IPCC First Authors/Experts Meeting on Good Practice Guidance for Land-Use, Land-Use Change and Forestry

Meeting Report

Eisenach, Germany
(12 – 14 March 2002)

Supporting material prepared for consideration by the Intergovernmental Panel on Climate Change. This supporting material has not been subject to formal IPCC review and approval process

Acknowledgements

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EXECUTIVE SUMMARY

In accordance with the work programme for the development of Good Practice Guidance for Land-Use, Land-Use Change, and Forestry (also known as Task 1), which was approved at IPCC XVIII, in September 2001, Wembley, UK, the First Experts/Authors' Meeting was held on 12-14 March 2002, in Eisenach, Germany. The meeting was hosted by the Government of Germany through the Federal Ministries BMBF and BMU. The main objective of the meeting was to conduct substantive work on all chapters with an accelerated handling of Chapter 2 (Basis for consistent representation of land areas) and with the aim of producing the zero-order draft. The meeting also aimed to: 1) discuss the initial draft outline for each chapter of the report, paying special attention to consistency and harmonisation requirements; 2) explore the availability of scientific and other materials; and 3) assign the authors to specific tasks and to identify gaps in required expertise.

Substantive discussions were held on Chapter 2 to have a basis for consistent representation of land areas. Participants were assigned to different breakout groups to discuss the initial draft outline of each chapter of the report and to pay special attention to cross-cutting issues for consistency and harmonisation. The meeting objectives were largely met through the constructive contributions of all participants. An agreement was reached on the proposed six broad categories of land use for reporting on land areas (i.e. forest land, cropland/arable/tillage, rangelands/pasture land, wetland, settlements, and other land). These broad categories or land use classes would be further elaborated (into sections and subsections) to form a functional basis for other chapters. The "mapping" of these broad categories to the categories in the Revised 1996 IPCC Guidelines was considered important. The main components of the Good Practice Guidance (i.e. methodological issues, reporting and documentation, and inventory quality) were applied to each chapter. Authors and Contact Persons for specific tasks or sections and subsections of each chapter were assigned and potential Contributing Authors were identified. Timeline for the development of extended outlines for sections and subsections and the preparation of the zero-order drafts for each chapter were set and contact persons to enhance discussions within and among chapters were named.

First Authors/Experts Meeting: Good Practice Guidance for Land-Use, Land-Use Change and Forestry
12 – 14 March 2002
Steigenberger Hotel Thüringer Hof , Eisenach, Germany

BACKGROUND

IPCC XVIII, in September 2001, in Wembley, UK, endorsed the Land-Use, Land-Use Change, and Forestry (LULUCF) work programme and accepted the Terms of Reference, the Table of Contents, and the Work Plan for the development of Good Practice Report for LULUCF (Attachments A, B, and C). The Panel also gave authorisation to the Task Force Bureau on Inventories (TFB) to select the Coordinating Lead Authors (CLAs) and Lead Authors (LAs) for the work. SBSTA15, in November 2001, in Marrakech, Morocco, welcomed the IPCC work on Good Practice for LULUCF and noted to give priority to this task in developing its LULUCF work programme. The Seventh Session of the Conference of the Parties, also in November 2001, in its Decision 11/CP.7, invited the IPCC to develop good practice guidance for the LULUCF Sector.

TFB 7, in December 2001, decided on the list of CLAs and LAs for the Good Practice Report, including the creation of the Steering Group with the TFB Co-Chairs and four LAs as its member (Attachment D). The IPCC B24, in December 2001, in Geneva, endorsed the list of CLAs and LAs and the Steering Group. Also in that meeting, the first expert meeting in March 2002 was approved with a view to work on a more detailed outline for the different chapters and to identify linkages among chapters.

OBJECTIVES OF THE MEETING

The main objective of the meeting was to conduct substantive work on all chapters with an accelerated handling of Chapter 2 (Basis for consistent representation of land areas) and with the aim of producing the Chapter 2 zero order draft as soon as possible. Meeting participants were also asked to:

- discuss the initial draft outline for each chapter of the report, paying special attention to consistency and harmonisation requirements;

- explore the availability of scientific information and other materials;

- assign the authors to specific tasks and to identify gaps in required expertise.

