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Item 5 of the provisional agenda
Reducing emissions from deforestation in developing countries: approaches to stimulate action

Report on the expert meeting on methodological issues relating to reference emission levels and reference levels

Note by the secretariat*

Summary

The Chair of the Subsidiary Body for Scientific and Technological Advice (SBSTA), with the support of the secretariat, organized an expert meeting on methodological issues relating to reference emission levels and reference levels as requested by the SBSTA at its twenty-ninth session. The expert meeting took place in Bonn, Germany, from 23 to 24 March 2009. The discussions focused on methodological issues relating to reference emission levels for deforestation and forest degradation and to reference levels for conservation, sustainable management of forests, changes in forest cover and the enhancement of forest carbon stocks. Experts discussed and exchanged views on various issues, principles and processes relating to different approaches for establishing reference emission levels, the availability of data and the use of existing tools and methodologies. Several issues and concepts that may require further elaboration were raised, such as leakage, an "aspirational goal" for reducing emissions from deforestation and forest degradation, and a development correction factor to accommodate different national circumstances. Experts also identified gaps in data and information and needs for further research and technical and institutional capacity-building.

* This document was submitted after the due date owing to the timing of the meeting.

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I. Introduction

A. Mandate

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its twenty-ninth session,[1] decided to continue its programme of work on methodological issues, as contained in decision 2/CP.13, paragraphs 7 (a) and 11, at its thirtieth session, with the aim of completing this work by its thirty-first session and reporting to the Conference of the Parties (COP) at its fifteenth session on progress made, including any recommendations on the remaining outstanding methodological issues as contained in annex III to the report on its twenty-eighth session.[2]

2. At the same session, the SBSTA requested its Chair, with the support of the secretariat, to organize an expert meeting before its thirtieth session and to prepare a report on this meeting for consideration at that session. It requested that the meeting should focus on methodological issues relating:

(a) To reference emission levels for deforestation;

(b) To reference emission levels for forest degradation;

(c) To the role and contribution of conservation, sustainable management of forests, changes in forest cover and associated carbon stocks and greenhouse gas (GHG) emissions and the enhancement of forest carbon stocks to enhance action on mitigation of climate change and to the consideration of reference levels;

(d) To the relationship among the reference emission levels and relevant reference levels.[3]

B. Scope of the note

3. This document contains a description of the proceedings of the expert meeting (chapter II), summarizes the presentations that were made (chapter III) and presents the main points and outcomes of the discussions on methodological issues noted in paragraph 2 (a–d) above that took place during the meeting (chapter IV).

C. Possible action by the Subsidiary Body for Scientific and Technological Advice

4. The SBSTA, at its thirtieth session, may wish to consider the information in this document as part of its continuing discussions on methodological issues being considered under its programme of work on methodological issues referred to in paragraph 1 above, and to provide additional guidance on further actions in order to complete by its thirty-first session the work on outstanding methodological issues.

II. Proceedings

5. The expert meeting on methodological issues relating to reference emission levels and reference levels took place at the premises of the German Federal Ministry of Education and Research in Bonn, Germany, from 23 to 24 March 2009. Financial support for the meeting was provided by the Governments of Belgium, Norway and Switzerland.

6. In total, 45 experts participated in the expert meeting, representing 23 Parties not included in Annex I to the Convention, 13 Parties included in Annex I to the Convention (Annex I Parties), four

[1] FCCC/SBSTA/2008/13, paragraph 39.
[2] FCCC/SBSTA/2008/6.
[3] FCCC/SBSTA/2008/13, paragraph 40.

intergovernmental organizations (IGOs) and four non-governmental organizations.[4] The IGOs represented were the Food and Agriculture Organization of the United Nations (FAO), the Intergovernmental Panel on Climate Change (IPCC), the United Nations Environment Programme and the World Bank. A resource person from the International Institute for Applied Systems Analysis (IIASA) at Laxenburg, Austria, provided technical expertise.

7. The meeting was chaired by the Chair of the SBSTA, Ms. Helen Plume (New Zealand). At the opening, she introduced the mandate and objective of the meeting and updated the experts on the progress of work on this agenda item under the SBSTA. She also thanked the Government of Germany and the Federal Ministry of Education and Research for providing the meeting facilities on a complimentary basis. A representative of the secretariat then delivered a statement.

