remote sensing, were used extensively. Reliability of the results was thus greatly enhanced, but there were still many information gaps

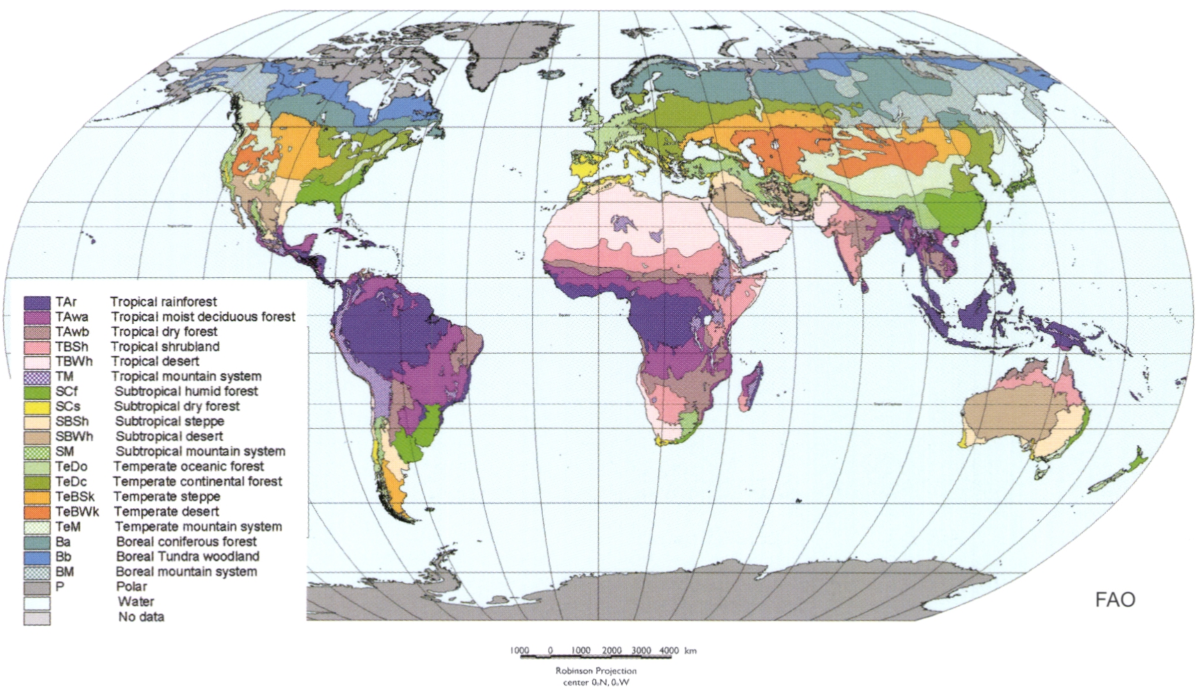
A uniform definition of forest

In FRA 2000, a uniform definition of forest—10 percent canopy cover—was used for all regions of the world. Revised estimates were made for the area of temperate and boreal forests in 1990 using the definition and methodology adopted in 2000.

Use of remote sensing to estimate tropical forest cover change

A pantropical remote sensing survey of forest cover changes was undertaken employing a

Global ecological zones

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stratified random sampling (10%) of the world's tropical forests through 117 sample units distributed throughout the tropics[1,2]. For each of the sample units, three Landsat satellite images from different dates provided the raw material for producing statistics on forest and other land-cover changes from the period 1980 to 1990 and from 1990 to 2000. This survey was an update of the study made for FRA 1990, using the same sample, but observing at three (instead of two) points in time over the twenty year period 1980–2000.

The resulting change matrix illustrated and quantified changes in the forest and landscape over time. The survey showed different patterns among regions within the tropics, which may have reflected general land-use patterns and policies. In Latin America, large-scale, direct conversion of forests dominated. Direct conversions also dominated in Africa, but on a smaller scale. In Asia, the area of gradual conversions (intensification of shifting agriculture) was equal to the direct conversions from forests to other land uses. At the global level, direct conversions dominated the picture, accounting for about three-quarters of the converted area. Most tropical deforestation was thus a result of rapid, planned or large-scale conversion to other land uses, mainly agriculture.