ORGANISATION OF THE MEETING

The meeting was hosted by the Government of Germany through the Federal Ministries BMBF and BMU. One hundred and one experts on land-use, land-use change, and forestry and greenhouse gas inventories were invited to participate and to serve as CLAs and LAs for

the task (Attachment E). This total number included six members of the Task Force Bureau for Inventories and experts from international organisations who took part in the discussions. The meeting was coordinated by the Technical Support Unit of the IPCC National Greenhouse Gas Inventories Programme (IPCC-NGGIP-TSU), with support from the local organisers of the German IPCC-Coordination Office of the Federal Ministries BMBF and BMU.

The meeting was chaired by Taka Hiraishi, TFB Co-chair, who also gave the opening remarks. Dr. Ulrich Katemkamp of the Ministry for Education and Research (BMBF) gave the welcome remarks. Riitta Pipatti, Head of the IPCC-NGGIP-TSU, presented the background of the Task 1 project, the objectives, and the expected output of the meeting. Claudio Forner, of the UNFCCC, gave an overview of the relevant LULUCF decisions of the Conference of the Parties to the UNFCCC.

Substantive discussions on Chapter 2 were held to have a basis for consistent representation of land areas. It was followed by CLA overview presentations of chapters 3 to 5 with focus on the structure and organisation of the work. Participants were grouped into six breakout groups (Attachment F) to discuss the initial draft outline for each chapter of the report and to pay special attention to crosscutting issues for consistency and harmonisation. Some breakout groups split at times also into smaller groups. The concluding part of the meeting, prior to the Closing Session, was the presentation of consolidated outputs of the breakout groups, which included the assignment of authors and identification of the gaps in expertise.

ISSUES/OUTCOMES OF PLENARY SESSIONS AND BREAKOUT GROUP DISCUSSIONS

Chapter 2: Basis for Consistent Representation of Land Areas

Background Paper: Basis for Consistent Representation of Land Areas by Ronnie Milne (UK) - This background paper proposed six broad categories of land use for reporting emissions and removals of greenhouse gases in the Land Use and Forestry Sector of the UNFCCC Inventory and for Articles 3.3 and 3.4 of the Kyoto Protocol. These categories were:

1. Forestry land - *All forest land, likely to be sub-divided into managed and unmanaged, and by ecosystem type as specified in the IPCC Guidelines;*
2. Cropland/arable/tillage – *Includes short-term grass and agro-forestry systems where tree cover falls below the level used for the forest category;*
3. Rangeland/pasture land – *All grassland that is not appropriate to be considered as cropland or low density forest land i.e. savannah;*
4. Wetlands – *All land which is covered by water for part of the year but which does not fall into the cropland category*;
5. Settlements (Villages, Urban) – *All developed land, including transportation and any size of human settlement*;
6. Other (e.g. bare soil, desert, rock, water, ice, uncharacterised) – *This category is included to allow the total of identified land areas to match the national area, where data are available.*

Issues/Outcomes

1. A question was raised as to where should biosphere reserves, national parks and other protected areas go. These areas were thought to be of administrative definitions rather than physical. It was suggested that these areas could be subcategories of forests.

2. The group agreed to link the land area estimation methods to the reporting tiers to indicate suitability. An appropriate table will be accompanied by explanatory text. In addition, the term Tier was replaced with Approach.

3. Good Practice should use the land-use based approach rather than land cover approach because it is consistent with the *IPCC Guidelines*.

4. The group was not confident about what it could recommend on this issue Spatial Assessment Unit for Kyoto reporting of LULUCF, or what it should say about stratified sampling within geographical areas greater than 1 ha.

5. The broad categories were developed to illustrate the approaches for consistent representation of land areas, more detailed ones would be needed in the estimation of the emissions and removals (Chapter 3).

6. Updating of data and frequency of sampling was discussed.

7. Good Practice Approaches for reporting LUCF: The group decided that the text needed additional clarification and explanation of the differences between approaches. There was also a discussion of whether or not all approaches should be considered Good Practice, regardless of the completeness of land area representation.