8. The expert meeting, which took place over one and a half days, was organized into three sessions:

(a) Session I: Methodological issues relating to reference emission levels for deforestation and forest degradation;

(b) Session II: Methodological issues relating to the role and contribution of conservation, sustainable management of forests, changes in forest cover and associated carbon stocks and GHG emissions and the enhancement of forest carbon stocks to enhance action on mitigation of climate change and to the consideration of reference levels;

(c) Session III: In-depth discussion on outstanding methodological issues.

9. The first two sessions comprised presentations[5] by several experts followed by discussions. During the second day, experts discussed outstanding methodological issues such as gaps in information and data, the need for research and development, technical and institutional capacity needs, and aspects of the establishment of reference emission levels and reference levels that may be linked to policy. The chair, at the start of the meeting, appointed Mr. Bas Clabbers (Netherlands) and Mr. V.R.S. Rawat (India) as rapporteurs to provide preliminary summaries of the discussions at the end of each day. Summaries of the presentations and discussions are contained in chapters III and IV, respectively.

III. Summary of presentations

10. As an introduction to the session on reference emission levels, a technical resource person from the IIASA presented an overview of work at the Institute on modelling frameworks for establishing reference emission levels. He highlighted two types of model, historical econometric models and future-oriented models (this latter group includes integrated assessment models, general or partial equilibrium models and agent-based models). In addition, the expert presented results of numerical analyses of baselines (or reference emission levels) of several geographical regions and the impacts of drivers on the baselines. Based on these results, he concluded that reference emission levels are sensitive to the quality of input data (both biophysical and socio-economic data). He also stressed that having reliable reference emission levels is essential for successful implementation of activities relating to reducing emissions from deforestation and forest degradation.

11. An expert from Gabon provided technical insight into reference scenarios for activities relating to deforestation and forest degradation, conservation, sustainable management of forests and

[4] Before the meeting, the Chair of the SBSTA extended an invitation to each of the six constituencies of civil society. The four experts from non-governmental organizations (NGOs) who attended the meeting represented four of these constituencies: environmental NGOs, research and independent NGOs, business and industry NGOs, and local governments and municipal authorities.

[5] All presentations are available at <http://unfccc.int/methods_and_science/lulucf/items/4770.php>.

enhancement of forest carbon stocks in developing countries. He described ongoing work relating to data collection and analysis of forest carbon stock changes in Gabon and concluded that activities for reducing emissions from deforestation and forest degradation must be integrated into a national development strategy. He added that any long-term mechanism for reducing emissions from deforestation and forest degradation in developing countries (REDD) should be based on total stable carbon stocks achieved through slowing and reversing deforestation and forest degradation, encouraging regrowth and maintaining standing forests and should not be based only on changes in deforestation and forest degradation rates.

12. An expert from Japan presented outcomes from work on possible approaches to projecting reference scenarios that draw on available data. The study indicated strong relationships between changes in different types of land use, such as forest land, farmland and unclassified land. The expert presented a projection model for estimating deforestation rates that takes into consideration direct factors (e.g. agricultural and commercial logging activities) as well as indirect factors (e.g. sectoral gross domestic product (GDP), and forestry and agriculture exports and imports). Such detailed models are necessary, he noted, especially if the model is required to factor out business-as-usual (BAU) socio-economic factors from specific effects of a forestry programme.

13. Elements and options for establishing reference levels have been assessed in a study supported by the Government of Norway. Presenting the results, an expert from Norway explained that these options include whether reference levels should be established through political negotiations or by expert review, whether reference levels for participating countries should be agreed all at once or by groups of countries as they prepare for full implementation of REDD activities, and whether the starting point should be based on countries' submissions or on values prepared by experts according to agreed principles and formulae. Variables considered in the study for the establishment of reference levels include historical trends of deforestation, forest cover and GDP per capita and a global additionality scaling factor (to ensure that total allowed emissions from deforestation are below BAU levels). These variables and supply-and-demand functions are part of the partial equilibrium model that the study used for establishing national reference levels.

14. Possible factors and other input that should be considered when establishing national forest emission levels were presented by an expert from Australia. These include emissions data, information about pre-existing emission reduction measures, the rate of population growth, drivers of deforestation, policies and measures, national circumstances and respective capabilities. The expert stressed that for participation in a forest carbon market mechanism, certain prerequisites need to be met, such as having a national carbon monitoring and accounting system, addressing issues relating to permanence and leakage, and ensuring measurable, reportable and verifiable emission reductions and removals by sinks.

