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## **Report on the technical assessment of the proposed forest reference level of Malaysia submitted in 2014**

### *Summary*

This report covers the technical assessment of the submission of Malaysia, on a voluntary basis, on its proposed forest reference level (FRL), in accordance with decision 13/CP.19 and in the context of results-based payments. The FRL proposed by Malaysia covers the activity “sustainable management of forests”, which is one of the activities included in decision 1/CP.16, paragraph 70. In its submission, Malaysia has developed a national FRL. The assessment team notes that the data and information used by Malaysia in constructing its FRL is based on currently available data on the basis of a step-wise approach in accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FRL and a few areas identified for further technical improvement by the assessment team, according to the scope of the technical assessment in the annex to decision 13/CP.19.

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## I. Introduction and summary

### A. Overview

1. This report covers the technical assessment (TA) of the submission of Malaysia on its proposed forest reference level (FRL),<sup>1</sup> submitted on 8 December 2014 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 16 to 21 February 2015 in Bonn, Germany, and was coordinated by the secretariat.<sup>2</sup> The TA was conducted by two land use, land-use change and forestry experts from the UNFCCC roster of experts<sup>3</sup> (hereinafter referred to as the assessment team (AT)): Mr. Craig Elvidge (New Zealand) and Mr. Sandro Federici (San Marino). In accordance with decision 13/CP.19, annex, paragraph 9, the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) was invited to participate in the TA as an observer. However, no representative of the CGE was able to participate at this TA session.

2. In response to the invitation by the Conference of the Parties (COP) and in accordance with the provisions of decision 12/CP.17, paragraphs 7–15, and its annex, Malaysia submitted its proposed FRL on a voluntary basis. This proposed FRL is one of the elements<sup>4</sup> to be developed in the implementation of the activities referred to in decision 1/CP.16, paragraph 70. The COP decided that each submission of a proposed forest reference emission level and/or FRL, as referred to in decision 12/CP.17, paragraph 13, shall be subject to a TA in the context of results-based payments, pursuant to decisions 13/CP.19, paragraphs 1 and 2, and 14/CP.19, paragraphs 7 and 8.

3. The objective of this TA was to assess the degree to which information provided by Malaysia was in accordance with the guidelines for submissions of information on FRLs<sup>5</sup> and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FRL, with a view to supporting the capacity of Malaysia for the construction and future improvement of FRLs, as appropriate.<sup>6</sup>

4. The TA of the FRL submitted by Malaysia was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed forest reference emission levels and/or FRLs as contained in the annex to decision 13/CP.19. This report on the TA was prepared by the AT following the guidelines and procedures in the same decision.

5. Following the process contained in the guidelines and procedures of the same decision, a draft version of this report was communicated to the Government of Malaysia, which provided comments that were considered and incorporated by the AT, as appropriate, into this final version of the report. The facilitative exchange during the TA allowed Malaysia to provide clarifications and information that were considered by the AT in the preparation of this report.<sup>7</sup> As a result of the facilitative interactions with the AT during the TA session, Malaysia submitted modified FRLs on 26 April 2015 and 24 September 2015, which took into consideration some technical inputs by the AT. This TA report was

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<sup>1</sup> The submission of Malaysia is available at <<http://unfccc.int/8414>>.

<sup>2</sup> Decision 13/CP.19, annex, paragraph 7.

<sup>3</sup> Decision 13/CP.19, annex, paragraphs 7 and 9.

<sup>4</sup> Decision 1/CP.16, paragraph 71(b).

<sup>5</sup> Decision 12/CP.17, annex.

<sup>6</sup> Decision 13/CP.19, annex, paragraph 1(a) and (b).

<sup>7</sup> Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

prepared in the context of the modified FRL submission made on 24 September 2015. This modified submission, which contains the assessed FRL, and the original submission are available on the UNFCCC website.<sup>8</sup>

## **B. Proposed forest reference level**

6. In decision 1/CP.16, paragraph 70, the COP encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking a number of activities, as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances, in the context of the provision of adequate and predictable support. The FRL proposed by Malaysia, on a voluntary basis, for a TA in the context of results-based payments, covers the activity “sustainable management of forests”, which is one of the five activities included in paragraph 70 of this decision.

