

## Overall comments

This document states in the introduction that it describes the methods and good practice for assessing GHG emissions and carbon stock changes resulting from LU, LUC and forestry, whereby ‘activities’ are included that are addressed under the articles 3.3 (mandatory) and 3.4 (voluntary, elected per country). Activities that are recently included are drainage of wetlands and rewetting of wetlands (negative and positive, resp. for reporting/accounting). Some remarks:

- Currently, in this FOD, WRD activities are the lowest in hierarchy to be accounted for in emissions inventories: (line 175, ‘wetland drainage and rewetting, being limited to lands that are not accounted for under any other activity, has the lowest position in the hierarchy among elected activities under Article 3.4’ and lines 6175-6177: WDR activities are limited to lands that are not accounted for under other activities). Most (lines 6177 onwards) will be reported under:
  - Forest land Management (FM)
  - In the case of conversion to forest: AR / D
  - If countries elect Crop Management (CM), Grassland Management (GM) or Revegetation (RE) WRD could fall under these categories.

Is this really the case? Are ongoing emissions from drainage of peatsoils fully being addressed under AR / D? We don’t think so. In all other cases, these categories are being elected or not (voluntary). A country could skip reporting all of these categories. This has large influence on emission reporting knowing that peatland emissions from drained peat are one of the key GHG sources in the world.

Suggestion: make WRD a mandatory category for reporting, preferably splitting this up in WD (drainage) and WR (rewetting), as this is the case for AR (afforestation/reforestation) and D (deforestation). This could be realised in STEP 1 and STEP 2 on pages 5 and 6 by creating a hierarchy of the various activities based on significance of source. Wetlands drainage is a major source/sink which in our opinion has to be accounted for in IPCC accounting/reporting in any case, also since the aim of IPCC is to reduce emissions worldwide. This means at least that the largest sources have to be addressed and that projects that aim emissions reduction have to be stimulated.

- There shall be a possibility that reporting on WDR activities (soil component) are being combined with reporting on e.g. AR activities (AGB component) or FM (forest management) activities. What is the reason that WDR activities are not allowed to be combined with others, while there is a total separation between sources and sinks (soil/biomass)?
- The focus seems on LUC, rather than on LU. Emissions from peatland drainage are not mainly caused by land use *change*, but rather by the land *use* itself. An initial

emission peak will follow after land use change (drainage of peat) which is a one-point emission in time, while emission resulting from peatland drainage is a continuous process in time. Hooijer and Couwenberg (subm.) suggest a value of 55-73 t CO<sub>2</sub> ha<sup>-1</sup> yr<sup>-1</sup> for continuous peat emissions from drained, managed peat in tropical regions, for the range of best to common practice. Given the significance of the source and the continuity of emissions (not only in the tropics, but the same is true for temperate peats and boreal peats), we would suggest to account for peat related activities (WDR) in any case and to make this mandatory. As soon as there is a peat component there shall be accounted for, and shall be combined with reporting of other sources and sinks related to other activities. A main question: again, where is election for the various 3.4 activities based on? This is not clear, and why shall countries choose the activities that have a negative influence on their GHG inventory. The election of activities shall be based on significance of source/sink strength.

- Throughout the document the focus is very much on ‘forest’ related activities. In examples, text boxes, ‘STEPS’ etc. never the WRD activities are mentioned. In the specific comments, some suggestions are given, however, this has consequently to be maintained throughout the whole document. An example is paragraph 1.1: STEPS are given to determine area for a certain activity and for stratification of these areas, however, this is only being done for ARD and FM activities. WRD activities have different requirements, different stratifications. This shall be discussed and translated in STEPS as well. E.g. Remote sensing is mentioned as an approach for stratify the country based on LU/land cover to focus on CO<sub>2</sub> emissions through loss of live biomass. RS can not yet been used for determining peat-loss (carbon loss through oxidation) and not for stratification based on water level.
- This document states in the introduction that it describes the methods and good practice for assessing GHG emissions and carbon stock changes resulting from LU, LUC and forestry. The title of Chapter 2 shall be changes accordingly. The title of Chapter 2 now suggests that it is about reporting of LULUCF activities only, however, its about methods for estimating and reporting GHG and C resulting from these activities.
- The order of paragraphs and sections is confusing, specifically that of chapter 2.3 – 2.4. We don’t understand the logic behind it. In the specific comments some suggestions are given. Section 2.3.9 on (natural) disturbances is too long compared to the other sections.
- It is perhaps better to separate WD (source) and WR (sink) (note AR (sink) and D(source)), e.g. in Fig 2.1.2 and in the text.
- If forest fires are accounted for as ‘disturbance’, also peat fires shall be accounted for and being reported. Looking at significance of source/sink strength, this is globally a major source resulting from (directly and indirectly) human induced drainage of peat (on- and off site impacts).