Special studies

Separate studies were conducted on forest plantations, trees outside of forests, endangered forest species, spatial indicators of forest biodiversity, forest management status, forests in protected areas, forest fires, wood supply, and non-wood forest products.

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[1] *The Kotka III consultation advised FAO to consider conducting the remote sensing survey at the global level with about 350 sample units. However, due to financial restrictions, no work was conducted outside the tropics (aside from some pilot activities).*

[2] *Due to a lack of suitable images available, the number of samples used for FRA 2000 was reduced to 113.*

Global forest maps

FRA 2000 developed new global forest and ecological maps which gave spatial definition to area statistics of the survey findings from individual countries and regions, providing a synoptic view of worldwide forest cover. The global ecological zoning map provides an important means of aggregating global information on forests or other natural resources according to their ecological character.

Regional and subregional summaries

Descriptions of the ecological zones and the main forest types found in each of the six regions used by FAO were also included, as were short descriptions of the forest resources, their management, and uses for 22 sub-regions.

A global data base and increased transparency

An electronic web-based forestry information system (FORIS) was developed. Efforts were also made to increase the transparency and availability of background information for FRA 2000. Many working papers were published in order to provide details on key countries and topics. Statistics, together with their underlying analyses and assumptions, were published on the FAO website and countries were officially requested to confirm their key statistics before publication.

Key Findings

- Total forest area (global) 2000: Nearly 3.9 billion hectares, of which 95 percent was natural forest and 5 percent forest plantations.
- Net forest change (global) 1990–2000: -9.4 million hectares per year (forest)
- Global deforestation 1990–2000: 14.6 million hectares per year.
- Global increase in forest area due to afforestation and natural expansion of forests during the same period: average of 5.2 million hectares per year
- Net forest change (tropical countries) 1990–2000: -12.3 million hectares per year
- Net forest change (non-tropical countries) 1990–2000: +2.9 million hectares per year
- Total growing stock: 386 billion m^3 over bark or an average of 100 m^3/ha
- Total above ground biomass: 422 Gt
- 51 percent of the world's forests lay within 10 km, and 75 percent within 40 km, of major transportation infrastructure

- 12.4 percent of the world's forests were located in protected areas
- At least 123 million hectares of forest in developing countries were covered by a formal management plan
- 89 percent of all forests in industrial countries were subject to a formal or informal management plan

Refer to www.fao.org/forestry/site/fra2000report for additional information.

KOTKA IV, 2002: Linking national and international efforts

Kotka IV was a milestone in defining and reporting on sustainable forest management, and the recommendations were fundamental for the design and implementation of FRA 2005.

Objectives

Kotka IV addressed more conceptual and strategic aspects of global forest resources assessments, including aspects relevant at regional and national levels, and considering future reporting requirements at the international level.

The objective of Kotka IV were to make recommendations to FAO and its partners regarding

- the overall scope of global forest assessments;
- the level and mechanisms for participating of countries;
- the relationship between FAO/FRA and other international bodies;
- organization of secretaries and supporting groups, particularly the establishment of a global advisory group;
- the scope and technical approach of country capacity building related to national forest assessments; and,
- the role of independent remote sensing surveys in future global assessments.

Recommendations

The participants at Kotka IV stressed the need to:

- emphasize links between national and international assessments;
- assist countries, on request, to fill information gaps;
- emphasize the multiple role of global forest assessments, including as a source of information for forest-related international processes;
- continue to expand the scope of global assessments to address all functions and benefits of forests;
- link assessments with criteria and indicators for sustainable forest management;
- reinforce the direct participation of countries in global assessments; and,
- establish an advisory group to support global forest resources assessments:

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Support to national forest assessments

Countries should assess whether they need external assistance to implement National Forest Assessments and consider seeking such help from FAO, for example through the National Forest Programme Facility, implemented by FAO.