15. An expert from Papua New Guinea, in his presentation, remarked that setting a fixed reference emission level is fundamental for incentivizing action to reduce emissions from deforestation and forest degradation. He stressed that reference emission levels should be based only on historical data on land use, GHG emissions and removals and socio-economic variables. Three possible technical approaches to establishing levels – "simplified", "complete" and "sector" – were proposed, which could potentially support three different approaches to REDD implementation. A "development correction factor", which takes into consideration the internal and external socio-economic variables that have determined historical net emissions, should be one of the elements included in the establishment of reference emission levels and reference levels. The respective capabilities of developing countries should also be addressed when establishing reference emission levels. Developing countries should be allowed more flexibility in proposing their reference emission levels and reference levels than that given to developed countries in determining their baseline emissions for their forest sectors.

16. An expert from Mexico described efforts being made in the country towards adopting a national approach to reducing deforestation. One of the first steps was to construct a deforestation risk map, on

which areas of deforestation observed between 1970 and 1997 were correlated with "predisposing" factors (e.g. slope, land tenure, and distance to agricultural land and roads) and "driving" factors (e.g. population density and poverty levels) that indicate the areas' susceptibility to deforestation. This classification of risks allowed deforestation rates and emissions to be estimated. However, the expert highlighted the limitations of this approach; for example, it considers only a small number of data points and does not take into account changes in drivers over time or effects of historical and future land-use policies. The expert told participants that Mexico is taking steps to establish a national REDD policy and a reference emission scenario, which involves intensive and extensive collection and assessment of data, both on the ground and remotely. Future plans include identifying forest areas at a high risk of deforestation owing to drivers such as easy access or land-use pressures, and analysing the impacts of recent land-use programmes on deforestation rates.

IV. Main outcomes of discussions

17. This chapter summarizes the key points from the discussions in each of the three sessions. It elaborates on, and is consistent with, the preliminary summaries of the chair and the rapporteurs mentioned in paragraph 9 above. It covers the main methodological issues relating to reference emission levels and reference levels that require further consideration by the SBSTA at its thirtieth session.

A. Methodological issues relating to reference emission levels for deforestation and forest degradation

18. During the presentations as well as the ensuing discussions, the experts raised a number of elements and issues to be considered when setting reference emission levels for deforestation and forest degradation. They also highlighted a number of points that require further clarification and exploration to facilitate the establishment of reference emission levels.

1. A process for establishing reference emission levels and reference levels, and guiding principles

19. In the course of the discussions, several principles to guide the establishment of reference emission levels and reference levels were identified. These include the need for effectiveness, efficiency, transparency, simplicity and consistency while ensuring environmental integrity and fairness. Any approach to establishing reference emission levels should be flexible to ensure broad but voluntary participation by developing countries.

20. On the general process for setting reference emission levels, some experts were of the view that there should be a "phase-in" approach whereby developing countries begin with default factors and available data and improve their data and information over time. These estimates should go through a review by experts. However, a phase-in approach in which countries participate only when they are ready may lead to inequities compared with an "all-in" approach (in which countries participate at the same time), and would need principles and guidelines to prevent perverse incentives.

21. Some experts were of the view that global reference levels are necessary, in order to avoid initial individual country estimates used for establishing reference emission levels leading to unrealistically high emission estimates at the global level before improvement of these estimates over time. Global reference levels may deter international leakage (see also paras. 50–53 below) and would allow all countries to participate in the process.

22. Given the differences in national circumstances, however, one expert queried if a global reference level would be appropriate, particularly when developing countries vary in their capacity to meet any reporting requirements. It was also noted that a global reference level would be useful only if all developing countries with forests were engaged in the process. Country-specific reference emission

levels might be better. Another expert was of the view that reference emission levels should be set at the national level.

23. In addition to global and country-specific reference emission levels, one expert mentioned the regional reference case, in which countries within a region establish reference emission levels. The expert raised several related issues that require consideration, such as ownership of reference emission levels of each individual country in the region under consideration, whether certain countries in the region have limited data and/or capacity, and whether the region or countries in the region should start with a simple approach to establishing levels or develop a sophisticated tool from the outset.