7. Malaysia provided information on the scope, scale and assumptions used in the construction of the FRL in its submission (sections 4.1–4.3). The proposed FRL for the activity “sustainable management of forests” includes 12.36 Mha of production forest in 2012, comprising around 85 per cent of the permanent reserve forest (PRF). The proposed FRL includes above-ground and below-ground biomass carbon pools and the associated carbon dioxide (CO<sub>2</sub>) removals from growth and emissions from commercial harvest from production forests within PRF.

8. The FRL proposed by Malaysia comprises historic averages of CO<sub>2</sub> emissions/removals from production forests within PRF over two periods:

(a) The average net CO<sub>2</sub> removals from 1992 to 2005 of –183.55 Mt CO<sub>2</sub> per year to be used as the reference level for the time period 2006–2010;

(b) The average net CO<sub>2</sub> removals from 1997 to 2010 of –197.83 Mt CO<sub>2</sub> per year to be used as the reference level for the time period 2011–2015.

9. In accordance with decision 12/CP.17, Malaysia has implemented a step-wise approach in the construction of its FRL. Malaysia has developed an FRL for sustainable management of forests, which includes only production forests within PRF. Production forest is the only functional class, among the 12 classes identified to promote sustainable forest management within PRF, that is subjected to commercial harvest. The FRL excludes protection forests from within PRF, as no commercial harvest is undertaken in these forests. During the TA, Malaysia indicated that the other forest management activities will be included when additional information becomes available.

10. The proposed FRL does not cover the entire national territory of forest area<sup>9</sup> in Malaysia, because not all forest areas are subject to sustainable forest management and not all areas subject to sustainable forest management according to the National Forestry Act have been included in the FRL calculation. The FRL is limited to the areas under sustainable forest management included in the PRF functional class “Timber production forest under sustained yield”, while forest areas classified under the other 11 functional classes (see annex 1 of the FRL submission by Malaysia) are not included in the FRL. The other 11 functional classes represent around 15 per cent of the total PRF. Emissions and removals from forest areas not included in the sustainable forest management activity, as well as emissions and removals from degazetted forest areas previously included under the PRF functional class “Timber production forest under sustained yield” are not included in the FRL. Degazettement of PRF occurs either for development or for protection purposes.

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<sup>8</sup> <<http://unfccc.int/8414>>.

<sup>9</sup> Decision 13/CP.19, annex, paragraph 2(c).

PRF areas degazetted for development purposes are subject to deforestation, and thus emissions from deforestation are not included in the current construction of FRL. Some PRF areas degazetted are transferred to the totally protected areas.<sup>10</sup>

## II. Data, methodologies and procedures used in the construction of the proposed forest reference level

### How each element in the annex to decision 12/CP.17 was taken into account in the construction of the forest reference level

#### 1. Information that was used by the Party in the construction of the forest reference level

11. For the construction of the FRL, Malaysia used the methodology provided in the *2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) for estimating emissions and removals from the sustainable forest management in production forests.

12. The FRL submission contains information on harvesting cycles and cutting limits for inland/hill, peat swamp and mangrove forests included within production forests of PRF. Malaysia reports that under the 'business as usual' harvest scenario, all commercial logs available (based on the pre-felling inventory) are harvested. Since 2004, the National Forestry Council has set an upper limit on the total allowable harvest of 85 m<sup>3</sup> ha<sup>-1</sup>.

13. Malaysia used the following activity data for the construction of its FRL:

(a) Historical data on commercial harvest of industrial roundwood from production forests (over bark; table 15) from Malaysia's National Commodity Statistic Report, which compiles commercial harvest from PRF annually<sup>11</sup> from 1994 onwards;

(b) Historical data on areas of production forests under PRF subdivided by forest types (inland/hill forest, peat swamp forest and mangroves; table 14).<sup>12</sup>

14. Malaysia used the following emission factors and other parameters for the construction of its FRL:

(a) Biomass growth rates for the three forest types (table 13) from Malaysia's national forest inventories (NFIs) and relevant literature;

(b) A root to shoot ratio of 0.48 from the *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (hereinafter referred to as the Wetlands Supplement) for mangrove forests and a single root to shoot ratio of 0.18 derived from Niiyama et al. (2010)<sup>13</sup> for all other forests;

<sup>10</sup> Totally protected areas consist of wildlife sanctuaries, national parks and state parks.