FAO should develop guidelines to support National Forest Assessments based on low-intensity field sampling and collecting data on the biophysical status as well as the management and uses of forest resources.

The FAO approach to support National Forest Assessments should take into consideration existing information and inventory systems to make efficient use of available inventory resources.

This approach should include activities to strengthen information management and analysis, and reporting on data reliability, including strengthening the capacity to report to international processes.

Assessment of goods and services provided by forests

FAO should continue to expand the scope of global assessments to address all functions and benefits of forests and should link assessments with criteria and indicators for sustainable forest management.

FAO should also develop the methods for assessment of wood products, non-wood forest products, and forest services including biological diversity to help countries undertake assessments of these.

Establishing an advisory group to support global forest resources assessments

Kotka IV also recommended that an Advisory Group be established to support future assessments in between Kotka consultations.

FRA 2005

Support to national forest assessments

A special initiative to support national forest resources assessments, based on low-intensity field sampling and collecting data on the biophysical status as well as the management and uses of forest resources, was launched. By 2005, assessments had been completed in 6 countries and were underway in another 5 countries with more than 20 additional requests in the pipeline.

Assessment of goods and services provided by forests

FRA 2005 was originally scheduled as an update, much the same as the 1995 interim assessment. However, the opportunity was taken to test a number of new parameters in response to the recommendations from Kotka IV.

An Advisory Group to FAO's Global Forest Resources Assessments

The FRA Advisory group was established in October 2002. It is informal in nature, but it is acknowledged and endorsed by the statu-

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tory bodies of FAO such as the Committee on Forestry (COFO). It is a long-term arrangement with meetings taking place annually. The Advisory Group is tasked to review and make recommendations aimed at strengthening existing institutional networks, to make future forest resources assessments increasingly user-oriented, demand-driven, and more closely linked with other international processes.

A global network of National Correspondents

In response requests for more direct involvement of countries in future assessments, countries were requested to formally nominate a National Correspondent to the FRA process to carry out the following tasks:

- act as focal point for communication to and from FAO on matters related to national forest resources;
- provide feedback on the design and process of the next round of global forest resources assessment;
- process and submit national data to the global forest resources assessment process, including coordinating input from different national institutions, and taking into account national reporting to other international processes;
- verify and validate national information before publication; and,
- contribute to specific regional activities relating to the global forest resources assessment programme.

The National Correspondents were asked to provide a report for his/her country following a standard reporting methodology and format.

Contents of the assessment

FRA 2005 is the most comprehensive global forest resources assessment to date. More than 800 specialists were involved in the FRA 2005 process—including 172 National Correspondents and their teams.

Information was collected on more than 40 different variables related to the extent, condition, uses and values of forests and other wooded land, for 229 counties and areas and for three points in time: 1990, 2000 and 2005.

The results were presented according to six themes representing important elements of sustainable forest management and an attempt was made to answer the question: "What does the information contained in FRA 205 tell us about progress towards sustainable forest management since 1990 on regional and global scales?"

FAO worked closely with countries and specialists in the design and implementation through regular contact, training for national correspondents, and ten regional and subregional workshops.

Seven thematic studies were prepared providing complementary information on planted forests, mangroves, bamboo, wildland fires, forest pests, forests and water, and forest ownership and resource tenure.

A separate policy brief with the 15 key findings of FRA 2005 was prepared and released prior to the main report.

Refer to www.fao.org/forestry/fra2005 for additional information.

