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**Expert Consultation on
National Forest Monitoring
and Assessment (NFMA):
*Meeting Evolving Needs***



Report of the

**EXPERT CONSULTATION ON
NATIONAL FOREST MONITORING AND ASSESSMENT (NFMA):
MEETING EVOLVING NEEDS**

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EXPERT CONSULTATION ON NATIONAL FOREST MONITORING AND ASSESSMENT (NFMA): MEETING EVOLVING NEEDS

Thirty-four external experts from 16 countries and eight international organizations gathered at an Expert Consultation at FAO Headquarters on November 26-28. The purpose of the meeting was to review the FAO's support to National Forest Monitoring and Assessment activities in light of new demands on countries to assess forest carbon, land use changes and other reporting requirements. These proceedings summarize the main results of the meeting.

1. BACKGROUND AND RATIONALE

The need for improving national forest monitoring systems is imperative as the demand for information has never been greater. The demand for forestry-related information comes from a variety of actors at the international, national and local levels. The problem is that few countries in the world today generate systematic data on the changing characteristics of their forest resources and trees outside forests (TOF), and even fewer countries collect and analyze information on the factors that help determine the effectiveness of public policy in supporting sustainable forest management. In 2005, FAO estimated that only 15 % of the forest in developing countries was covered by regular field-based forest inventories (FAO, 2005). The reasons for this situation are largely related to the perceived high costs of forest inventories and that countries have chosen to prioritize other areas of public investments.

The 2005 and 2007 Committee on Forestry (COFO) meetings recognized this limitation and consequently asked the FAO to “strengthen its activities in the area of monitoring, assessment and reporting on forests and intensify assistance to countries for activities in this area” (ibid: 9-59). FAO was also asked to “assist countries to better incorporate forestry in poverty reduction strategies, to enhance forest law enforcement...and to strengthen capacity for conducting national forest assessments and building forest information systems” (ibid: 9-58).

The report of the FAO Conference Committee in November 2008, responding to the recent Independent External Evaluation of FAO, indicated seven possible impact focus areas where extra-budgetary resources should be mobilised to achieve results as defined in the Medium Term Plan of FAO. One of the identified impact focus areas, “*Strengthening the information base for sustainable forest management: Building countries' capacities to manage forests and trees based on timely and reliable information*”, highlights the importance of the NFMA programme.

At the UNFCCC COP-13 meeting in Bali, the parties adopted a decision on reducing greenhouse gases emissions from deforestation and forest degradation (REDD) in developing countries involving approaches to stimulate action. Further decisions concerned enhancing the development of methodological approaches to consistently monitor and verify estimated national reductions of greenhouse gases emissions from deforestation and forest degradation over time in developing countries through transparent and verifiable means. Yet in many countries, forest and land use information is outdated, partial or subjective, and in most cases the precision is not sufficient to draw reliable conclusions in order to develop or adapt relevant policies. As a result of such insufficient information and poor data quality, including differences in concepts and definitions, scenario development and planning regarding

sustainable forest management may not be realistic. Consequently, land use policies are not in tune with real conditions and user needs, in particular those of rural populations.

FAO's response to this situation is to support member countries to carry out national forest monitoring and assessment activities. These activities aim to "contribute to the sustainable management of forests and TOF by providing decision makers and stakeholders with the best possible, most relevant and cost-effective information for their purpose at local, national and international levels" (FAO, 2002). Through the National Forest Monitoring and Assessment (NFMA) programme, FAO assists countries that have requested support in developing baseline information from statistically verifiable data on the state of the country's forestry resources, their uses and management. More specifically, countries that collaborate with FAO in implementing this approach generate policy-relevant information based on a broad set of variables ranging from biophysical characteristics of the resource to socioeconomic aspects of resource usage. The FAO-led programme is one of the few global programmes that aim at helping selected member countries to collect the data necessary to monitor and verify estimated national reductions of greenhouse gases emissions from deforestation and forest degradation.

Increased investments in NFMA programmes in developing countries have never been more urgent. There are both national and international policy processes that are in desperate need of better data and analysis on the changing role of forests in human development efforts. At the national level, the information and knowledge that are generated from such assessments may be used for strategic decisions related to how public and private investments might be directed to increase the flow of forest-derived benefits to society at large. Questions that decision makers are not able to answer without good national forest assessment data include:

- Are there untapped potentials (income, employment, livelihoods, environmental services, etc.) in the sector?
- What is the potential economic, social and ecological contribution of forests to society?
- What are the economic, social and environmental tradeoffs between forests used for conservation, commercial management and/or subsistence use for rural people?

At the international level, forest policy actors need to be informed about how the world's forest resources change over time and how these processes affect our collective ability to mitigate climate change, protect biological diversity, and to enhance the potential for forests to contribute to poverty reduction and food security. The specific questions that decision makers at this level would not be able to answer without reliable and valid NFMA data include:

- How do forests affect climatic change and how does such change affect forests?
- How do individual countries' efforts to govern forests in a sustainable way add up at the global level? What is the net effect?
- What opportunities exist for international transfers of human, financial and infrastructure capital to augment the role played by forests in the quest for the millennium development goals?

Realizing that traditional National Forest Inventories (NFIs) could not provide answers to many of these questions at both national and international levels, FAO designed the NFMA so that it also included systematic data collection on trees outside forests, identification of

forest products and services and their beneficiaries, property rights and policies associated with such products and services, as well as the socioeconomic and institutional characteristics of forest use and users.

One of the advantages of this approach is the inclusion of data on the human use of the forest resources. This feature allows national forest policy analysts and decision makers to develop new knowledge about the factors that affect the changing forest condition in a country, something that traditional NFIs could not deliver. Such knowledge makes it possible to monitor the effects of previous policy efforts and to develop alternative policy instruments that may be more effective in achieving the national forest policy goals.