<sup>11</sup> In response to a question raised by the AT, Malaysia clarified that data reported in table 15 are over-bark volumes (i.e. the bark volume is included) of commercial harvest from production forests under PRF.

<sup>12</sup> In response to a question raised by the AT, Malaysia clarified that data reported in table 14 are areas of production forests under PRF.

<sup>13</sup> Niiyama K, Kajimoto T, Matsuura Y, Yamashita T, Matsuo N, Yashiro Y, Ripin A, Kassim AR and Noor NS. 2010. Estimation of root biomass based on excavation of individual root systems in a primary dipterocarp forest in Pasoh Forest Reserve, Peninsular Malaysia. *Journal of Tropical Ecology*. 26 (3): pp.271–284.

(c) A single biomass conversion and expansion factor (BCEF) value of 1.05 (t d.m.) m<sup>-3</sup> from the 2006 IPCC Guidelines (volume 4, chapter 4, table 4.5) to expand and convert commercial roundwood volume to total above-ground biomass dry matter;

(d) A single carbon fraction (CF) value of 0.47 t C (t d.m.)<sup>-1</sup> from the 2006 IPCC Guidelines (volume 4, chapter 4, table 4.3) to convert dry matter into carbon.

15. Based on a comparison of these growth rates with the default above-ground biomass increment rates in the 2006 IPCC Guidelines (see para. 20(e) below) and the analysis of Banin et al. (2014)<sup>14</sup>, cited in the submission as one of the sources from which growth rates have been calculated, the AT concluded that reported growth rates are likely gross increment rates (i.e. mortality losses are not included). In response to a question raised by the AT, Malaysia clarified that data from the fourth and fifth NFIs do not completely cover the Sarawak and Sabah regions, as well as mangrove forests, and therefore growth rates have been also derived from Ong (1993)<sup>15</sup> and Banin et al. (2014).

16. In the course of the facilitative interaction with the AT, Malaysia indicated that recalculations of its net growth rates to be made following the availability of data from the fifth NFI will include mortality losses. The AT notes that in applying the reported net increments, Malaysia has estimated an average net accumulation of biomass of PRF of 192 t d.m. ha<sup>-1</sup> during the reported time period 1990–2011. The AT further notes that owing to the harvesting limit of 85 m<sup>3</sup> ha<sup>-1</sup> being in place, almost two thirds of the biomass accumulated across the rotation cycle is left standing after harvest, so the effect of saturation of the biomass carbon pool should be considered when calculating net increments of subsequent rotation cycles.

17. The FRL is based on the assumption that existing management practices established under the revised National Forestry Policy (1992) will be maintained. In response to an observation made by the AT, Malaysia recalculated the FRL using a time series beginning in 1992. The AT acknowledges that historical information from the year 1992 represents a more realistic ‘business as usual’ scenario in the absence of a REDD-plus<sup>16</sup> policy prescribing a universal fixed limit on harvesting (i.e. 85 m<sup>3</sup> ha<sup>-1</sup>). The AT commends Malaysia for making this improvement in its FRL.

## 2. Transparency, completeness, consistency and accuracy of the information used in the construction of the forest reference level

### Methodological information, including description of data sets, approaches and methods

18. As mentioned in paragraph 17 above, in response to an observation made by the AT, Malaysia recalculated its FRL using historical rolling averages of emissions and removals for 1992–2005 and 1997–2010 for assessing performance of REDD-plus activities in the time periods 2006–2010 and 2011–2015, respectively. The AT acknowledges that when historical data show a clear trend, a rolling average of historical data on emissions and removals can appropriately reflect counterfactual emissions/removals expected from forest

<sup>14</sup> Banin L, Lewis SL, Lopez-Gonzalez G, Baker TR, Quesada CA, Chao K-J, Burslem DFRP, Nilus R, Abu Salim K, Keeling HC, Tan S, Davies SJ, Monteagudo Mendoza A, Vasquez R, Lloyd J, Neill DA, Pitman N and Phillips OL. 2014. Tropical forest wood production: a cross-continental comparison. *Journal of Ecology*. 102 (4): pp.1025–1037.