Key Findings

- Total forest area (global) 2000: Nearly 4 billion hectares, of which 36 percent was classified as primary forest, 53 percent as modified natural forest, 7 percent as semi-natural forest and 4 percent as forest plantations.
- Deforestation continued at an alarming rate, but the rate of net forest loss was slowing down:
  - Global deforestation 1990–2005: about 13 million hectares per year
  - Net forest change (global) 1990–2000: -8.9 million hectares per year
  - Net forest change (global) 2000–2005: -7.3 million hectares per year
- Total growing stock: 434 billion m^3 over bark or an average of 110 m^3/ha
- Global removals of wood: 3 billion m^3 per annum
- Total above ground biomass: 448 Gt
- Total carbon stock in, above, and below ground forest biomass: 283 Gt
- Net change in carbon stock in forest biomass: -1.1 Gt per annum
- There was a wide variation in the number of native tree species, but, on average, 5 percent of the tree species native to a country were either vulnerable, endangered, or critically endangered
- 84 percent of the world's forests were publicly owned but private ownership was increasing
- Some 10 million people were employed in forest conservation and management

KOTKA V, 2006: Collaboration with other forest related reporting processes

Kotka V looked at forest area dynamics in much more detail than previous assessments.

Objectives

The purpose of Kotka V was to evaluate FRA 2005 and to provide guidance for FRA 2010. In addition, Kotka V aimed at enhancing collaboration with other forestry related reporting processes and organizations, and to assess the need for and potential scope of a remote sensing component to complement the information provided in national reports.

Evaluation of FRA 2005

The participants recognized that FRA 2005 was the most comprehensive assessment to date in terms of scope and the number of countries included. More than 800 specialists were involved over a period of four years—including 172 officially nominated national correspondents and their teams.

The experts noted that the increased country involvement and the network of national correspondents were key factors in the success of FRA 2005 and acknowledged the very substantial work by the national correspondents, who prepared the country reports.

The national correspondents underscored that the FRA reporting process offered an incentive to gather and analyse information on the forestry sector. They highlighted the importance of the country reports in assessing and monitoring forests at the national level and as input to the policy-making process.

Recommendations

The experts made a series of recommendations for FRA 2010 and beyond.

FRA 2010: Overall scope and framework

The next Global Forest Resources Assessment should be scheduled for 2010 (FRA 2010) and employ 1990, 2000 and 2010 as the main reporting years.

The thematic elements of sustainable forest management should be maintained as the reporting framework for FRA 2010, with the addition of the 7th thematic element on the legal, policy and institutional framework.

Country reports submitted by individual countries should form the basis for FRA 2010.

Meeting the needs of conventions and other international and national processes

An important role of FRA is to provide a global platform for reporting on core, quality-controlled information on forest resources, which can be used by a wide range of international and national processes and which can contribute to an assessment of progress towards sustainable forest management.

FRA 2010 should continue to provide information on carbon stocks in forests and should provide the forest-related information needed for the assessment of progress towards the 2010 biodiversity target of the Convention on Biological Diversity.

A global remote sensing survey

A global remote sensing survey should be included as a complementary part of FRA 2010. It should provide information on the spatial distribution of forests, and on forest and land cover and land-use change dynamics, such as deforestation, afforestation and natural expansion of forests, at the biome, regional and global levels.

The network of national correspondents

The network of national correspondents should be maintained and strengthened, including support to regional networks. Collaboration among focal points for various forest-related reporting processes within countries should be encouraged.

Enhanced collaboration with other forest-related reporting processes

Collaboration with forest-related organizations, e.g. members of the Collaborative Partnership on Forests (CPF)[3], criteria and indicator processes and the remote sensing community should be maintained and enhanced with a view to pooling resources and expertise and reducing the reporting burden on countries.

A user assessment and a long term strategy for the FRA programme

A user assessment of the key outputs of FRA 2005 should be conducted once the main report has been disseminated in all six languages.

A longer term (> 15 years) strategy for FRA should be developed. This should include an analysis of the role and advantages of regional networks and regional reporting, the future reporting schedule and modality, as well as options for more streamlined reporting on forests at the international level.

The FRA Advisory Group

The FRA Advisory Group should continue to provide guidance to the FRA process and be involved in the finalization of reporting specifications, the proposed remote sensing component, and in the review of progress towards FRA 2010 and analysis of draft results prior to publication.