Suggestions for including WDR in Chapter 1:

- Lines 370-375: add example of WDR

- STEP 1 (lines 112 onwards) until STEP 3 (line 251): implementing the same steps for WRD (soil component related) activities (not only for forest-related activities), or implement WDR in the existing STEPS that focus now on forest-related activities mainly. E.g. discussion on wetland/peatland/organic soil definition (national/international), add bulletpoint under lines 211-216: units of (peat)land affected by drainage and/or rewetting etc.
- Lines 467-474: add WRD
- Box 1.1 (pages 13-15): add examples of WDR as activity
- Build WRD in Fig 1.1. This Fig. has not been adapted to WDR activities yet. There is no way of classifying a land under article 3.4, WDR, or at least it is not clear.
- Lines 280-281: WDR shall be mentioned here
- Table 1.1: Write not just forest-related activities, but all activities, including CM, GM and WD en WR.

This shall consistently be done throughout the entire document, also in Chapter 2.

Specific comments:

## **Chapter 1**

There shall be an introduction to activities under article 6 and their role in this document in 'Introduction'.

There shall be made reference to the Wetland Supplement more frequently.

How to deal with 'off-site' impacts in the case of peat related activities such as drainage. Once the area of this unit of land (peat/organic soil/wetland) is being assessed, this is not perse the area where the emissions come from. Due to disruption of the hydrological system, emissions and carbon losses can occur outside the area where the activity takes place.

Page 1.3, <sup>1</sup>: Suggestion for specific definitions of wetland drainage and wetlands rewetting:

**Wetland Drainage:** Lowering of the water table to lower than the natural average annual water level in a wetland due to accelerated water loss or decreased water supply resulting from human activities and constructions, both on and off site.

**Wetland Rewetting:** The change of elevation of the average annual water table in a drained wetland by partially or entirely reversing the existing drainage state.

Lines (76-79): This separation is clear, however, in our opinion this shall be mentioned, but not be maintained in this document. It is more clear that in this document one of the two is chosen. In the case that the authors decide to maintain this separation, this shall be done consistently and the term 'area of land' shall be avoided. An example of lines where this is not consistently being done yet:

Page 2.2 (line 489): methods for lands subject to article 3.3 and units of land subject to article 3.4

Page 2.12 (line 792): ;reporting methods for lands subject to .....activities' has to be consequently: "reporting methods for lands subject to article 3.3 and units of land subject to 3.4 activities'.

Page 2.12 (line 799): ‘...entails delineating areas that include multiple land units subject to article 3.3 and 3.4 activities.....’. Land units has to be replaced by: land and units of land.

Page 2.18: (lines 996-997 and 998) Sources of data for identifying lands and other new reporting requirements: lands only? Or also units of land?

Page 2.21 (line 1151): ‘.....non-CO2 greenhouse gases from all lands subject to the included activities.....’. Shall be: lands and units of land, otherwise article 3.4 activities are excluded.

Line (82): ‘...3.4 activities that can be elected by a country...’. Please explain where this election shall be based on. In our opinion, the election shall have a basis such as the significance of source (see earlier comment)

Paragraph 1.1 (see earlier comment): 3.4 activities, specifically WDR activities shall be outlined more complete in all STEPS, the focus is now on forest-related activities (AR, D, FM).

Lines (140-142): ‘establish a hierarchy among all activities’. Lines 144 onwards give ‘guidance on good practice’. E.g. line 144: ‘ARD and FM activities take precedence in reporting hierarchy over any elected article 3.4 activity because they are mandatory activities. That is no guidance! What is the reasoning behind this already chosen hierarchy? Just because it’s mandatory? Why is it mandatory, and why are the other activities selectable activities? Again: why not a hierarchy based on the height of GHG emissions/carbon fluxes from following the different activities? We believe that the bullet list as is given now does not sufficiently give guidance and does not provide a base for countries to make their hierarchy. The bulletlist highly focuses on forest again. There shall be a very clear paragraph on establishment of hierarchy of activities to be accounted for.

Line 185: ‘stratification of the country into areas of land for which the geographic....’. Stratification for the purpose of reporting of forest-related activities and their related GHG’s and carbon fluxes (which is based on land cover) is different from stratification for the purpose of reporting of drainage and rewetting activities and their related emissions (which is based on water table). There shall be more guidance/explanation on this in this document. At some places this is mentioned, but not fully explained.

Line 186: ‘and/or’: is this possible? Can there be only 3.4 activities being reported?

Line 197 (STEP 2.3): ‘...are subject to mandatory activities’...this shall be rephrased: ‘...are subject to activities that are mandatory for reporting’. The activities are not mandatory (!).

Line 213: ‘lands of forest plantation which have been converted to forest to compensate for harvesting of forest plantation’. The discussion was: how can we avoid that low/average carbon rich native forests are being replaced by fast growing, not native, high carbon, commercial tree species. Reading through this document, the steps that have been taken are: countries have to report their area of (commercial) plantation and area of natural forest. However, what is being done with this? What are the steps that will be taken by IPCC to avoid that native forest is being replaced by not-natural, more C-rich forest? Its not clear from this document.

Lines (224-23): relocate this tot the bulletpoint list on page 1.7.