2. OBJECTIVES OF THE EXPERT CONSULTATION

Increasingly detailed and diverse forest information requirements necessitate continued flexibility from NFMA systems in order to optimally serve all stakeholders. With this in mind, the main objective of the expert consultation was to explore ways to enhance the NFMA programme to meet increasing country needs in monitoring forest cover and land use change and in generating the required information for national planning purposes and international negotiations. Specifically, the Expert Consultation focused on the following objectives:

- **NFMA AS A TOOL FOR REDD MONITORING:** Identify strengths and weaknesses of the FAO approach to NFMA in relation to monitoring REDD and provide guidance for improvements taking into account methods and technologies developed for forest carbon monitoring.
- **NATIONAL AND INTERNATIONAL PROCESSES AND THEIR REQUIREMENTS:** Identify requirements of national and international policy, planning and reporting needs and assess NFMA programme capacity to meet these requirements and recommend further evolution and adaptation.
- **INFORMATION PACKAGING:** Provide guidance on how to present and disseminate information and results of the NFMAs effectively to make them accessible to policy and decision makers in countries for domestic use and reporting to international processes.

3. EXPECTED OUTPUTS

With these objectives in mind, the meeting aimed at delivering several essential outputs:

- Improved understanding of reporting and information requirements of national and international processes and conventions and recommendations for improvements to the NFMA methodology to meet requirements including monitoring REDD and establishing linkages of national forest programs with international initiatives e.g. UN Collaborative Programme on Reducing Carbon Emissions from Deforestation and Forest Degradation (UN-REDD), WB Forest Carbon Partnership Facility (FCPF), Global Environment Facility (GEF), and other international initiatives for REDD.
- Identification of strengths and weaknesses of the NFMA approach in relation to monitoring REDD and provision of recommendations for improvement to meet

UNFCCC requirements and establishment of linkages with other initiatives for methodological developments on REDD.

- Recommendations on how to improve methods for NFMA field- and remote sensing surveys to better meet national planning needs.
- Assessment of how NFMA is addressing information requirements for national land use planning and advice on how best to adapt to meet country-specific needs.
- Recommendations on how to develop the NFMA tools to be more user-friendly and applicable for various users from data collection to analysis and utilization.
- Advice on how to communicate and disseminate NFMA data according to different audiences.

4. RESULTS OF THE EXPERT CONSULTATION

Discussions during the expert consultation took place in plenary as well as in working group sessions. The FAO-NFMA team had prepared several technical documents that served as critical inputs for these discussions. In addition, several presentations were made by invited experts during the plenary sessions and served as another important input for discussions. The main findings from each of these two sources of inputs are summarized below.

4.1 Technical Background Papers

Three background papers had been prepared in advance, and were presented during the plenary sessions of the meetings. These were: (1) Technical review of the NFMA sampling strategy and statistical framework (Tomppo and Andersson, 2008); (2) Cost-analysis study of the NFMA approach (Saket et al, 2008); and (3) Working paper on Knowledge Reference, Dissemination and Networking Activities within the NFMA (Piazza, 2008). These documents provided several valuable findings, and served as useful points of reference for the participants in the subsequent discussions. What follows below is a summary that highlights the key findings from each document as well as the observations made by participants in response to the plenary presentations of the papers.

4.1.1 Technical review of the NFMA sampling strategy and statistical framework

The review carried out by Tomppo and Andersson (2008) found that the NFMA approach is generally sound and that its country-driven process with integrated social and biophysical data collection has already established itself as a viable alternative to the traditional and much more expensive National Forest Inventories. The review is available in the NFMA Working Paper series: <http://www.fao.org/forestry/media/16583/0/0/>

More specifically, the review provides methodological tools, such as semivariograms and sampling simulation exercises, to be used for exploring alternative sampling designs and plot lay-outs¹. These methodological tools allow users to compare the estimated costs associated with alternative designs. The authors also identified opportunities for how NFMA's may take advantage of multiple sources of auxiliary data. In addition to field data, which should remain the main source of data, examples were given of how a variety of remote-sensing data might

¹ See Appendix 1 of Tomppo, E. and Andersson, K. 2008. Technical Review of the FAO's Approach and Methods for National Forest Monitoring and Assessment (NFMA).

contribute to efficiency gains. To ensure that the collected NFMA is useful for policy analysis, the authors proposed a method for strengthening the links between biophysical and socioeconomic field measurements. As far as socioeconomic data collection goes, the review found that household surveys, as applied in the Integrated Land Use Assessment (ILUA) of Zambia and Kenya, represent an important step forward for the interview component and the authors recommend that the household surveys become a permanent part of a multi-source suite of methods for data collection. The likely increments in costs for doing so, the authors argue, are offset by improved levels of precision and accuracy for the estimation of socioeconomic parameters. Finally, in the report the authors encourage the FAO-NFMA programme to invest more in country-led analysis of NFMA data, especially as it relates to the country's pronounced policy needs and priorities.

In response to the authors' presentation of the review, meeting participants offered several comments. One expert noted that the cost differences that the authors observed when comparing alternative designs may be significantly different for the tropics because of differences in both vegetation characteristics and accessibility conditions. It would be worthwhile to replicate the study with data from tropical forest, if possible, (the authors expressed their willingness to carry out such tests). Several participants responded to the findings about data collection and analysis of socioeconomic data. As noted by one expert, the value of collecting data through interviews goes beyond the prospects of conducting meaningful policy analysis as it represents an opportunity to involve local resource users and communities. One participant stressed the need for the NFMA team to coordinate with other organizations that may also be collecting socioeconomic data using household surveys and/or population census, arguing that considerable cost-savings may be made. Several experts expressed their support of the reviewers' recommendation to strengthen the existing linkages between socio-economic and biophysical data. This will allow the NFMA data to be used for the monitoring of forest policies, including the REDD-related initiatives and programs. Finally, one participant suggested that the NFMA programme should focus not only on whether the NFMA has a cost-effective/optimal sampling design for specific countries, but also on to what extent decision makers actually use NFMA information and why (impact analysis)..