<sup>15</sup> Ong JE. 1993. Mangroves – a carbon source or sink. *Chemosphere*. 27 (6): pp.1097–1107.

<sup>16</sup> In decision 1/CP.16, paragraph 70, the Conference of the Parties encouraged developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

management in the absence of the proposed REDD-plus activity, and commends Malaysia for its improved FRL.

19. Malaysia has applied a gain-loss method for estimating the carbon stock changes in production forests under PRF as provided in the 2006 IPCC Guidelines (volume 4, chapter 2). The AT notes the following with regard to the method applied for estimating the carbon stock changes in production forests under PRF:

(a) While the total net carbon stock accumulation in production forests under PRF over the period 1990–2011, as reported in table 16 of the FRL submission, is 1.117 Gt C, or 1.385 Gm<sup>3</sup> in growing stock volume, the values reported in table 5 of the FRL submission indicate a net loss of growing stock of 329 Mm<sup>3</sup> over the same period. Further, the AT notes that Malaysia has reported a net loss of biomass carbon stock of about 284 Mt C to the 2015 Global Forest Resources Assessment (GFRA) of the Food and Agriculture Organization of the United Nations (FAO).<sup>17</sup> In response to observations of the AT, Malaysia provided the explanation that the methodologies used in tables 5 and 16 are different and hence the values in these tables cannot be directly compared. While acknowledging Malaysia's explanation, as well as the fact that the values reported to GFRA are for the entire forest area of Malaysia, the AT notes that the difference in trends between the values reported in table 16 (a net carbon stock increase) and table 5 (a net carbon stock decrease) is not adequately explained. The AT also notes that the decrease in wood harvested from PRF from 1990 to 2011 is also accompanied by a decrease in total biomass carbon stocks in PRF, which cannot be explained based on the reported information unless there are other significant biomass carbon stock losses, such as those due to illegal harvesting or disturbances. The AT identifies this as an area for future improvement and encourages Malaysia to verify net carbon stock change estimates with other data sets and to provide transparent information on the difference in the carbon stock change values reported in different sections of the submission. For instance, data from the pre-felling inventories made on the same area at consecutive harvests can be used to estimate actual net carbon stock changes. In addition, comparison of carbon stocks in consecutive forest inventories can be used for verification;

(b) Accurate estimation of annual net carbon stock changes using the gain-loss method requires that all carbon stock losses are estimated. However, Malaysia includes only carbon stock losses from harvesting of commercial roundwood in its FRL, while reporting that PRF areas are not affected by disturbances or illegal harvesting. The AT notes that since net CO<sub>2</sub> removals reported for the time series 1990–2010 do not match the total carbon stock changes calculated from data from the NFI as reported in table 5, carbon stock losses should be verified, including by estimating losses associated with natural mortality. In response to the AT observation, Malaysia clarified that the methodologies applied for estimation of carbon stocks in tables 5 and 16 are different. The AT considers this to be an area for future improvement of the FRL, and encourages Malaysia to address it in future FRL submissions.

20. The AT notes the following with regard to the data used in the FRL:

(a) The FRL does not include fuelwood harvesting although international data sets report a significant amount of wood harvested for energy purposes in Malaysia. For example, the online database maintained by the Statistics Division of FAO (FAOSTAT)<sup>18</sup> reports a time series of annual production of fuelwood volume measured under bark from Malaysia ranging from 4 Mm<sup>3</sup> in 1990 to 2.6 Mm<sup>3</sup> in 2012. The fuelwood values of

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<sup>17</sup> <<http://www.fao.org/3/a-az266e.pdf>>.

<sup>18</sup> This database contains data on food, agriculture and forestry communicated to FAO by its member countries. Available at <<http://faostat.fao.org>>.