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[3] *The CPF is currently comprised of 14 member organizations: Center for International Forestry Research (CIFOR), Food and Agriculture Organization of the United Nations (FAO), International Tropical Timber Organization (ITTO), International Union of Forest Research Organizations (IUFRO), Secretariat of the Convention on Biological Diversity (CBD), Secretariat of the Global Environmental Facility (GEF), Secretariat of the United Nations Convention to Combat Desertification (UNCCD), Secretariat of the United Nations Forum on Forests (UNFF), Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), World Agroforestry Centre (ICRAF), World Bank, and the World Conservation Union (IUCN).*

Analysis and conclusions : Towards a truly global assessment and sustainable forest management

The Kotka process has evolved from an ad hoc Expert Consultation held in 1987 to an established process of regular consultation with forest inventory and resources assessment specialists, and representatives from all the major forest-related organizations and processes.

The most recent consultation (Kotka V) was attended by a total of 87 participants from 45 countries and 17 international and regional forest-related organizations. There were 43 participants from 23 countries at Kotka I, 53 participants from 30 countries at Kotka II, 45 participants from 32 countries at Kotka III, and 66 participants from 32 countries at Kotka IV, according to the proceedings.

The establishment of the "Kotka Process" of expert consultations has shaped the FRA process to a very large extent over the past 20 years. Some of the major developments driven by the advice provided by the participants at these meetings are highlighted below.

Towards a truly global assessment

When Kotka I was held in 1987, the most recent Global Forest Resources Assessment had been published in 1963. Since then, a number of regional assessments had been undertaken, but the use of different parameters, reporting years and definitions made it impossible to provide a global picture of the status and trends of the world's forest resources.

The desire for a global assessment was high on the agenda for the first meeting and FRA 1990 did provide a global synthesis (published in 1995). However, definitions of such key parameters as "forest" differed between developing and industrialised countries.

In FRA 2000, a uniform definition of forest—10 percent canopy cover—was used for all regions of the world. Revised estimates were made for the area of temperate and boreal forests in 1990 using the definition and methodology adopted in 2000 in order to also present information on forest area change for the world as a whole.

Yet, there were many other parameters in FRA 2000 which differed between the industrialized temperate/boreal countries and the rest of the world. However, in FRA 2005 all countries reported on the same variables using common definitions and a common reporting format. The reporting process was jointly managed by FAO and the UNECE in Geneva.

From forest area and volume to progress towards sustainable forest management

The scope of the global forest resources assessments has evolved over time in response to new knowledge and new concerns. FRA 2005 employed more than 40 variables related to the extent, condition, uses and values of forests and other wooded land. Information was provided both on the current status and on recent trends.

The use of the thematic elements of sustainable forest management as the reporting framework for FRA 2005 increased the relevance of the findings—and also pointed to areas where information is still weak.

Meeting the needs of users and harmonization of forest-related reporting

The FRA process today provides a global platform for reporting on core, quality-controlled information on forest resources used by a wide range of international, regional and national processes. The results are, for example, used for reporting on progress towards the Millennium Development Goals.

With the broader scope of the global forest resources assessments over the years, the reporting burden on countries has increased. On the other hand, there have been some positive signs, particularly in the last few years under the auspices of the Collaborative Partnership on Forests (CPF), in terms of harmonization of forest-related reporting.

An important milestone was reached at Kotka V when participants recommended that the FRA