4.1.2 Cost-analysis of the NFMA

The report, which was prepared by the FAO-NFMA team, presented cost estimates for some of the countries that have carried out an NFMA supported by FAO's NFMA programme. The full report is available online: <http://www.fao.org/forestry/media/16584/0/0/>. The analysis in the report took into account estimated cost figures broken down by capacity building, equipment, management, mapping activities, field work (access, measurements and interviews), awareness raising among local actors, supervision and monitoring of field crews, data entry, data processing, reporting, and international technical assistance provided by FAO. The authors find that only about 25 % of total NFMA costs are consumed by fieldwork, which is almost equivalent of the cost of technical assistance provided by FAO (24%). Transportation costs from the base to the sampled tracts and back represents 27% of the fieldwork costs. Adding the household survey component in Zambia's ILUA did not significantly alter the proportion of time spent on interviews as compared to the basic NFMA

approach with interviews with key informants and focus groups only.² The table below compares the actual costs of selected NFMA and ILUA countries.

Table 1. Comparison of costs in NFMAs and ILUA

| NFMA Experience on costs | | | | | | |
|--|--------|----------|-----------|------------|----------|---------|
| Cost: US\$ 0.3 – 6 Millions, (Field data collection ≈ US\$ 3,000/sample unit: Tract) | | | | | | |
| Items | Zambia | Honduras | Nicaragua | Bangladesh | Cameroon | Average |
| Sample size (Tracts) | 221 | 156 | 371 | 296 | 206 | 250 |
| Total budget (Million US\$) | 1.169 | 0.500 | 1.068 | 0.520 | 0.580 | 0.815 |
| % of fieldwork from total | 29 | 24 | 27 | 22 | 32 | 25 |
| % of management from total | 7.7 | 7.2 | 8.5 | 6.7 | 15.3 | 8.8 |
| International TA | 29.5 | 29.6 | 13.3 | 38.5 | 13.8 | 23.7 |
| Cost per Sample unit (US\$) | 5,290 | 3208 | 2,879 | 1757 | 2,614 | 3,261 |
| Cost per km ² (US\$) | 1.6 | 4.5 | 8.2 | 3.6 | 1.2 | 2.4 |

4.1.3 Knowledge Reference, Dissemination and Networking

This background paper, prepared by Piazza (2008), presents an overview of the work developed by the FAO-NFMA team regarding the development of activities related to knowledge reference, dissemination, and networking. This paper is also available on the NFMA website: <http://www.fao.org/forestry/media/16585/0/0/>

The Knowledge Reference for NFMAs is available online and presents guidelines for how sampling, data collection, processing, and analysis may be carried out in the NFMAs (<http://www.fao.org/forestry/NfaKnowledgeRef/en/>). Potential improvements of this resource include wider dissemination through professional networks and the establishment of country-specific knowledge references. The author also notes that NFMA information dissemination occurs through a variety of channels. Examples include the NFMA website, publications series (i.e. working papers, country reports); promotional materials, and international meetings.

Finally, networking activities—defined as “the use of formal and informal linkages of individuals groups or institutions for the purpose of facilitating productive relationships for the exchange of knowledge, services, skills, and contacts”—should be organized with the purpose of spreading the awareness of NFMA and promoting a discussion for the further refinement of the methodology. At the country level, a formal network could also improve the awareness of NFMA processes and could help in maintaining a high level of attention throughout the duration of an NFMA project, as well as keeping all stakeholders involved and closely connected. Possible tools for future NFMA networking activities

² As noted in the report, this is mostly due to the fact that the ILUA team has a slightly larger number of specialized crews that inventory forests, crop, and livestock.

include the utilization of FORIS, LISTSERV, Dgroups, and Wiki pages as viable network tools for NFMA actors.

4.2 Results from Presentations and Subsequent Plenary Discussions

4.2.1 IPCC Guidelines and REDD Monitoring and Verification

Nalin Srivastava from the IPCC National Greenhouse Gas Inventories Programme presented on how the IPCC Guidelines relate to the estimation of greenhouse gases emissions and removals associated with LULUCF and REDD. The full presentation may be accessed at: <http://www.fao.org/forestry/media/16663/0/0/>

In response to the presentation, one participant asked to what extent the definitions of forest are harmonized for FAO and IPCC. The presenter explained that while the IPCC provides the methods for estimating emissions and removals from land use, land use change and forestry (and all other land uses), it does not give a definition of forest to be used by countries in reporting their national emission inventories. IPCC has also not operationalized a particular definition of forest degradation, however changes in carbon stock due to degradation are included in the emission and removal estimates. One participant suggested that forest degradation should be defined simply to mean “any loss of carbon stocks in forests at national level”. Noting the increased interest in national forest inventories that REDD has brought about, one participant pointed out that there are currently 39 pilot countries under UN REDD and World Bank initiatives. This means that FAO needs to move quickly to show how NFMA can contribute to REDD monitoring, and help countries in meeting Tier 2 and Tier 3 reporting requirements. Another observation from the plenary suggested that it is a challenge for the NFMA program to conduct the assessments in a way that achieves adequate levels of accuracy and precision for emission estimates. This obviously requires increased financial investments into NFMA activities. The same participant argued that one should not count on breakthrough from remote sensing to deliver accurate results at low costs: Field measurements will continue to constitute a critical component of all serious REDD monitoring activities, in particular for the estimates of carbon stock change and their drivers. As another participant noted, however, even if NFMAs are carried out with a higher sampling intensity to achieve higher levels of precision, one critical constraint is likely to remain for REDD: the lack of historical data to define the reference emission level (baseline) and make projections for the future. Historical satellite remote sensing data are, in many countries, the only objective data source for deriving and comparing historical and future rates of deforestation (GOFC-GOLD, 2008). Finally, several participants mentioned the essential role for independent verification of reported accomplishments so as to ensure that net removals are not overestimated. This is especially important as the majority of actors involved in REDD have an interest in seeing positive results.