FAOSTAT include the FAO modelled estimates of large-scale charcoal production. However, in its FRL submission, Malaysia has reported that no fuelwood for subsistence purposes is collected in the production forests under PRF. In response to the AT observation, Malaysia further confirmed that it did not report fuelwood data to FAO;

(b) Malaysia has reported a higher production of commercial roundwood to international organizations than that used in the FRL calculation. For instance, for the year 2012, Malaysia reported commercial roundwood production of 22.50 Mm<sup>3</sup> (over bark) to the International Tropical Timber Organization (ITTO) and 19.63 Mm<sup>3</sup> (under bark) to FAO, while it has used a value of 15.89 Mm<sup>3</sup> (over bark) for the FRL (table 15). The AT notes that the ITTO and FAO data are consistent with each other when adjusted for over- and under-bark volumes. In the course of the facilitative interaction with the AT, Malaysia clarified that while the data reported in table 15 represent only the commercial roundwood extraction from production forest areas under PRF, while the values reported to ITTO may include roundwood extraction from forest plantations and deforestation. The AT notes Malaysia's response but considers that further investigation of differences in data submitted to different organizations could help improve the consistency of estimates used for the FRL with those reported to other international organizations;

(c) Malaysia reports in its FRL submission that the annual felling rates (coupe) have been monitored from 1996. However, the FRL submission contains no information on how consistency in the time series data on harvesting of commercial roundwood (table 15) has been ensured, especially between pre-1996 data and those collected through post-1995 annual monitoring of felling. In particular, there is no information on whether the commercial roundwood data for 1990–1995 only relate to production forests under PRF or whether they also include harvest from degazetted forests and stateland forests. The AT notes that provision of information on how time series consistency of commercial roundwood quantities has been achieved would enhance the transparency of the FRL submission;

(d) The AT considers verification of the applied growth rates, as well as of biomass net carbon stock changes, against complete data sets taken from the NFI across the entire time series as an area for further improvement given that biomass growth rates used by Malaysia in its FRL are high in comparison with the IPCC default values, in particular:

(i) The biomass growth rate value for inland/hill forests, 9.3 t d.m. ha<sup>-1</sup> per year, is 3–20 times larger than the default factors provided in the 2006 IPCC Guidelines (volume 4, chapter 4, table 4.9) for tropical mountain systems older than 21 years in continental and insular Asia, which are 0.5–1 t d.m. ha<sup>-1</sup> per year and 1–3 t d.m. ha<sup>-1</sup> per year, respectively;

(ii) The biomass growth rate value for peat swamp forests, 9.2 t d.m. ha<sup>-1</sup> per year, is higher than the default factors provided in the 2006 IPCC Guidelines (volume 4, chapter 4, table 4.9) for tropical rain forests older than 21 years in continental and insular Asia, which are 2.2 t d.m. ha<sup>-1</sup> per year and 3.4 t d.m. ha<sup>-1</sup> per year, respectively;

(iii) The biomass growth rate value for the 30 year harvesting cycle of mangrove forests, 11.1 t d.m. ha<sup>-1</sup> per year, is derived from a set of growth rate values calculated according to age classes provided by Ong (1993). The AT notes that the default factor provided in the Wetlands Supplement (chapter 4, table 4.4) is smaller (9.9 t d.m. ha<sup>-1</sup> per year), with an upper boundary of confidence interval (10.4 t d.m. ha<sup>-1</sup> per year) lower than the value used by Malaysia.

(e) Malaysia has applied a single default value of BCEF of 1.05 (t d.m.) m<sup>-3</sup> for converting merchantable volume to total above-ground biomass. The AT notes that the 2006 IPCC Guidelines (volume 4, chapter 4, table 4.5) and the Wetlands Supplement



(chapter 4, table 4.6) as well as the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) (tables 3A.1.9 and 3A.1.10) contain different values of BCEFs or biomass expansion factors and basic wood density factors to be combined to calculate appropriate BCEFs for different forest types. Further, the AT notes that when BCEF values applicable to wood removals ( $BCEF_R$ ) are applied to harvested volume under bark, the volume needs to be expanded to over-bark volume, by using appropriate bark percentages or the default IPCC factor of 1.15 contained in the IPCC good practice guidance for LULUCF, before applying the IPCC default  $BCEF_R$ . The AT notes this as an area for future improvement, and encourages Malaysia to consider applying different  $BCEF_R$  values for different types of forests, converting, where needed, the under-bark volume to over-bark volume using bark percentages or the IPCC default factor of 1.15 in order to improve the accuracy of estimates;

(f) Malaysia has applied a single value of CF to convert biomass to carbon stocks for all types of forests. The AT notes that the 2006 IPCC Guidelines (volume 4, chapter 4, table 4.3) and the Wetlands Supplement (chapter 4, table 4.2) contain different values of the CF for different types of forests. Therefore, the AT notes this as an area for future improvement, and encourages Malaysia to consider applying different CF values for different types of forest in order to improve the accuracy of estimates.