Chapter 3. LUCF Good Practice Guidance

Five background papers were developed to raise questions and initiate discussion on this chapter:

1. *Organisation of Chapter 3, Land Use Change and Forestry by William Hohenstein and Kathryn Bickel (US)* - The paper reviewed the limitations of the current organisation of the LUCF Chapter in the *IPCC Guidelines* and presented opportunities for improving the structure of Chapter 3. It encouraged consistent representation of land uses, complete coverage of carbon pools, and systematic treatment of land use conversions. The paper presented two alternative structures for Chapter 3 in the good practice guidance report and discussed the merits of each alternative. It concluded that reorganising the chapter by major land uses and addressing carbon pools as subsections within each land use is the optimal approach.

2. *Background report for Section 3.2: Forest by Gert-Jan Nabuurs (The Netherlands)* – This paper provided some principles that should be considered in estimating carbon stock changes in above ground, below ground, soils, and product pools of forest. The paper enumerated some carbon pools and process to be accounted for under methodological issues; methods to choose from for an accurate, reliable, and verifiable estimate; and some

parameter values and activity data to consider in developing decision trees.

3. *Chapter 3 Background Paper on Non-CO2 fluxes by Annette Freibauer* – This background paper covered non-CO2 fluxes from LULUCF other than those covered by the Agriculture sector in the *IPCC Guidelines*. The paper assessed the relevance of source categories in forests, croplands, grasslands, and other lands with the approved chapters of the Good Practice Report and how these categories are covered in the *IPCC Guidelines*. The paper suggested some issues to be addressed under methodological issues, choice of methods, and choice of parameter values.

4. *Chapter 3.2 Background Paper on "Forest and Grassland Conversion" by N.H. Ravindranath (India) and W. Makundi (Tanzania)* – The paper reported the need to address several methodological issues on land-use changes including forest to tree plantation, grassland to plantation, and good grassland to degraded grassland. It suggested methods to estimate CO_2 emissions from land-use change, from forest and grassland conversion, and the methods to estimate above ground biomass for land-use categories.

5. *Background Paper on C inventories (sinks and sources) from cropland by Keith Paustian and Steven Ogle (US)* – This paper presented some issues related to methodological options in estimating carbon flux from agricultural soils; options for land use and management data sources; issues related to the development of nationally specific approaches and coefficients; and the areas needing clarifications within the existing guidelines.

The proposed outline of the chapter by Hohenstein and Bickel (US) and the broad categories proposed by Chapter 2 became the basis of discussion and elaboration of the sections/subsections in Chapter 3. Below is the proposed chapter outline as compared with the current sections of the LUCF Chapter of the *IPCC Guidelines* and with the approved Table of Contents of the IPCC Good Practice Guidance Report:

Proposed Outline (Bickel and Hohenstein)	*IPCC Guidelines*	IPCC GPG TOC
3.1. Overview		3.1
3.2. Forestry land		
3.2.1 Changes in biomass	5A	3.2
3.2.2 Changes in soil carbon		
3.2.3 Harvested wood	5A	
3.2.4 Non-CO2 GHGs		
3.3. Cropland		3.3, 3.5
3.3.1 Changes in biomass		
3.3.2 Changes in soil carbon	5D	
3.3.3 Non-CO2 GHGs	Chapter 4	3.3,3.5
3.4. Rangelands/grasslands		
3.4.1 Changes in biomass	5A	
3.4.2 Changes in soil carbon	5D	
3.4.3 Non-CO2 GHGs	Chapter 4	
3.5. Wetland/tundra/peatland		
3.5.1 Changes in biomass	5E	3.6
3.5.2 Changes in soil carbon		

3.5.3 Non-CO2 GHGs		
3.6 Urban	5E	3.6
3.6.1 Changes in biomass		
3.6.2 Changes in soil carbon		
3.6.3 Non-CO2 GHGs		
3.7 Land use change	5B, 5C, and 5A	3.3-3.5
3.7.1 Forestry land		
3.7.2 Cropland		
3.7.3 Rangeland/grassland		
3.7.4 Wetland		
3.7.5 Urban		

Issues/Outcomes

1. Members of BOG 2 and BOG 3 had a joint session to discuss the Hohenstein/Bickel outline. The outline was improved to integrate land-use change under different land categories. For instance, on Forest Land (instead of Forestry land), it will have two subsections: 1) Forest land, and 2) Lands converted to forest. Under each subsection are all carbon pools (i.e. changes in biomass, soil carbon, etc.).