24. The discussions raised several questions concerning a possible process for establishing reference emission levels. Should an agreement on reference emission levels be made at the same time by all countries, or could countries decide on individual reference emission levels depending on their readiness level? Would the chosen reference emission level depend on national circumstances? Experts also raised the question of whether the reference emission levels proposed by participating developing countries, once the estimates had undergone expert review, would be formalized in a COP decision. One expert asked whether a regional reference case is the sum of reference emission levels of individual countries in the region, which are set at various scales of implementation and use satellite imagery data collected at different resolutions, or whether the scales of implementation and resolutions used should be harmonized. Another question concerned the role that the human development index could play in setting reference emission levels.

25. Regardless of the process for establishing reference emission levels, one expert noted that any system established should be attractive to all developing countries and encourage them to develop their capacities. There should be a period during which financial support is provided for policy implementation before any actual payments for emission reductions are given or received.

2. Approaches to establishing reference emission levels

26. Two main approaches to establishing reference emission levels were identified: one based on historical deforestation rates and the other based on projected or expected deforestation rates. Most experts mentioned that any approach to establishing reference emission levels should take into consideration a country's position on the forest transition curve, socio-economic factors, existing policies and measures and the respective capabilities of developing countries.

Modelling approaches

27. Experts identified several weaknesses of modelling approaches to establishing reference emission levels. It is difficult for models to accommodate policies that a country is implementing or planning to implement, and making projections into the future of factors such as energy security, extension of biofuel production and prices of commodities poses a challenge. Some modelling approaches may require more socio-economic data than are available. Hence, obtaining accurate results from pure modelling approaches can be difficult.

28. It was also mentioned that the proxies used to model future rates of deforestation, such as GDP and forest cover, may not always correlate with actual emissions for some countries. In addition, causal factors that lead to reduced deforestation are difficult to define. For example, in many instances low prices and demand for forest products may lead to a reduction in the rate of deforestation that is not necessarily due to any land-use policies in place. Experts also questioned the predictive capabilities and the surrounding uncertainties of models regarding changes in policies and measures which may affect forest carbon stocks and GHG emissions.

29. A single modelling approach may not be the solution and should not become fixed as the one approach that developing countries are mandated to use. Instead, general guidance is needed for using

modelling approaches. Any projections should also be reviewed through time against actual data obtained from monitoring.

Historical rates approach

30. With a historical approach, historical deforestation rates or trends and policies and measures are used to develop reference scenarios. Several experts suggested that having a fixed reference scenario is necessary and that this reference scenario should be based on historical data. The reference emission level should be fixed for the implementation period and revised and/or updated for the next period or phase of implementation. A few experts suggested that this approach may not be the best way to set reference emission levels and that it could penalize developing countries that had low deforestation rates in the past.

31. It was generally agreed that countries with high forest cover and low deforestation rates (HFLD) need incentives to maintain their carbon stocks. However, some experts suggested that, in order to ensure the participation of HFLD countries, there may be a need to consider other incentive mechanisms rather than basing the incentive structure solely on reference emission levels.

3. Data availability and methodologies

32. All the data needed for establishing reference emission levels may not always be available; countries are at different stages of data collection and assessment, and their data vary in quality. In particular, some experts were of the view that at present it is difficult to assess forest degradation simply by using satellite imagery. Ground-truthing is necessary, which can pose a challenge for the larger countries. However, this should not mean waiting until there are enough countries with data of sufficient quality before any action is taken.

33. It was acknowledged that international data and information on forest cover and changes are available. Although there are concerns about the quality of such data and associated uncertainties, the experts were of the view that they could be used initially to make conservative estimates and as a basis for establishing reference emission levels. As more and better data are gathered, reference emission levels could be modified and improved over time.

34. It was noted that FAO has relatively reliable data on forest area, particularly for the years 1990, 2000 and 2005. However, its data on trends are not as good, and data on deforestation rates are not available – countries are merely submitting data on net changes in forest area to FAO.

35. One expert added that any data and estimates used should refer to anthropogenic emissions and removals. Increases in forest carbon stocks where no measures to reduce emissions from deforestation have actually been taken should not be included in any calculations of reductions in emissions from deforestation and forest degradation as a contribution to mitigate climate change.