Trends towards sustainable forest management at the global level

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate (%)	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	H	-0.21	-8 351	1 000 ha
	Area of other wooded land	M	-0.35	-3 299	1 000 ha
	Growing stock of forests	H	-0.15	-570	million m³
	Carbon stock per hectare in forest biomass	H	-0.02	-0.15	tonnes/ha
Biological diversity	Area of primary forest	H	-0.52	-5 848	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	H	1.87	6 391	1 000 ha
	Total forest area excluding area of productive forest plantations	H	-0.26	-9 397	1 000 ha
Forest health and vitality	Area of forest affected by fire	M	-0.49	-125	1 000 ha
	Area of forest affected by insects, diseases and other disturbances	M	1.84	1 101	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	H	-0.35	-4 552	1 000 ha
	Area of productive forest plantations	H	2.38	2 165	1 000 ha
	Commercial growing stock	H	-0.19	-321	million m³
	Total wood removals	H	-0.11	-3 199	1 000 m³
	Total NWFP removals	M	2.47	143 460	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	H	1.06	3 375	1 000 ha
	Area of protective forest plantations	H	1.41	380	1 000 ha
Socio-economic functions	Value of total wood removals	L	0.67	377	million US$
	Value of total NWFP removals	M	0.80	33	million US$
	Total employment	M	-0.97	-102	1 000 pers. yrs
	Area of forest under private ownership	M	0.76	2 737	1 000 ha
	Area of forest designated primarily for social services	H	8.63	6 646	1 000 ha

H = High (reporting countries represent 75–100% of total forest area)
M = Medium (reporting countries represent 50–75% of total forest area)
L = Low (reporting countries represent 25–50% of total forest area)

● = Positive change (greater than 0.50%)
● = No major change (between -0.50 and 0.50%)
● = Negative change (less than -0.50%)
– = Insufficient data to determine trend

process should provide the forest-related information needed for assessing the progress towards Target 2010 of the CBD—thus avoiding duplication of efforts.

As part of the process of harmonising forest-related reporting, three Expert Meetings on "Harmonizing Forest-related Definitions for Use by Various Stakeholders" have been held since the beginning of 2002. These meetings were organised by FAO in collaboration with the Intergovernmental Panel on Climate Change (IPCC), the Centre for International Forestry Research (CIFOR), the International Union of Forest Research Organizations (IUFRO), the United Nations Environment Programme (UNEP), and the International Tropical Timber Organization (ITTO).

Increased involvement of countries and partner organizations

The establishment of the global network of national correspondents and the emphasis on exchange of information and experiences through (sub-) regional networks and workshops were critical to the success of FRA 2005.

Collaboration with other organizations, in particular with members of the CPF, but also with the criteria and indicator processes and, more recently, with the remote sensing community has increased over the years.

The establishment of the FRA Advisory Group has helped guide the FRA process in between the Kotka meetings and has allowed for a sharing of information among specialists and representatives of partner organizations.

Incorporation of new technologies

Technological developments, not least in the field of remote sensing, have created new opportunities and the FRA programme has responded to these. FRA 1990 included a survey of forest and land use change in the tropics based on sampling of Landsat imagery. This study was updated in FRA 2000.

FRA 2010 includes plans for a very ambitious global forest remote sensing survey using both low resolution imagery to create forest maps and medium-high resolution imagery to provide information on forest change dynamics.

This initiative will allow for easy (and free) access to remote sensing imagery for sample plots located at each 1 degree latitude/longitude intersection for 4 points in time, which can also be used for other purposes.

Countries will be fully involved in the image interpretation ensuring capacity building in developing countries. Although focusing on the regional and global level, the methodology is equally applicable to the national level and provides a common, global framework for assessing and monitoring forests. The methodology could also be used, if a mechanism for reducing emissions from deforestation in developing countries is adopted under the UNFCCC.

Future challenges

Although much progress has been made over the last 20 years, many challenges remain.

Better information is needed on:

- the extent of trees outside forests;
- carbon sequestration and emission from forests;
- forest degradation – including fragmentation;
- forest biodiversity – other than trees;
- the extent, removals and value of non-wood forest products;
- the value of environmental and socio-cultural services provided by forests;
- the role of forests in providing livelihoods and reducing poverty; and,
- the area of forest under sustainable management.

While some progress has been made on the harmonization of international reporting on forests, much remains to be done regarding agreements on parameters and definitions, and reporting schedules and modalities.