2. Peat land was removed as land type in Section 3.5, as it will be included in other land categories. Section 3.7 was changed to "Other developed lands".

3. Following the joint session, it was decided that BOG 2 would address the following categories: forest lands, and rangelands/grasslands. BOG 3 would work on the sections of cropland, wetland/tundra, urban, and other developed lands. The BOGs identified key issues for each subsection of the chapter and draft the decision trees for good practice guidance.

4. On Forest Land,

   - Decision tree for selecting data sources for assessment of changes in biomass was developed taking into consideration the availability of National Forest Inventory (NFI), its coverage, its possibility to establish or expand, and its comprehensiveness for greenhouse gas estimation.

   - On the choice of parameter values, the following were considered: area (land use categorisation); growing stock; annual increment (i.e. frequency of inventories, use of models, remote sensing, etc.); volume of dead wood/coarse woody debris; species composition; age distribution; and biomass expansion/conversion factor.

   - For the choice of activity data, the following are considered: harvest, silvicultural operations, disturbances, and land conversion.

5. For harvested wood products,

   - The decision tree took into account the following: availability of production and trade data (judged to be with 25% of correct values); life span of wood and paper products; proportion of discarded wood and paper that goes to landfills; estimates of

total carbon in specific stocks available; and the flow of wood that goes into that stock.

- Three tiers were considered for the choice of methods to estimate carbon: 1) No change in product stocks/all emission at harvest (Tier 1); 2) Estimation of stock changes and emissions from product flows (Tier 2); and Estimation from product flows and stock inventories (Tier 3).

- The choice of parameter values and activity data for Tier 2 included: 1) Default FAO data or other product production and trade data; 2) Default or national estimates of product volume to carbon conversion factors; 3) Default of national estimates of product use life; 4) default of national estimates of proportion of products to landfills after use; and 5) Decay of wood and paper to CO2 in landfills using waste management sector Tier 1 or Tier 2 methods.

- For Tier 3, the following data are considered: 1) National data on flow of products into specific end use stocks and their use life; and 2) National data on inventory of carbon in specific end use stocks.

- On completeness, Tiers 2 and 3 considered change in stock for primary products only. The implicit assumption was there is no net import of secondary products that would change the stock of carbon in the country. Data on carbon in imports and exports of secondary products should be included in computations for the estimates to complete.

- In developing consistent time series, landfill method used should be consistent with emission estimation method used for methane emissions in the Waste Management Sector. Assumptions about the decay of export, for a given countries production approach versus the assumptions made by trading partners, calculate stock change and emissions associated with the exports they received.

6. On Croplands, Wetlands and Reservoirs, Settlements, and Other Developed Lands

- There was broad ranging discussion on how to include long lived biomass products (e.g. fibre plants) and non-forest woody biomass (e.g. fruit trees and aerial grazing trees). This was included in the draft decision tree for croplands.

- Discussions on the assigned categories resulted in the re-organisation of the categories as follows: Cropland, Wetlands and Reservoirs, Settlements (urban, villages, etc.). Draft decisions trees for soil carbon, woody and non-woody biomass and NOx in croplands were developed.

- For Wetlands, marshes and industrial peat lands require definition and how to account for the greenhouse gases, cultivated. Where to address cultivated wetlands, managed riparian zones, constructed wetlands, restored wetlands, and reservoir (e.g. aquaculture, artificial lakes, dam, etc.)