4.2.2 Usefulness of NFMA data to policy makers

Timo Tokola from the Finnish Forest Research Institute made a presentation on “*Increasing accessibility of NFMA data for decision makers and other users*”. The full presentation may be retrieved at <http://www.fao.org/forestry/media/16662/0/0/>.

Several participants welcomed the central message from this presentation: the data does not speak for itself and a great deal of preparatory and planning work need to take place in order for data to be useful to policy makers. One participant reflected on the fact that as inventory specialists, it is easy to fall into the trap to believe that once data collection is completed, the process is over. As a result the NFMA the data dissemination process is often left unattended and under-prioritized. We are now beginning to see the importance in identifying the end-user and carry out needs assessment. Another participant suggested that ideally, the NFMA should have a professional dissemination focal person responsible for a communication strategy. A member of the FAO-NFMA team said that the team realizes that dissemination is critical, but efforts still need to be increased in this area. There are no blue-print solutions that will work in all countries because effective dissemination requires close connections to decision makers, accessibility to the relevant information at the right time and place, and most importantly specialized skills and knowledge about which methods are likely to work best under given conditions. Another FAO staff member noted that the countries' statistical bureaus are the natural targets for dissemination in many countries and collaboration with these entities seems critical for the sustainability of dissemination activities.

4.2.3 Country Experiences Implementing NFMA and ILUA

Ms. Ramirez and Masinja presented their experiences with NFMA and ILUA processes at the national level. The presentations may be reviewed at:

<http://www.fao.org/forestry/media/16667/0/0/> and

<http://www.fao.org/forestry/media/16664/0/0/>. Both presenters were asked about the degree to which the NFMA and ILUA data had been found useful for policy makers. Ramirez explained that in the case of Nicaragua, the government was very interested in the results to integrate them in the national forest programme (nfp) because they had been closely involved in the NFMA process from the start. In Zambia, the results of the ILUA have been used to reorient some of the national policies, in particular, for the identification of underutilized products and areas of production forests. Participants highlighted the need to put more emphasis on making the information useful to policy makers, well disseminated, and on informing them on the results and on how to use them.

4.3 Results from Working Groups

During the three days of the Expert Consultation, participants engaged in group discussions in three working group sessions. The sessions addressed (1) Information Needs; (2) Methodology and (3) Information packaging and partnerships. Each one of these technical themes was addressed for three different types of actors: (a) National level; (2) REDD actors; and (3) International Level actors. The main recommendations of the nine working group sessions are presented in Appendix 3.

5. KEY RECOMMENDATIONS FROM PARTICIPATING EXPERTS TO FAO-NFMA

Participants in the Expert Consultation made numerous recommendations to the FAO Forestry Department and its NFMA program. In the final session of the meeting, the plenary

adopted 16 priority recommendations.³ These recommendations may be organized into four overarching themes: (1) Methodological development; (2) REDD readiness; (3) Policy relevance, and (4) Management issues. What follows is a discussion of each of these recommendations.

5.1 Methodological Development

a. Explore field sampling and field plot design alternatives to match the specific country conditions.

The overall objective of FAO's NFMA programme is to support countries to plan and implement NFMA. If countries have secured necessary funding for carrying out an NFMA, FAO's NFMA programme should encourage the countries' institutions to experiment with alternative designs for sampling and plot lay-outs, if the countries by doing so do not jeopardise the NFMA implementation due to depletion of funds, human resources or "time". The NFMA programme should continue utilizing the existing country data e.g. from previous inventories and then compare analytical results with experiences from other countries. The findings from such comparisons enrich all participating NFMA countries as they plan for their assessments. Carrying out pilot studies on new ways of doing things may lead to more efficient and effective designs for responding to specific country needs and conditions. However pilot studies have proven to be very expensive activities in comparison to full scale operations and can therefore only be recommended when countries possess sufficient resources to pursue the pilot study with a full scale country NFMA.

Tomppo and Katila (2008) provide methodological tools, such as semivariograms and sampling simulation exercises, which may be used to explore alternative sampling designs and plot lay-outs⁴. These methodological tools allow users to compare the estimated costs associated with alternative designs. The FAO-NFMA programme should support partner countries in their efforts to adapt their designs to their information needs while taking full advantage of existing data (i.e. remote sensing, census data). One way of providing such technical support would be to develop illustrations and examples of how NFMA partners may explore and test alternative designs through simulations and/or pilot studies. Such guidelines may be included in future editions of the NFMA Knowledge Reference.

b. Explore how increased integration of remote sensing could make the NFMA more efficient.

While it is clear that field data collection should be the primary basic data source for any serious, large-area forest inventory, a modern inventory design should take advantage of multiple sources of data. In addition to field data, a variety of remote-sensing data may be useful, such as air-borne and space-borne remote sensing data, and other existing remote sensing-derived data (digital maps or information from possible earlier inventories and management inventories).

³ A complete list of the all recommendations from working groups and plenary is available in Appendix 1 to this report.

⁴ See Appendix 1 of Tomppo, E. and Andersson, K. 2008. Technical Review of the FAO's Approach and Methods for National Forest Monitoring and Assessment (NFMA).

Space-borne remote sensing data can be applied in at least four different non-exclusive ways: a) to calculate forest resource estimates for areas of minor representation than what is possible using sparse field data only (10,000-100,000 ha); b) to produce wall-to-wall covering maps of forest resources and others; c) as the basis for stratified estimation; d) for change detection, (area changes estimates and hotspot identification) i.e. forest disturbance or deforestation); and e) for landscape analysis such as forest fragmentation (McRoberts et al. 2002, Reese et al. 2002 and 2003).