36. A few experts saw the need for flexibility and to allow countries to start with the IPCC tier 1 approach for estimating changes in forest carbon stocks and emissions and removals. Countries could start identifying their key categories before moving on to higher tiers recommended by the IPCC. It was noted that when default factors provided by the IPCC are used for establishing reference emission levels, these same default factors should also be applied to the calculation of emission reductions to ensure consistency.

37. One expert, however, argued that the IPCC tier 1 approach, in which default values and spatially coarse data are used, is too simple for establishing reference emission levels and that, although there is a need for incremental improvement of data and approaches, beginning with IPCC tier 1 could affect the required robustness of results.

38. In general, the experts stressed that the quality of data will influence the accuracy of reference emission levels established. It was noted that in many cases expert judgement will be needed to evaluate the quality of countries' data and estimates. The experts also agreed that robust national monitoring systems for estimating and monitoring emissions from deforestation and forest degradation, and changes in forest cover and forest carbon stocks, will be necessary to ensure transparent and reliable estimates over the long term. Long-term monitoring of emissions is equally important for obtaining trends. The experts noted that the time frame for monitoring is important, because it has an impact on monitoring costs.

4. Issues requiring further consideration

39. Several issues and new concepts were raised in the discussions on reference emission levels. The experts were of the view that these require further clarification and elaboration.

The concept of a business-as-usual baseline

40. The concept of a BAU baseline and its link to reference emission levels were mentioned in the discussions. One expert explained that the BAU baseline is close to the reference emission level and that there is a need to distinguish between the reference emission level and the realized path. The difference between the realized path and the reference emission level is the amount of credits that could be awarded in the accounting of emission reductions.

41. BAU is related to the effects of existing national policies and also to the evolution of future drivers. There is also a need to consider the effects of domestic policy measures in developing the BAU baseline.

42. One expert held the view that the reference emission level is not necessarily the same as the BAU baseline. The reference emission level could represent the goal to be achieved in order to meet the ultimate objective of the Convention. Hence, the reference emission level should contribute to reductions below the BAU baseline.

43. Nevertheless, it was noted that establishment of reference emission levels should be supported by robust measurement, reporting and verification systems, to ensure accurate and transparent estimation and reporting of changes in forest carbon stocks and emissions reduced before accounting of emission reductions and issuance of credits take place.

An aspirational goal of reducing emissions from deforestation and forest degradation in developing countries

44. The concept of an "aspirational goal" (as part of establishing reference emission levels) was introduced by one of the experts as a goal that participating developing countries could set as part of their ambition of reducing emissions from deforestation and forest degradation. The concept would imply developing countries setting a pathway towards an agreed level of standing carbon stocks. Each commitment period should allow the trajectories to be reset, taking into account BAU and any changes to BAU without losing sight of the aspirational goal.

45. A few other experts argued that the need to set such a goal is not as urgent as the need to achieve the ultimate objective of the Convention. While stabilization of forest carbon stocks is necessary at some future point in time, for now it is more important to reduce emissions from deforestation and forest degradation. It was also noted that there is still little understanding of the science behind stabilization and maintenance of forest carbon stocks.

46. An aspirational goal being a novel concept, some experts queried whether it would relate to carbon stocks or to a reduction in emissions or changes in forest area. They also questioned the role of

an aspirational goal in the context of reducing emissions from deforestation and forest degradation in developing countries.

47. The issue of liability was also raised with regard to emissions from deforestation in a country exceeding its reference emission level or failing to meet the goal. An expert proposed that one solution would be for these emissions to be rolled over to the following year.

Development correction factor

48. The presentation by the expert from Papua New Guinea proposed the concept of a development correction factor in the setting of reference emission levels and reference levels. It was explained that this factor is not a forward-looking element, but is an adjustment factor that takes into account respective national circumstances and capacities of developing countries in order to ensure equity.

49. One expert responded that this should not form a single approach and that there is a need to explore other approaches to addressing differences in national circumstances. Furthermore, the development paths of developing countries are changing. Future demands for food and energy and their links to technology advances are unknown and difficult to forecast.

International leakage

50. Several experts expressed the view that the issue of international leakage is relevant to the subject of reducing emissions from deforestation and forest degradation in developing countries. There was a call for a global assessment of deforestation rates. If there were potential for leakage, then potentially there would not be any climate benefits. One of the experts stated that measures to address leakage require consideration of demand-side measures. For example, leakage is related to the trade of harvested wood products. However, international leakage could be avoided if there were a 100 per cent buy-in to the process, in other words, if all developing countries with forests participate.