- Recommendation for the further separation of wetland mineral soils, wetlands, and peat lands

- Reservoirs stratification by type, climate, depth of water (<10 m shallow, >35 m

deep reservoir)

- On Settlements, how to address non-CO2 gases from parks, garden, urban forest, alleys, and golf courses. Is fertilisation of these areas included in the Agriculture Sector? Is there a possibility to disaggregate (lack of expertise and data)? How to treat the conversion of urban land to other type of urban lands?

- There is a lack of expertise and data in the area of removal of top soils and burial of soils.

7. For rangelands/grasslands, the key issues were the following,

- To clearly distinguish from "forest" – use less than 10% canopy cover. Grazed forests or woodlands are covered under forest land.

- Very high large areas involved, with often low change in greenhouse gas per unit area. Subject to high rates of land use change (e.g. grazing, cropping).

- Biomass estimation differs from forests – multi-stems, coppicing, shrubs, hollow trees, high standing dead tree component, high root:shoot ratios, etc.

- Fire impacts very important – "thickening", mortality/regrowth, root:shoot ratio

- Long-term dynamics markedly affected by climatic variability (e.g. drought) as well as management (e.g. grazing, fire).

- Divide systems into "natural" and intensively-managed grasslands (only non-CO_2 fluxes are handled under Agriculture Sector). Note all non-CO_2 from animals are treated under Agriculture Sector.
- Need methodological guidance for change in: Woody biomass (above- and below-ground); Non-woody biomass (above- and below-ground); Soil Organic Matter; Non-CO_2 from fire.

- This land use has a strong interface with forests (extensively areas also grazed) and agriculture (especially due to LUC and the effects of subsequent management).

- Application of methods/defaults to very large and variable systems.

Chapter 4: Supplementary methods and GPG arising from the Kyoto Protocol

Five background papers were prepared to initiate discussion on this chapter:

1. *Background Paper on the Overall Structure of Chapter 4 by Ian Noble (Australia)* – This paper proposed an overall approach to the drafting of Chapter 4. It provided the general overview of the issues related to the identification and stratification of relevant land areas; estimation of C stock changes and non-CO2 GHGs emissions; and the specific

requirements of the accounting systems. The paper raised some methodological issues in relation to estimation, measurement, monitoring and reporting of changes in carbon stocks and anthropogenic GHG emissions by sources and removals by sinks resulting from LULUCF activities. The paper also raised two overarching issues in relation to fire (and other disturbances) and national systems of accounting.

2. *Background paper on Afforestation, Reforestation, and Deforestation (ARD) by B. Schlamadinger (Austria) and K. Boonpragob (Thailand)* – This paper is concerned with estimating carbon emissions and removals from ARD activities. It suggested that the reporting of ARD activities should involve a two-step process: 1) Determination and reporting of lands that fall under Article 3.3; and 2) Credit and debit accounting for these Article 3.3 lands. Under the first step, two criteria were identified that determine whether lands fall under Article 3.3: a) definitional limitation, and b) temporal limitation. The paper provided some issues (including generic issues) on land monitoring and reporting, and on the accounting of carbon.

3. *Background paper on Forest Management by Rodel Lasco (Philippines)* – This paper discussed the type of activities, definitions, and practices under forest management as identified in the IPCC Special Report on Land-Use, Land-Use Change, and Forestry. The paper presented a summary table describing methods and uncertainties for quantifying changes in carbon stocks for each type of forest management activity and the possible application of the *IPCC Guidelines* in the estimation.

4. *Background paper on Revegetation, Cropland, and Grassland Management by Pete Smith (UK)* – The brief background paper raised some questions on the suitability of current methods for carbon accounting under the Kyoto Protocol; the type and source of data and the level of detail (spatial, temporal, and analytical); and what supporting data is necessary to make the figures submitted transparent and verifiable. The paper provided guidance (in the form of questions) on how to translate Chapter 3 methods to reporting on revegetation, cropland, and grazing management.