In addition, it was stressed the importance that field data and remote sensing analysis be conducted by the same team, to guarantee the full use and understanding of both data sets, their strengths and limitations. This recommendation concerns also REDD analysis.

c. Develop approaches and guidelines to estimate over-time changes for specific parameters of interest in countries that have carried out their NFMA more than once.

The FAO NFMA programme should compile best practice guidelines for re-measurements of NFMA plots and the estimation of over-time changes for selected parameters. These should be based on current national forest inventory experiences, and include themes such as pre-stratification and statistical methods for estimating change parameters.

When the first case of a repeat NFMA becomes reality, the NFMA team should carefully evaluate the lessons learned from the way in which sampling was carried out, how change estimates were made, and which level of precision was achieved for the change parameters. Such an evaluation would shed light on the question whether the sampling errors in the NFMAs are sufficiently small to allow for statistically significant change estimates for the parameters of interest. Countries planning for their repeat NFMAs would greatly benefit from such lessons.

d. Identify options for sub-national data collection design and analyses.

Often, national counterparts are in need of representative NFMA data at sub-national levels, for “rare events” or for priority areas of their country. If they are willing to cover the extra costs involved in intensifying the sampling to reach accuracy at those levels, the NFMA programme should assist the country in exploring cost-effective design options.

e. Develop guidelines for data analysis / estimation design.

There is a wealth of existing NFMA data, but so far very little of it has been analyzed to its fullest potential. Hardly any data has been used for scientific studies. The meeting participants proposed that system be created to make some version of the data-sets (without exact/true coordinates) accessible to interested and respectable members of the research community. It is very likely that having more scientists using this data would not only deliver more knowledge to the interested parties, but it would also augment the program’s visibility. Ideally, the analysis should be carried out by the in-country NFMA colleagues together with other analysts. Supporting training opportunities for NFMA colleagues to continue to develop their analytical skills seems like a crucial part of such an endeavour. The NFMA could also help support future analytical work by producing support material and manuals for data analysis. These supportive materials could focus on specific themes of interest, such as (1) analytical methods for interview data; (2) Analyzing NFMA to estimate REDD parameters;

(3) Statistical approaches for testing socioeconomic drivers of forest variation, and (4) Estimating over-time changes for parameters of interest, among many other possible topics.

f. Develop a system for data quality control and quality assurance.

No matter how detailed the instructions in the field manual are and no matter how competent the field staff is, there are no guarantees that all data will be collected according to the established protocol. Some countries seem to have been more rigorous than others in introducing systems for quality assurance and quality control. In Central American NFMAs, the management teams have clearly taken the establishment of such systems very seriously. Besides a very rigorous and complete training of the field crews in Guatemala, Honduras and Nicaragua, the management teams conducted frequent field supervision during the data collection phases and also carried out routine controls with in-situ re-measurements to ensure compliance by the field crews. While it is important to monitor field crews and periodically check the quality of their work, it is often just as important to create quality control systems that reward good performance.

The meeting participants urged the FAO to support partner countries in the design of an NFMA system for data quality control and quality assurance that are appropriate for the individual country context.

5.2 REDD Readiness

a. Monitoring of forest area and carbon stock changes

Land use changes such as deforestation are usually rare events and therefore difficult to monitor with an adequate reliability with low sampling intensity design. Tracking such changes pose a challenge for the NFMA development. While field inventories provide essential information for the calculation of carbon stock and carbon stock changes, the use of remote sensing for improved land use / land cover change detection should be stressed, NFMA should develop this methodology in order to better meet the REDD requirements, building upon existing technical guidance (i.e. IPCC LULUCF guidelines).

b. NFMA should track anthropogenic and natural causes of land use and cover changes.

While detections of area change of deforestation and forest degradation are key issues for REDD monitoring the participants recognized that the NFMA approach is unique in that it integrates data collection for both biophysical and social processes associated with trees and forest resources. This feature will, in principle, allow users of future longitudinal NFMA data to identify potential drivers of REDD as well as distinguishing between anthropogenic and natural causes of land use/cover changes. Participants noted that such analysis requires careful treatment of land cover and land use and interactions between the two.

The integrated data collection protocol means that the NFMA programme, by combining both biophysical observations and socioeconomic data, has the potential to contribute to monitoring systems, which can gauge the socioeconomic impacts of REDD-related policies and programs.

Participants urged the NFMA programme to further develop such monitoring capabilities by taking two immediate actions:

- Strengthen the links between biophysical and socioeconomic measurements (as discussed in recommendation 3.a), and
- Adapt the existing interview protocols to capture specific indicators related to REDD-related policy outcomes at the forest-user level.

c. Explore how data collection may be expanded to cover the dynamics of five carbon pools.

Responding to likely requirements for measuring and reporting changes in forest-related greenhouse gases emissions and uptake to future UNFCCC REDD programs, the NFMA programme should analyze the degree to which existing NFMA data allows for the monitoring of over-time changes in five carbon pools: above-ground, below-ground, dead wood, litter, as well as soil and organic matter. The NFMA programme should conduct a gap analysis, which involves four basic steps: (i) For each carbon pool, describe the extent to which existing NFMA data may be used for estimating the desired carbon flux parameters; (ii) In close collaboration with partner countries, identify which additional variables may be measured to achieve better estimates for all carbon pools and define acceptable levels of error for each parameter; (iii) Given the results from analysis undertaken under point (ii) above, explore implications for both human and financial resources as well as participating countries' willingness to pay for a five-carbon-pool NFMA.

d. Further develop sampling and modelling efforts for the assessment of soil and belowground carbon.