51. Several other experts were of a different view. They noted that international leakage is not considered for the other economic sectors under the Convention and that it would be unnecessary and unfair to treat the forest sector differently. It was also pointed out that there is more concern about national leakage and that implementation of a national approach in this case could help.

52. Describing international leakage as a “red herring”, one expert noted that it is impossible to legally prove causality. In addition, if Annex I Parties are not required to consider international leakage in their reporting and accounting, nor should developing country Parties.

53. The experts were of the view that leakage or displacement of emissions is a policy issue and should be taken up by the Ad Hoc Working Group on Long-term Cooperative Action under the Convention. Another related issue that requires further consideration is that of non-permanence – for example, how it relates to issues such as liability and the time frame for monitoring.

B. Methodological issues relating to the role and contribution of conservation, sustainable management of forests, changes in forest cover and associated carbon stocks and greenhouse gas emissions and the enhancement of forest carbon stocks to enhance action on mitigation of climate change and to the consideration of reference levels

54. The experts acknowledged that conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries form part of the portfolio of activities that reduce global emissions from deforestation and forest degradation, and also produce many additional environmental benefits. During the second session of the meeting, discussions were held on methodologies for estimating and monitoring emissions from these activities, and how reference levels for these activities could be established.

55. Some experts pointed out that since these activities by their very nature contribute to reducing emissions from deforestation and forest degradation, they should not be considered separate activities that warrant separate reference emission levels.

56. One expert raised the question of how to create an incentive mechanism for such activities that do not result in changes in carbon stocks or a reduction in emissions, and whether methodologies are available. Another expert suggested that as these activities do not result in changes in carbon stocks, they are symmetrical to addressing forest degradation: when a developing country tackles degradation, it is also benefiting conservation, sustainable management of forests and enhancement of forest carbon stocks. Hence, methodologies for estimating and monitoring emissions from forest degradation could be applied to these activities as well. Methodologies for estimating emissions and changes in carbon stocks from forest degradation are also useful for estimating carbon stock accumulation. However, one expert cautioned that there is still uncertainty as to whether those methodologies could be similarly applied to conservation or sustainable management of forests, and that further exploration of this point will be necessary.

57. It was also proposed that estimation of emissions and removals from these activities could be based on the IPCC "forest land remaining forest land" category. However, a few experts pointed out that if this category were used to estimate emissions and removals from enhancement of forest carbon stocks, it could also include changes in forest carbon stocks from afforestation and reforestation. On this point, an expert noted that enhancement of forest carbon stocks through afforestation and reforestation is not part of the package of activities, as only changes in gross deforestation are being considered as part of emission reductions from efforts to reduce deforestation and forest degradation.

58. It was noted that mitigation benefits from forest conservation can be had only if deforestation of the area is prevented; otherwise there will be no additional benefits to the atmosphere, which is already seeing these benefits from the existing stocks.

59. The experts noted that many forest areas under conservation are facing heavy pressures and may be deforested in the near future. Hence, it is necessary to consider measures for ensuring the participation of HFLD countries as well as countries with low forest cover and low deforestation rates. In addition, the risk of international leakage is a legitimate reason for including these countries in any arrangement for reducing emissions from deforestation and forest degradation. However, more information is needed on these countries so that ways to include them can be better explored.

60. One expert highlighted ongoing studies that model deforestation rates and leakage, which indicate that there are more standing carbon stocks maintained in the long term when HFLD countries are included. Another expert noted the importance of understanding the development perspective of these countries; it was highlighted that forests are more than just carbon, they provide many other services.

61. One expert noted that despite pressures to deforest, HFLD countries are making efforts to conserve their forests, and that it is necessary to provide them with incentives to ensure success in their efforts. It might be necessary to set approximate reference emission levels given that the rates of deforestation in these countries have been low and that therefore, historical deforestation rates cannot be used.

62. There may be a need to prove that forests under conservation are indeed facing pressures of deforestation. Present models for establishing reference levels are not able to provide this proof. While it was suggested that proxies for emissions based on future projections could be used to form reference emission levels, this may not necessarily be the correct approach. Ex-post assessment will be necessary to show that actual emission reductions were achieved.