In order to satisfy the needs of various consumers of FRA findings, the participants at Kotka V recommended that FAO look into the option of more frequent updates of information on core variables.

It was also recommended that FAO analyse the feasibility of including additional variables for specific regions to take advantage of increased availability of information in some regions and to address region-specific issues.

Both FRA 2000 and FRA 2005 clearly showed that very few countries have an established national forest inventory system which can provide comprehensive and comparable information on their forest resources at regular intervals. Securing the political will and resources to invest in regular field based forest inventories is a key challenge for many countries.

FAO

Future global forest resources assessments

FRA 2010

Plans are currently underway for FRA 2010, including the preparation of reporting tables, prioritization of the proposed special studies, and the design and implementation of a global remote sensing survey.

Work on a long-term strategy for the FRA programme has also started.

Kotka VI

Finland has indicated a willingness again to host the next Expert Consultation on Global Forest Resources Assessments tentatively scheduled for June 2011.

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PHOTO GALLERY

Kotka I

26–30 October, 1987

In 1987 when the first Kotka meeting was held, telex was still used for communication and a major work of the meeting organizers was typing the hand-written presentations of the participants. The technical development has been huge in the past 20 years and it has affected also forest inventory methods and tools.

Unlike the later Kotka Meetings that were held in May-June, the first meeting in 1987 was organized in October and the weather in Finland started to get chilly. The forest tour of the meeting included demonstration of the Finnish National Forest Inventory and forest damage studies.