The NFMA already comprises a methodology for collecting soil samples for soil carbon estimates. Its inclusion in the data collection protocol has never been applied so far due to the lack of willingness from national counterpart to cover the relatively high costs of analyzing the soil samples. Given the likely REDD data requirements from the UNFCCC, further development of sampling and modelling to improve the assessment of soil and belowground carbon should be pursued by the FAO-NFMA team.

5.3 Policy Relevance

a. Strengthen the linkage between social and biophysical data.

One of the fundamental justifications for collecting data through interviews is that this information is useful for producing policy-relevant knowledge at both the national and international levels. The idea is that the data on forest users and their relationship to forests and trees outside forest will help policy makers identify priority areas for policy interventions. For example, NFMA data may indicate that 30% of the country's rural residents do not have secure access rights to fuel wood. Subsequent analyses may show a significant correlation between the insecurity of access rights and the degree of forest degradation. Such analytical results might be useful for policy analysts and decision makers. Hence, the analyses integrating socioeconomic and biophysical data are currently tenuous and need to be strengthened to better understand their inter-linkages.

It is recommended that the NFMA programme adopt, as a starting point, the interview protocol proposed for this purpose in Tomppo and Andersson (2008). By systematically applying this protocol in all field sites, analysts of interview data can be more confident that the data on forest use and user characteristics correspond more closely to data on measured trees and forests.

b. Develop efficient dissemination techniques/approaches, including web based access to data and query systems and a systematic effectiveness/impact analysis.

All working groups concluded that dissemination of NFMA results constitutes a critical factor for the national programs' ability to inform policy decisions and actions. Meeting participants also noted that the communication and dissemination of results is an area that has not received as much support and attention from the FAO forestry department as the data collection and processing components. The participating experts advise the FAO to invest more resources and offer more technical support for the strengthening of the dissemination component of the NFMA programs in partner countries. The working groups proposed several actions:

- i. Establish interactive, web-based data accessible to the general public. Before making the data available online, each national NFMA programme should remove or modify data that may cause an invasion of privacy or affect the treatment of the resources. One working group suggested that future NFMA support should be offered on the condition that the resulting NFMA data are made available to the public.
- ii. Provide technical support to partner countries for how they might make communication and dissemination of results more effective. The NFMA programme should draw on FAO' existing expertise from other Departments within the organization and on similar programmes worldwide to identify appropriate techniques and formats for dissemination activities. The organization has several professional staff who are experts in media, communication, and dissemination. While such expertise currently exists at headquarters, it is the task of the NFMA team in the Forestry Department to bring this knowledge down to the country level where it can actually be tested, adapted, and put to use.
- iii. Conduct an empirical analysis of why some countries' NFMA activities have been more successful than others in achieving positive policy impact. One working group proposed a comparative research design in which the NFMA team investigates the enabling conditions for positive policy impacts. Such an analysis should seek to document which particular decisions and actions seem conducive to establishing stronger links with policy makers. This analytical work should form the basis for future NFMA resource materials and guidelines that would help countries establish stronger ties to the policy processes in their countries. One working group stressed the importance of organizing meetings in which representatives from participating countries have a chance to exchange their experiences and learn from each others' efforts to create stronger linkages with public policy processes in their respective countries. In general, impact analysis should be carried out systematically after the NFMA in each country to assess the impact on the findings on policy and decision making processes.

c. Develop a protocol and guidelines to identify and prioritize country data / information needs.

In an effort to tailor each NFMA country programme to respond to the specific information needs of that country, the NFMA should develop a protocol that can help the participating actors with the identification and prioritization of the national information needs. Such a protocol would consist of a series of questions that participants in the planning phase can go through together. Questions would ask for the specific parameters that are of particular interest to national policy actors; the error levels that are acceptable for national and sub-national parameter estimates; and the degree to which national actors would be willing to pay for higher precision for national and sub-national estimates.

5.4 Management Issues

a. Reinforce the FAO NFMA team with experts from other fields, including communication and media experts, social scientists, and policy analysts.

The countries needs have evolved and may no longer be addressed through traditional technical support programs that focus exclusively on data collection and processing. New needs, as noted during the EC, include ways in which the NFMA data could be used to track emissions and removals associated with land use changes and how NFMA programs may strengthen their linkages with policy processes. To meet these evolving needs, the NFMA programme needs reinforcement from experts in areas such as policy analysis; carbon accounting, as well as in the area of communication, dissemination and media. As noted under recommendation 3.b.ii, some of this expertise is available in-house at FAO headquarters.

b. Establish a multi-disciplinary advisory team to FAO NFMA.

An NFMA Advisory Board with members representing a variety of relevant specialties should be formed to provide continuous guidance and support to the growing FAO program. The Advisory Board should include members representing political, scientific and practical field experience related to the implementation of NFMA-type activities.

c. FAO should increase partnerships both at national and international level to meet current and emerging needs.

Participants were encouraged to see that the 2008 Expert Consultation included representatives from a broad range of organizations. The FAO NFMA team should continue its current efforts to broaden its international NFMA network, and to form new partnerships with organizations with particular know-how and experience, as this will help the programme meet current and emerging needs.

d. Invest in national capacity building for NFMA.

The quality of NFMA data and the impact its results have on national policies depend, to a large extent, on the capacity of the personnel involved in national NFMA activities. The FAO-NFMA team should continue their excellent work in the area of capacity building in partner countries. The program's creative use of NFMA field experts from countries that have

already carried out NFMAs, through FAO's TCDC program, is particularly noteworthy.⁵ Future capacity building should take into account emerging needs in the area of communication with policy actors (including dissemination tools), REDD monitoring, and the development of analytical NFMA products on topics that are of high priority to national policy actors.

⁵ FAO has employed NFA experts from Guatemala to support NFA developments in Honduras, Nicaragua and Kenya; an NFA expert from The Philippines has been employed to support NFA developments in Lebanon and Bangladesh and an NFA expert from Lebanon has been employed to support NFA developments in Zambia and Congo.