21. During the TA, Malaysia provided the information that it plans to extend remote sensing based forest monitoring,<sup>19</sup> which was initially (2008) limited to Peninsular Malaysia, to the States of Sarawak and Sabah. Malaysia also plans to extend the data collection of the NFI to Sabah and Sarawak from 2016. The AT commends Malaysia for these initiatives.

22. While Malaysia's FRL submission provides some information on uncertainties of NFI data and carbon stock assessment as well as some qualitative information on the sources of uncertainty of activity data, it does not contain quantitative information on uncertainties of factors and activity data used for constructing the FRL as well as on the uncertainties of the FRL itself. The AT notes that providing uncertainty estimates would enhance the transparency of the FRL. The AT consider this to be an area for further improvement of the FRL.

#### Description of relevant policies and plans, as appropriate

23. Malaysia provided a description of the policies and plans relevant to the management of land considered in the FRL in section 6 of its FRL submission, together with some additional details in annex 2. The revised National Forestry Act (1994) provides the legal basis for the multi-use management of PRF based on functional classes, with the aim of promoting sustainable forest management, recognizing the multiple roles and functions of forests. Under Article 74(2) of the Federal Constitution, forestry falls under the jurisdiction of State governments, which have the overall responsibility for management of their forestry resources. State governments have the authority to gazette as PRF areas of forest previously outside PRF or degazette forest areas within PRF. In 2004, the National Forestry Council set an upper limit on the total allowable harvest of  $85 \text{ m}^3 \text{ ha}^{-1}$ .

### **3. Pools, gases and activities included in the construction of the forest reference level**

24. According to decision 12/CP.17, annex, subparagraph (c), reasons for omitting a pool and/or activity from the construction of the FRL should be provided, noting that significant pools and/or activities should not be excluded.

<sup>19</sup> <<http://hutan.remotesensing.gov.my/fmrs/index.html>>.

25. Malaysia has included the following carbon pools in the construction of the FRL (table 8): “above ground biomass” and “below ground biomass”. According to the IPCC tier 1 approach, litter, dead wood and soil carbon stocks are assumed to be in equilibrium. Malaysia has also included some information demonstrating why these pools are not significant subcategories of forest land remaining forest land.

26. However, given that there could potentially be significant accumulation of carbon stocks in these pools, the AT considers the inclusion of emissions from dead wood, litter and soil organic carbon as an area for future technical improvement of the FRL. As part of the step-wise approach, the AT encourages Malaysia to obtain better information on carbon stock changes in litter, dead wood and soil organic carbon pools, with the aim of including them in future submissions. In this regard, the AT notes the work towards development of a soil organic carbon database currently under way in Malaysia.

27. The AT notes that Malaysia has not considered non-CO<sub>2</sub> emissions in the construction of the FRL. In its FRL submission, Malaysia reported that while wildfires did not occur within PRF, open burning is not practised in Malaysia, because permission is needed for any form of burning. Consistent with the step-wise approach to the FRL, the AT notes treatment of non-CO<sub>2</sub> emissions as an area for future improvement and encourages Malaysia to estimate emissions from forest fires, as appropriate, in PRF in future FRL submissions.

28. The AT notes that emissions from the removal of forest areas from PRF due to degazettement are not included in the FRL calculation. In this context, the AT also notes that during the period 1990–2012, areas of peat swamp and mangrove forests have decreased by around 530,000 ha and 40,000 ha, respectively, even though the total area reported as subject to PRF has remained almost constant (table 14). During the TA, Malaysia provided additional clarification on the status of degazetted forest of PRF while informing that further information on this was being collected. The AT commends Malaysia for providing this additional information to enhance the transparency of the FRL. Based on the information provided, the AT notes that deforestation is likely to be a significant activity in Malaysia. The AT further notes that Malaysia has also not provided any information on forest degradation in non-PRF forests. The AT notes this as an area for further improvement, and in accordance with decision 1/CP.16, paragraph 70, encourages Malaysia to include, subject to its capabilities and national circumstances, emissions from deforestation and forest degradation, if any, in future FRL submissions.