C. Other outstanding issues and further needs for establishing reference emission levels and reference levels

1. Data availability

63. Although it was acknowledged that many gaps remain in terms of data quality and quantity (see para. 67 below), there was general agreement among the experts that there are sufficient data to allow developing countries to get started with establishing reference emission levels and reference levels. Developing countries should start with conservative estimates while recognizing that data quality and quantity are likely to improve as implementation progresses. An expert noted that a number of scientific groups are working to identify the gaps in the data. The World Bank Forest Carbon Partnership Facility was cited as one example of efforts being made to assist developing countries in identifying the kind of data needed and to improve data accuracy. In addition, satellite imagery from Landsat for the years 1990–2005 is also freely available for use.

64. One expert remarked that there is a need to collect national data in a globally consistent way, although another said this is not realistic. It was noted that some countries already have robust data sets available, which can be used for setting reference emission levels. It was pointed out that it is more important to ensure consistency in data collected at the national level and over time.

65. A global database was suggested, with guidelines for collecting data to ensure consistency. However, one expert cautioned that guidelines for data collection should not become "the rule" (as guidelines may imply carrying out an inventory for the forest sector), and that guidance provided should instead allow developing countries to improve and move forward in their efforts to reduce emissions from deforestation and forest degradation.

2. Methodologies and tools

66. The experts agreed that cost-effective and robust methodologies and tools for estimating and monitoring emissions from deforestation and forest degradation and changes in forest cover and forest carbon stocks are available. One expert said that cost-effective, global-scale monitoring is already available and producing data with sufficient certainty. Furthermore, developing countries could begin with cost-effective and reliable low-technology tools that are available for ground-based measurements and national forest inventories. However, a few experts noted that the cost-effectiveness of ground-truthing of data depends on economies of scale and the size of a country. For many large developing countries, it is difficult to rely on ground-based assessment as it takes a lot of time and resources.[6] On the other hand, these countries also have more human resources to call on for ground-truthing.

3. Addressing the gaps, needs for research and capacity-building

Gaps in data, information and tools

67. The experts identified several areas where data and information are insufficient or non-existent and where better quality data and information may be needed for developing countries. These include:

(a) Estimates of standing stocks per hectare;

(b) Estimates of carbon stocks and emissions from the below-ground biomass pool;

(c) Estimates of biomass density, development of biomass expansion factors and allometric equations;

(d) Improved estimates at the levels of forest type and forest ecosystem;

[6] The technical paper prepared by the secretariat on the cost of implementing methodologies and monitoring systems provides some relevant information on this matter (FCCC/TP/2009/1).

(e) Estimates of potential emissions from forest fires;

(f) More socio-economic data that could be used to improve modelling of reference emission levels.

68. Many large developing countries rely on remote sensing for data on forest cover. It is still difficult for them to reliably assess forest biomass with remote sensing tools, as many of these tools are still under research development.

69. It was noted that there is a need not only to monitor the forest sector, but also to obtain information on agriculture and other socio-economic sectors as part of efforts in data collection and assessment. IPCC methodologies allow countries to stratify their land areas according to both ecosystems and socio-economic factors.

70. In addition to technical methodologies for estimating forest carbon stocks and GHG emissions, developing countries are also looking for decision support tools.

Needs for research and capacity-building

71. While it was acknowledged that more research and development is needed on the issues identified, experts reminded the meeting that the need for research should not be a reason for inaction. Research should be used to make methodologies, tools and actions more economically efficient and effective over time.

72. There was general agreement that capacity-building in many areas and at various levels is urgently needed. Most critically, there is a need to train participating developing countries to use the methodologies available in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Also, trained professionals are needed to collect relevant data and information to support efforts on reducing emissions from deforestation and forest degradation.

73. It was highlighted that, although many institutions are involved in efforts to reduce emissions from deforestation and forest degradation in developing countries, there is still a need to build capacities and capabilities. New partnerships are needed to coordinate capacity-building activities. There is also a need to find ways to encourage regional coordination. For example, in its work on forest resources assessment, FAO is considering regional training to build capacities in data collection and assessment in developing countries. It was also noted that many local governments are involved in data collection efforts and that any capacity-building and partnership initiatives should also involve them.

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