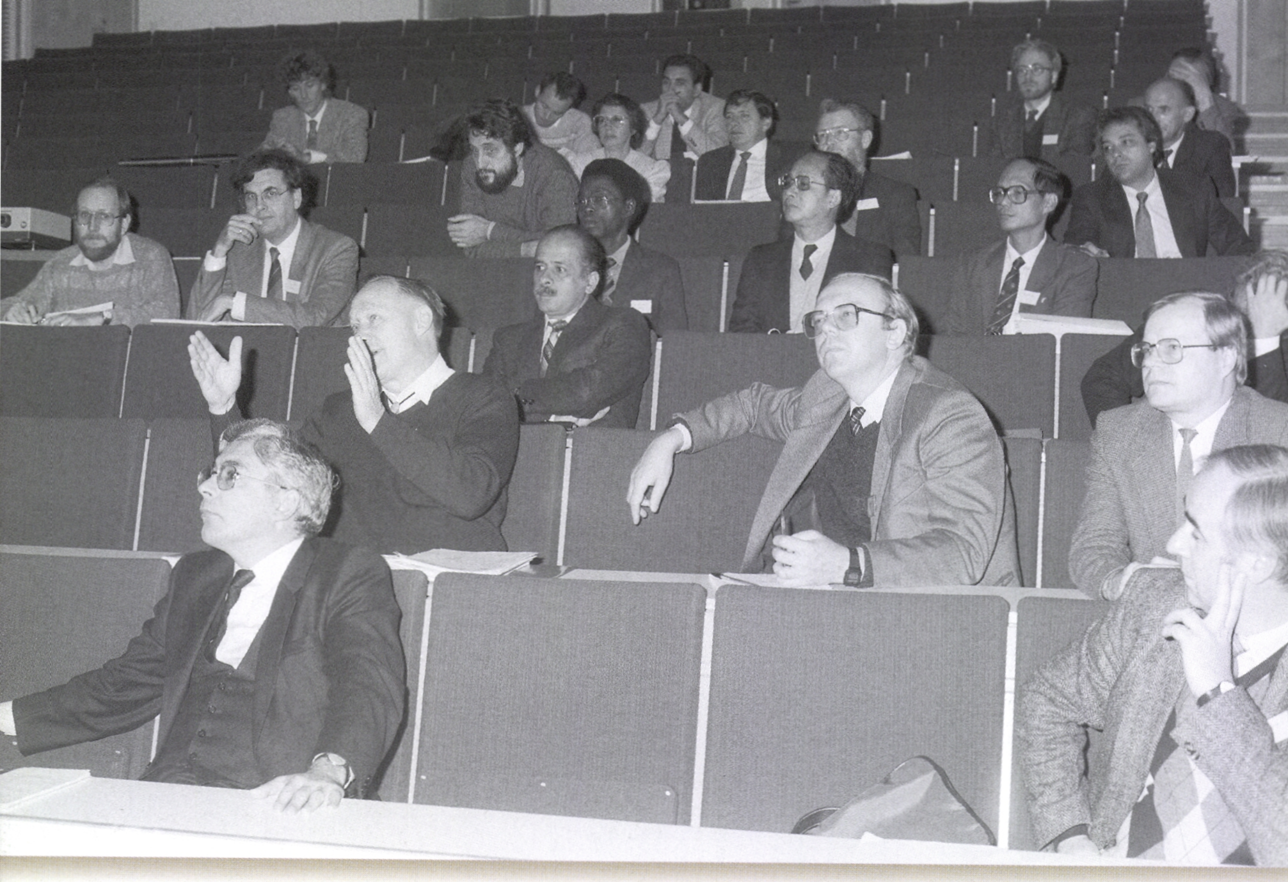


PHOTO GALLERY

Kotka II

3–7 May, 1993

The name of the venue for Kotka meetings has changed from Kotka College of Forestry and Wood Technology to Kotka Polytechnics, but the building has been the same for all the five Kotka meetings. The Auditorium has witnessed several presentations, discussions, conclusions and recommendations by specialists on global forest inventories within the past 20 years.

The excursion of Kotka II was hosted by the Finnish forest company Enso-Gutzeit Ltd.

Kotka III

10–14 June, 1996

There is an eagle in the arms of the city of Kotka. "Kotka" means "eagle" in the Finnish language.

The forest excursion of Kotka III was hosted byt the Finnish forest company UPM Kymmene Concern. During the excursion the participants learned about forest management planning system and biodiversity monitoring in Finland.


Managing
THE FOREST ENVIRONMENT
in Finland

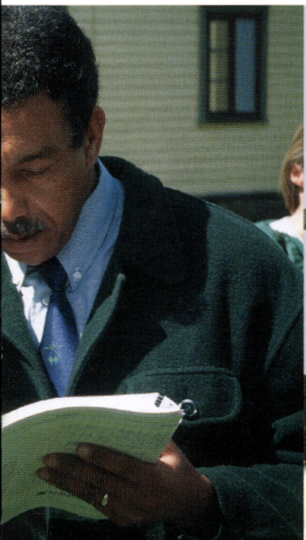

PHOTO GALLERY

Kotka IV

1–5 July, 2002

The class rooms of the College of Forestry and Wood Technology offered excellent facilities for parallel working group sessions.

In addition to forests, water element was included in Kotka IV. The ice breaking event of Kotka IV took place on the Ice Breaker "Tarmo" where participants were brought by a boat.

The forest tour of Kotka IV was organized by Stora Enso Group. The participants visited a forest site and saw a demonstration to Finnish harvesting system and family forestry.


UN-ECE/FAO
EXPERT CONSULTATION
KOTKA IV
Kotka, Finland 1-5 July 2002


Holmgren


Jagdish
Rawat
Souleymane
Gueye

PHOTO GALLERY

Kotka V

12–16 June, 2006

Kotka V was the biggest ever Kotka meeting convening 87 specialists from 45 countries and 17 international organizations. As most Kotka excursions also Kotka V had luck as for the weather. In 2006 the Kotka excursion was hosted by UPM Kymmene Corporation and it was focused on harvesting of energy wood.


DA Forest Service
FIA 2005
75th
Year
e Nation's Forest Census


KOTKA
FAO FORESTRY


UNECE/FAO
EXPERT CONSULTATION
KOTKA V
Kotka, Finland 12–16 June 2006

The cover shows the arms of the city of Kotka. "Kotka" is the Finnish for "eagle".

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