#### **4. Definition of forest**

29. Malaysia has provided its definition of forest in its FRL submission. This definition is the same as that used in the NFI and greenhouse gas inventory: a minimum area of 0.5 ha, at least 30 per cent tree canopy cover and a minimum tree height at maturity of 5 m. However, this definition differs from that used for reporting to FAO, which is based on a canopy cover of 10 per cent. During the TA, Malaysia provided additional explanation that some areas of cropland (e.g. oil palm) and rubber plantations, even though they meet the thresholds used in the forest definition, are excluded under the National Forestry Act and thus are also not included in the FRL.

### **III. Conclusions**

30. The information used by Malaysia in constructing its FRL for sustainable management of forests is constructed based on currently available data on the basis of a step-wise approach, according to the guidelines for submissions of information on FRLs (as contained in the annex to decision 12/CP.17).

31. The AT notes that information reported by Malaysia on deforestation rates, especially in table 1, is not sufficiently transparent. The AT considers the provision of transparent information on gross areas of conversion of forest land to other land uses to be an area for improvement in future FRL submissions by Malaysia.

32. The AT notes that according to the Malaysian Forest Law, forest land included in the production forest class of PRF, and as such subject to the REDD-plus activity, cannot be converted to other land uses unless it has first been degazetted from PRF. The AT further notes that while emissions on degazetted PRF lands previously included in the REDD-plus activity are not estimated, the net carbon stock accumulation occurring on these degazetted PRF lands before degazettement has been included in the FRL calculation. The AT also notes that no information on the treatment of displaced emissions has been included in Malaysia's submission. The degazettement of the production forest class of PRF for development purposes is seen by the AT as displacement of emissions from forest areas included in the REDD-plus activity to those excluded from it. For this reason, emissions associated with degazettement of forest land from PRF have been excluded by Malaysia from the historical time series of emission and removal data used for constructing the FRL (see para. 10 above). In response to the AT assessment, Malaysia noted that the degazettement of PRF is not a consequence of REDD-plus activity, but is due to the development needs of the country. Therefore, Malaysia does not consider emissions from degazetted PRF areas excluded from REDD-plus activity as displaced emissions.

33. In the construction of the FRL, Malaysia has included the most significant pools in terms of emissions and removals from sustainable management of forests. In doing so, the AT considers that Malaysia has followed decision 1/CP.16, paragraph 70, on activities undertaken, paragraph 71(b) and decision 12/CP.17, paragraph 10, on implementing a step-wise approach.

34. As a result of the facilitative interactions with the AT during the TA session, Malaysia submitted modified submissions that took into consideration some of the technical inputs by the AT. The AT notes that the transparency and credibility of information improved in the modified FRL submissions, and commends Malaysia for the efforts made. However, the new information on the construction of the FRL provided in the modified submissions is only partly complete and partly transparent.

35. Pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified the following areas for future technical improvement:

- (a) Treatment of carbon stock changes in litter, dead wood and soil organic matter using national information in the FRL;
- (b) Treatment of emissions of non-CO<sub>2</sub> gases in the FRL;
- (c) Provision of information on how time series consistency in the data on harvesting of commercial roundwood has been achieved;
- (d) Transparent documentation of the reasons for differences in carbon stock and carbon stock change values reported in different sections of the submission and their verification against other data sets;
- (e) Verification of applied biomass increment rates with complete data sets taken from the NFIs;
- (f) Revision of estimation using more disaggregated BCEF<sub>R</sub> and CF values for different forest types;
- (g) Provision of uncertainty estimates of factors and activity data used for constructing the FRL as well as uncertainties of the FRL;

(h) Treatment of emissions from deforestation in the construction of the FRL.