5. *Background Paper for LULUCF Projects by Omar Masera (Mexico)* - This paper briefly summarized the main issues related to LULUCF Projects. The paper raised the following issues: overall scope of the discussions on projects; the extent of discussion regarding Articles 6 and 12; the comparability of project accounting with national accounting; the extent to which the existing revised guidelines for project reporting can be used; the requirement for definition/methodologies at the project level; which method are available to estimate, measure, monitor, and report changes in carbon stocks and GHG emissions at the project level; and the type data integration required for multi-activity project.

Issues/Outcomes

1. On definitional issues,

- Certain sets of definitions are mutually exclusive, i.e. land will be accounted for in one and only one category (e.g. land can be forest or grazing land but not both, forest land can either be managed or unmanaged, but not both).

- Other definitions are such that land can fall into more than one category, but guidance must then be provided on primacy of one definition over another (e.g. forest can be both under Art. 3.3 and 3.4 land but the rules of Art. 3.3 have primacy over Art. 3.4).

- Scientific methods for the determination of C stocks and stock changes are not affected by the definition assigned to land categories. The guidelines that apply to the accounting and reporting of the observed stock changes, however, differ between land categories. For example, C stock changes in the managed forest are subject to a cap, while those in grazing land are not.

- The Good Practice Guidance report needs to provide guidance on the definitions of land categories such as managed forest. Where conflicting definitions exist, decision tress could be developed to assist in the choice of land category designations. For example, can the report provide guidance on how to distinguish grazing land from forest where grazing land has tree cover? Can it provide guidance on how to distinguish managed forest from unmanaged? Is all managed forest included in Article 3.4 or only that part of the managed forest subject to specific activities?

- The definition of "managed forest" in the Marrakech Accords specifies "sustainably managed forests" – what are the implications of C stock changes in forest that are not managed on a sustainable basis?

- Issues to communicate with Chapter 2: Does the land transition matrix distinguish managed and unmanaged forest? Does the land transition matrix distinguish managed and unmanaged grazing land? Will the definitions for forest and managed forest be used for both UNFCCC and the Kyoto Protocol?

- Issues to communicate to Chapter 3: Will the land categories distinguish managed and unmanaged forests? Will the land categories distinguish Article 3.3 and 3.4 land categories? Can the national inventory be compiled such that subtotals of C stock changes can be calculated for the managed forest, land areas subject to Article 3.3 and 3.4 activities?

2. For Afforestation, Reforestation, and Deforestation (ARD)

- The choice of method (under Chapters 2, 3, and 4) is multiple tiers.

- Identification of ARD lands is linked with Chapter 2. Definitional issues to consider the following: planting; seeding; human-induced promotion of natural seed sources (guided natural succession); distinction from harvest-regeneration cycle; definition start of activity (i.e. preparatory part of afforestation); and shelterbelts and linear planting. There is also a question of the availability of spatially explicit and complete coverage or statistical sample.

- Carbon stocks changes estimates are linked with Chapter 3. The factors to consider are the following: estimation of pre-activity C stocks (lack of information); biomass, specific density, carbon content, expansion factors (dead wood, litter, SOC); disturbances, natural and human-induced (e.g. fires, pests); yield of young stands (lack of information); yield of afforested lands (lack of information); and volume to

carbon conversion. If pools are increasing, accounting is optional (generic).

- Non-CO$_2$ emissions are linked with Chapter 3. For emission factors, to consider the effect of forest type and activity, nitrogen, and acid rain. For Kyoto-specific accounting and reporting, to consider: summary of applicable accounting rules; if harvest in the first commitment period (CP 1), no net debit on AR land over CP; and accounting not to start before the activity starts.

- On completeness, if pools are increasing, accounting is optional (generic) but to give guidance on transparency and verifiability.

3. On Forest Management

- What additional/revised methods and reporting are needed for Article 3.3 and 3.4 (on top of the *IPCC Guidelines*?

4. On Revegetation, Cropland, and Grassland Management

- 1996 soil CO$_2$ flux method may not be adequate for Kyoto purposes. Development of refined methods in collaboration with Chapter 3 which could become a Tier 2 and/or Tier 3 method for national inventories as well as for Kyoto purposes. Cropland and grazing land can be treated in a similar way.