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APPENDIX 1: AGENDA

AGENDA

**Expert Consultation on National Forest Monitoring and Assessment
(NFMA): Meeting Evolving Needs
26-28 November 2008 - German Room C229**

| TIME | AGENDA ITEM | DESCRIPTION |
|--|--|--|
| Wednesday 26 November | | |
| OPENING Session | | |
| 8:00-9:00 | Registration | Participants may obtain building passes at the Turkish lodge |
| 9:00 -9:30 | Welcome | Jan Heino, ADG Forestry Department, FAO José Antonio Prado, Director/Jim Carle, Chief, FOMR, FAO |
| PLENARY Session | | |
| Overview of FAO Support to NFMA programme | | |
| Chairperson: Jim Carle/José Antonio Prado | | Rapporteur: Dr Krister Andersson |
| 9:30 – 10:00 | National Forest Monitoring and Assessment (NFMA): an evolving process | <i>Overview and rationale of NFMA,</i> Mohamed Saket, NFMA Coordinator, FOMR, FAO |
| 10:00 – 10:15 | Discussion | |
| 10:15 – 10:30 | Coffee break – German Room, C229 | |
| 10:30-11:30 | Findings and recommendations of NFMA methodological evaluation | Erkki Tomppo, Professor, The Finnish Forest Research Institute , Vantaa, Finland Krister Andersson, Assistant Professor in Environmental Policy, Department of Political Science, University of Colorado at Boulder |
| 11:30 – 12:00 | Discussion | |
| 12:00 – 12:15 | International information needs on forest resources | Mette Loyche Wilkie, Global Forest Resources Assessment, FOIM, FAO |
| 12:15 – 12:30 | Discussion | |
| 12:30 – 14:00 | Lunch break | |

TECHNICAL Sessions

Technical Session 1 : INFORMATION NEEDS

Adapting NFMA methodology to serve new information needs

Chairperson: Jim Carle/José Antonio Prado

Rapporteur: Dr Krister Andersson

| | | |
|---------------|--|---|
| 14:00-14:20 | Integrated Land Use Assessment (ILUA), addressing national policy and planning needs | Anna Chileshe Masinja, Director of the Forest Department, MTENR, Zambia |
| 14:20-14:40 | Country experience implementing NFMA | Carla Ramirez, NFMA Forestry Officer, FOMR, FAO |
| 14:40-15:00 | <p>Introduction to working group sessions</p> <p><i>Description of theme-based working groups and review of terms of reference for session one: information needs. Participants are requested to divide into 3 respective working groups::</i></p> <ul style="list-style-type: none"> - National level - REDD context - International level <p>(please refer to Working Group ToR for more details on stated goals & objectives)</p> | Mohamed Saket, NFMA Coordinator, FOMR, FAO |
| 15:00-15:15 | Coffee break – German Room, C229 | |
| 15:15– 17:00 | Working Group 1: National Information Needs | German Room, C229 |
| | Working Group 2 : REDD-specific information needs | TC Meeting Room D642 |
| | Working Group 3: International information needs | NR Meeting Room B503 |
| 17:00 -18:00 | Presentations and discussions of each WG's conclusions on information needs (German Room) | |
| 18:00 – 20:00 | Cocktail – Indonesia Room, B844 | |

Thursday 27 November

Technical Session 2: METHODOLOGICAL REVIEW

Technical Session 3: INFORMATION PACKAGING, DISSEMINATION & PARTNERSHIPS

Chairperson: Jim Carle/José Antonio Prado

Rapporteur: Dr Krister Andersson

| | | |
|--------------|---|---|
| 9:00-9:20 | Methodological developments in monitoring, assessment and verification of REDD | Nalin Srivastava, Program Officer, Technical Support Unit, IPCC National Greenhouse Gas Inventory Program, Kanagawa, Japan |
| 9:20-9:40 | Increasing accessibility of NFMA data for decision-makers and other users | Timo Tokola, Professor, Faculty of Forestry, University of Joensuu, Finland |
| 9:40 – 10:00 | Introduction to Working Group Sessions 2 & 3 | Adapting NFMA methodology to better address stated information needs from Session 1. Information packaging & dissemination – getting data into the right hands Mohamed Saket, NFMA Coordinator, FOMR, FAO |
| 10:00-10:15 | Coffee break – German Room, C229 | |
| 10:15-12.30 | Working group 1: <i>Methodological review for meeting national level information needs</i> | German Room, C229 |
| | Working Group 2: <i>Methodological review for responding to REDD information needs</i> | TC Meeting Room D642 |
| | Working Group 3: <i>Methodological review for meeting international level information needs</i> | NR Meeting Room B503 |
| 12:30 -14:00 | Lunch break | |
| 14:00-15:45 | Working group 1: <i>Information packaging and dissemination to national policy makers</i> | German Room, C229 |
| | Working Group 2 : <i>Information packaging and dissemination for REDD</i> | TC Meeting Room D642 |
| | Working Group 3: <i>Information packaging and dissemination to international reporting and processes</i> | NR Meeting Room B503 |
| 15:45-16.00 | Coffee break – German Room, C229 | |
| 16.00-17:30 | Presentation by Working Groups followed by discussions (German Room) | <i>Presentations and discussions of each WG's conclusions on information needs</i> |

Friday 28 November

CLOSING session

Chairperson: Jim Carle/José Antonio Prado

Rapporteur: Dr Krister Andersson

| | | |
|----------------------|---|---|
| 8:30-10:00 | Plenary discussions | Plenary and discussion session on the results of working groups |
| 10:00-10:15 | Coffee break – German Room, C229 | |
| 10:15-12:30 | Recommendations | Statements and recommendations from the expert consultation |
| 12:30 – 12:45 | Closing remarks | Selected persons Jan Heino, ADG Forestry Department, FAO |