36. The AT acknowledges and welcomes the intention expressed by Malaysia to:

(a) Develop a soil organic carbon database and include soil carbon in the FRL for its future improvement, while noting that Malaysia lists this among its capacity needs and cites lack of funding, as well as gaps in technical capacity, as constraints for developing such a database;

(b) Enhance sustainable forest management, including by reducing damage from logging while noting that this is also an area that Malaysia lists among its capacity needs.

37. In conclusion, the AT commends Malaysia for expressing its commitment to continuous improvement in its FRL estimates, in line with the step-wise approach to development of the FRL. However, Malaysia's submissions do not include adequate information on future inclusion of other significant activities in the FRL. A number of areas for future technical improvements of Malaysia's FRL have been identified in this report. At the same time, the AT acknowledges that these improvements are subject to national capabilities and policies, and notes the importance of adequate and predictable support for their implementation. The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Malaysia.

38. The table in the annex summarizes the main characteristics of Malaysia's proposed FRL.

## Annex

### Summary of main features of the proposed forest reference level based on information provided by the Party

	<i>Main features of the FRL</i>	<i>Remarks</i>
Proposed FRL (in t CO <sub>2</sub> eq/yr)	<p><math>-183.55 \times 10^6</math> (2006–2010)</p> <p><math>-197.83 \times 10^6</math> (2011–2015)</p>	Paragraph 8
Type and duration of FRL	FRL; 2006–2010 and 2011–2015	The FRL is based on historical rolling averages of 14 year time series of net CO <sub>2</sub> emissions starting in 1992 (paras. 17 and 18)
Adjustment for national circumstances	No	
National/subnational <sup>a</sup>		According to decision 13/CP.19, annex, paragraph 2(c), the proposed FRL covers less than the entire national territory of forest area. No information on the treatment of displacement of emissions has been reported (paras. 10 and 32)
Activities included <sup>b</sup>	Sustainable management of forest	Lack of complete data sets has been reported as the justification for exclusion of other significant activities (paras. 6, 7, 9, 10, 17, 23, 28, 31 and 35)
Pools included <sup>b</sup>	AB and BB	Carbon stock changes in DOM and SOM pools have been assumed to be in equilibrium based on the tier 1 methodology for forest land remaining forest land in the 2006 IPCC Guidelines (paras. 7, 25, 26, 33 and 35)
Gases included	CO <sub>2</sub>	Fires are reported as insignificant and drainage of peat forest is reported as not occurring in production forests under permanent reserve forest (paras. 27 and 35)
Forest definition <sup>c</sup>	Reported	<p>Minimum tree crown cover of 30 per cent; minimum land area of 0.5 ha; minimum tree height of 5 m</p> <p>Oil palm and rubber plantations are not included (para. 29)</p>
Relationship with latest GHG inventory	Methods used for the FRL differ from those used for the latest GHG inventory in Malaysia's second national communication submitted in 2011	Malaysia has used the 2006 IPCC Guidelines in its FRL, but has used the Revised 1996 IPCC Guidelines in the GHG inventory in its second national communication. The GHG inventory in the first biennial update report is currently in preparation with an updated methodology (paras. 11 and 19)

<i>Main features of the FRL</i>		<i>Remarks</i>
Description of relevant policies and plans <sup>d</sup>	Reported	Paragraph 23
Description of assumptions on future changes in policies <sup>d</sup>	Not applicable	
Descriptions of changes to previous FRL	Not applicable	
Future improvements identified	No	Paragraphs 19(a),19(b), 20(d), 20(e), 20(f), 22, 26–28 and 35–37

*Abbreviations:* AB = above-ground biomass, BB = below-ground biomass, DOM = dead organic matter, FRL = Forest reference level, GHG = greenhouse gas, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, SOM= soil organic matter, t CO<sub>2</sub> eq/yr = tonnes of carbon dioxide equivalent per year, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

<sup>a</sup> If subnational, comments should include information on the treatment of displacement of emissions.

<sup>b</sup> In the case of omitted pools or activities, comments should include the justification provided by the country.

<sup>c</sup> The forest definition should be summarized, and it should be stated if it differs from the definition used in the greenhouse gas inventory or in reporting to other international organizations.

<sup>d</sup> May be relevant to the description of national circumstances, which is required in the case of adjustment.