- Revegetation is less similar to cropland/grazing land – existing guidelines do not provide advice – sections from the AR sector could be adapted for revegetation.

- Most non-CO$_2$ GHGs are dealt with under the Agriculture Sector of GPG 2000 – could be directly applied for "Kyoto accounting" but be aware of possibility of double counting

- Managed vs. unmanaged grazing lands to be dealt with in Chapter 3.

5. On LULUCF Projects,

- All eligible activities under the Kyoto Protocol (i.e. afforestation, reforestation, deforestation, forest management, cropland management, grazing land management, and revegetation) need to be examined.

- More intensive methods for measurement/monitoring of changes in carbon stocks and GHG emissions are required (i.e. reference case [baseline] and project case). Duration of monitoring period (including possibly after the project). Project monitoring and guidelines: intended for governments or project operators or both? Measurement issues for "reference case".

- Consistency between national inventories and projects (i.e. land use classification; use of best "best estimates"; GHG accounting)

- There is a need to check the linkage between the work in Chapters 3 and 4.

- The report should not include the work on baselines, it is SBSTA matter. The work should not deal on counterfactuals but to work on inventory estimates inside project boundaries.

Chapter 5: Cross cutting issues

Five background papers were prepared to initiate discussions on this chapter:

1. *Overview of the cross-cutting issues by Kristin Rypdal (Norway) and Newton Paciornik (Brazil)* – The paper enumerated important things to bear in mind in developing the report for LUCF: generally larger uncertainties than many other sources; the term "sink" entering the estimations; possible lack of annual data; particular need for consistency, completeness, and no double counting; and enhanced need for verification. The areas of particular concerns to the other chapters are: identification of key sources and sink categories required for reporting and resource prioritisation; uncertainty analysis in the framework of the overall approach chosen; recalculations and reconstruction of missing data using proxy variables; QA/QC including procedures for data collection and archiving; and verification.

2. *Background paper on the Identification of Key Sources by Kristin Rypdal and Ketil Flugsrud (Norway)* - This paper briefly described the current methodology to identify key sources and how this methodology can be extended to include LUCF. The current approach provides two tiers to determine key sources. Two problems were identified in applying the approach: LUCF removals have negative signs; and the thresholds have been determined without LUCF.

3. *Background paper on Uncertainty Analysis by Newton Paciornik (Brazil)* – The paper briefly commented on the main points of the methodology adopted in the Good Practice Guidance (GPG) Report and highlighted some particular characteristics of the LUCF sector that may influence the application of the concepts. The paper identified issues that should be further discussed and examined in the groups dealing with Chapters 2 to 4 of the GPG for LULUCF. Discussions in the paper included: uncertainty evaluation for a source category; uncertainty associated with activity data; uncertainty associated with emission factors; and the overall uncertainty estimation.

4. *Background Paper on QA/QC and Time Series Consistency (Recalculations) by Michael Gillenwater (US)* – This paper briefly described the QA/QC issues (data and methodology) and how to apply QA/QC and time series consistency guidelines to land-use change and forestry. The quantity and complexity of data that will, in many cases, be used to develop LUCF estimates may lead to some difficulties for implementing Tier 2 QC checks and investigations, and potentially some Tier 1 checks.

5. *Background Paper on Verification by Giorgio Matteuci (European Commission Joint Research Centre)* – The need for verification is emphasised by this paper. In general, the verification levels (national and international) and approaches proposed in Annex 2 of the GPG 2001 could be of relevance also for the LUCF sector, but it must be underlined that the ecological and biological processes that rule the emissions and removals in the sector need also particular approaches and has to be further developed. The paper discussed

some possible approaches for LUCF and provided linkages to international scientific programmes and data sets.

Issues/Outcomes

1. On Identification of Key Sources

   - Key sink concept in consideration of key sources in LULUCF

   - Sinks have negative signs and key source identification may require new threshold. Two options: 1) integrate LUCF into the current methodology (enter sinks with absolute values, or enter sinks with negative values); or 2) develop a separate threshold for LUCF. Option 1 can affect key sources for the rest of the inventory. Using Option 2, overall assessment of key elements on inventory will not be done in a comprehensive way.