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APPENDIX 3: RECOMMENDATIONS FROM WORKING GROUPS

Session 1: Information Needs:

Recommendations from Working Group 1 (National Level)

- Develop guidelines for data analysis
- Define 10-15 core NFMA variables
- Study and incorporate “Climate Change” parameters
- Acknowledge uncertainty (sampling and measurement errors) when presenting data
- Support the application of harmonization approaches in view of international reporting to cover the existing information to comparable one;
- Strengthen linkages between social and biophysical data for better analytical results
- Adopt new estimation methods for carbon and soil characteristics (which requires the collection of new data)
- Create guidelines for implementation of data quality assurance/control systems
- Explore how sub-national information needs may be accommodated in the NFMA
- During the planning phase, investigate possible collaboration and synergies with other organizations/data collection activities
- Use needs-based approach in the planning of inventory output and methodologies

Recommendations from Working Group 2 (REDD)

- The monitoring methodology should be effective, efficient and equitable
- Explore how interview data may be used to identify potential drivers of deforestation and forest degradation and to monitor the socioeconomic impacts of REDD policies
- Continuous monitoring of the carbon stocks dynamics in the five pools (aboveground, belowground, deadwood, litter, soil) is required, at a higher level of disaggregation (management regimes, age, elevation, soil types, and level of disturbance, etc) (Tier 2 and 3 reporting level)
- Use existing data from completed NFMAs to identify gaps in monitoring and reporting for REDD
- Information is needed at Reference Emission Level (REL)

Recommendations from Working Group 3 (International Reporting):

- Move towards “permanent ongoing sub-sampling approach” (e.g. 20% of measurements per year)
- Look at the availability of timber/wood resources connected with bio-energy and bio-fuels
- Monitor of social aspects of carbon markets: biophysical and socio-economic information should be combined to understand how people use the forest
- Expand their reporting of tenure arrangements to include forest tenure
- NFMA should be scaleable in order to support information generation for sub-national policy processes, e.g. at province and district levels

Session 2: Methodology

Recommendations from Working Group 1 (National Level):

- Develop guidelines which address the implementation of data quality assurance systems
- Guidance is needed on how to reach policy makers--study what worked in existing NFMA country experiences
- Involve stakeholders as early in the planning cycle as possible to discuss possibilities of additional variables, sampling intensity, willingness to pay for sub-national data
- Prioritize and reduce number of variables
- Explore alternative sampling designs and plot layout with actual cost data to identify efficiency gains;
- Match socio-economic with biophysical data
- Field data and RS data should be handled and analyzed by the same team
- RS data should be combined with field data to improve efficiency

Recommendations from Working Group 2 (REDD):

- Use stratification based on variance of carbon density;
- NFMA carbon monitoring should aim to become at least tier-2 (IPCC guidelines) compatible and strive for tier-3 compatibility
- Expand measurement to all trees (>1 cm)
- Change methodology (sampling intensity) so that sub-national level results are achievable;
- Method should focus on accuracy and reliability and completeness of the information;
- Sampling design should be stratified based on biophysical information so that it is time efficient and cost effective;
- Find out how much it costs to reduce the sampling error;
- Report annually only for the hotspots, using RS in combination with field observations;
- Use household survey to explore potential drivers of deforestation;
- Each country should select an approach that suits their circumstances;
- Country capacity building component of REDD and NFMA should be continuous over time,
- All methods and results should be open to users so that they understand how the results were produced.

Recommendations from Working Group 3 (International):

- NFMA should be expanded to cover variables and parameters required for other conventions;
- Provide guidelines on how to analyze socioeconomic data
- Coordinate data collection with other organizations;
- Verification of species identification (if it is a priority to the users);
- All variables should be split between MUST KNOW and NICE to KNOW variables;
- Carry out impact analysis of which variables are critical;
- Remote sensing should be used as available;
- Distinguish between land use and land cover;

- Carry out training workshops on how to combine field data and remote sensing
- Train enough people to make sure a critical mass exists, and provide guidelines for training.

Session 3: Information Packaging

Recommendations from Working Group 1 (National Level)

- Strategy of dissemination should be formulated in the planning stage (end use analysis) and be included in the budget,
- Establish mechanisms to receive feedback from users (through advisory committee, or tracking web users);
- Communicate results using map-based presentations
- Use popular topics as hooks/baits to inform people about the availability of data (e.g. blueberries in Norway);
- Make people-friendly products that consider a variety of users
- Store data in formats that make it accessible;
- Make data sharing obligatory and condition support to NFMA with a commitment to share;
- Partner with FAO COUNTRYSTATS to build capacity for statistical analysis;

Recommendations from Working Group 2 (REDD)

- Coordinate with existing initiatives (UNFCCC, IPCC, GOFCC);
- Focus on capacity building for REDD,
- Follow REDD requirements and recommended reporting format;
- Separate users according types (international, national and local);
- Spatial data should be made available without coordinates;
- Socioeconomic drivers should be compiled and analytical results should be disseminated;
- Protect confidentiality and sensitive privacy issues, and countries are the owners of the data;
- Develop strategies to link with REDD –closely follow the outcomes from the REDD negotiations and cater outputs to those needs;

- Freely available, searchable, on-line data base for NFMA data linked to a web interface (similar UNFCCC GHG database)

Recommendations from Working Group 3 (International)

- Move beyond reports and have online system that is a more continuous process
- Introduce clear meta data in order to better understand background
- Promote online access
- Produce a newsletter to informing people of updates/reports/new statistics
- Need to assess/analyze existing experiences and the factors that led to success and failure
- Produce knowledge reference on NFMAs—how to combine field data with RS, how to analyze data, etc.
- Introduce NFMA to Internet based search engines and references like Wikipedia, Google etc.