   - If category is a sink in one year and a source in the following year, it can affect the trend analysis

   - Two separate approaches; UNFCCC approach and KP approach

2. On Uncertainty Analysis

   - The use of the terms "sources" and "emission factors" may be inappropriate in application to LUCF sector.

   - When net flux is close to zero, then uncertainty percentage relative to the level becomes unstable. Consider presenting absolute uncertainty range.

   - Should focus on reasons for uncertainty and broader context for uncertainty, not just on quantitative metric alone. Uncertainty in trend from stock changes, versus single measurement.

   - Consider a Tier 3 uncertainty approach specific to LUCF. Focus will be on practical approaches to applying uncertainty, and will not abandon existing GP without good reason(s)

   - To what extent should we differentiate LUCF from other categories? What are the areas of LUCF with the largest uncertainties?

3. On QA/QC and Time Series Consistency/Recalculation

   - How do you distinguish between managed and unmanaged? Need to think about in terms of QC.

   - How is harvested wood accounted for? What QC is needed?

   - Documenting assumptions is extremely important. Can we come up with a list of standard assumptions that need to be documented? (in terms of what assumptions

and where they are taken from). Categories of assumptions may include: input data, model assumptions, extrapolations, expansion factors (vary across geography, climate, etc.), and default factor values used. Chapters 2, 3, and 4 have to provide list of standard assumptions that need to be documented for each method and/or type of model.

- Use of scientific peer reviewed literature is important; however, this is not sufficient for accuracy and complete credibility

- Need to link with Chapters 3 & 4 to collect wisdom on what QA/QC issues are important and what checks need to be included

- Need to be sure that other BOGs address QA/QC

- Need to ensure there is good connection to verification work

- Need guidance on determining and checking for completeness and to ensure that there is no double counting (net changes in land uses must be zero)

- Transparency issues linked with verification

- Good practice in using models in the calculations

- Time-series inconsistencies: different quality in calculation pre/after 1990

- Additional QA/QC specific to cover KP part

4. On verification

- Verification should focus on things measured versus actual reporting categories

- Gives possible techniques/methods to develop verification data

- Different scales of area to verify (i.e. project level or activity level, national, regional, continental, global, etc.)

- Different costs and accuracy

- Focus on what parties can actually do with verification

- Focus on options for verification in guidance

- Complicated due to different accounting for convention inventory and articles 3.3, 3.4, 6, and 12

- Discuss whether verification should be "recommended" for LUCF, or just be given as list of options for QA/QC, preference given for not "requiring" verification due to burden on Parties. Suggestion was to recommend verification, but not as a part of ordinary good practice. Must emphasise verification from the point of view of

improvements, not of compliance

- Links to international programmes and data sets

CONCLUSION

The objectives of the First Authors/Expert Meeting were largely met through the constructive contributions of the participants. Substantive work on all chapters was achieved and accelerated handling of Chapter 2 was realised. An agreement was reached in terms of the proposed six broad categories of land use for reporting (i.e. forest land, cropland/arable/tillage, rangelands/pasture land, wetland, settlements, and other land). These broad categories or land use classes were further elaborated (into sections and subsections) by the other chapters. The main components of the Good Practice Guidance (i.e. methodological issues, reporting and documentation, and inventory quality) were applied to each chapter. Authors and Contact Persons to sections and subsections of each chapter were assigned and potential Contributing Authors were identified. Timeline for the development of extended outline for sections and subsections, feedback mechanism, and preparation of the zero-order draft for each chapter were set. Zero-order draft for Chapter 2 will be available on the web by 5 April while most of the chapters aimed by 14 June. Attachment G consolidates the writing tasks and authors for the LULUCF Good Practice Guidance Report as agreed in the Eisenach Meeting.

ATTACHMENTS

Attachment A – Terms of Reference
Attachment B – TOC
Attachment C – Work Plan
Attachment D – Slate of authors for Task 1
Attachment E – Participants List
Attachment F – BOG Assignment
Attachment G – Consolidated tasks and authors for GPG Report