Lines (224-225): is this mandatory in the case that WDR is elected as activity? Or is this mandatory in any case? Not clear. Why shall countries do this when a country does not elect this activity?

Lines (280-281): add WDR.

Lines (354-357): what is the meaning of these restrictions. A change of the situation (e.g. there was FM (with a peat component), the forest is being removed (D), and now the area is rewetted (WDR) shall be reported accordingly .

## **Chapter 2.**

Lines (480-483): methods and good practice guidance for estimation, measurement, monitoring and reporting of GHG emissions and carbon changes following LULUCF activities under articles 3.3 and 3.4 (and 6?). See also earlier comment in Overall comments.

Lines (477-492): the titles of the subparagraphs do not fully relate to the title of paragraph 2.2: 1) identification 2) stratification 3) reporting. Suggestion: reorder paragraphs and sections.

Lines (495-505): re-arrangement of sections is needed. Suggestion or 'order': 1) pools 2) spatial issues (stratification, spatial variability etc) 3) temporal issues (inter-annual variability, length of time series, commitment periods etc) 4) measuring 5) uncertainty and quality issues 6) reporting.

Table 2.1.1: this table could be used for the explanation on the difference between LUC (going from initial to final) and LU (going from a LU category, to the same LU category; e.g. going from a drained Wetland to a drained Wetland), including the explanation of how is dealt with ongoing emissions following an activity such as peat drainage.

Fig 2.1.1 and Fig 2.1.2: As suggested earlier: in the case that accounting/reporting for WDR is mandatory, make Wetlands a separate category that overlaps with Managed Grassland, Cropland and Managed and Unmanaged Forest. Perhaps better to also split WDR in WD and WR like ARD is splitted in AR and D.

Lines 729 onwards: In The Wetlands Supplement there is a section on ' Good practice and implications for reporting'. Refer to this section.

Lines 806-807: it is good practice to stratify the entire country and to define and report the geographic boundaries of these areas of land. Criteria could include.....administrative considerations....'. Suggestion: give clear guidance on stratification. Of course there are statistical considerations, consideration on LUC activities and elected activities, however, its not clear how to deal with these: 1) when is it needed to stratify 2) stratification based on what (e.g. land cover for the categories AR, D, FM, CM, GM; water table for the categories WD and WR etc) 3) how to upscale this to larger temporal scales 4) how dealing with overlap between categories 5) how to deal with sudden changes such as natural disturbances .

Fig 2.2.1. WDR is not included.

Table 2.2.1: Approach 3, Reporting method 1: 'if resolution is fine enough to represent minimum forest area'. Why focusing on forest area only?

Lines 948 onwards (How to identify lands (units of land) in general). This paragraph does not represent what has been mentioned in the title. It is not 'general', but focused on forest related activities.

Lines 949 onwards (spatial configuration of forests and afforestation, reforestation or deforestation events). Add either a similar section on 'spatial configuration of drainage and rewetting events or ongoing drainage and rewetting' or amend paragraph 2.2.6.2 accordingly or refer to the Wetlands Supplement if the information in this document is sufficient: how are units of land (article 3.4: CM, GM, RV, WDR) being identified (e.g. how is peat being identified? RS is not a good instrument to do this, but what method is?)? These questions should be answered according to the title of 2.2.6.

Lines 963-995: mention choice of peat definition; for peat areas there shall be criteria on hydrological connectivity, peat depth etc.

Lines 996-998 Sources of data for identifying lands and other new reporting requirements: lands only? Or also units of land? And in line 998: units of land?

Lines 1007-1013: bulletpoint list is too narrow, its not only information on existing land use, forest inventory systems, monitoring and measurement systems. Suggestion: make the list more general, and not specific to forest inventory systems. E.g. add national statistics, (process based) models etc., extra- and interpolation of data.

Lines 1024-1029: RS is being mentioned throughout the document as being the most promising method for monitoring changes in carbon stocks and GHG emissions. Note that RS not yet can be used for reliable estimates of 1) forest degradation 2) peat degradation (e.g. changes in thickness, changes in peat depth)

Line 1182: '...guidance for estimating GHG emissions and removals.....'

Lines 1186 onwards: this section could be combined with the 'choice of hierarchy/electability' in/of activities to be reported on per country. If a pool is significant, there shall be accounted for and this pool shall be reported in the national inventories. This significance of pools shall be outlined: when is a pool significant and when is a pool insignificant: add guidance on criteria.

Lines 1477 onwards: here is stated that it is good practice to examine qualitatively which of the possible activities actually are key. There is no description on how to determine 'what is key'.

Lines 1552 onwards (Disturbances). This section is relatively much too long compared to the other sections (the other have a maximum of two pages, while 2.3.9 has 18+ pages). Also peat fires shall be used as major disturbance.

Line 1853: not only forest lands are affected by natural disturbances. Perhaps create a bullet point list per category (Cropland, Grassland, Forest, Peat) and list what the potential major disturbances are.

Line 6153 onwards (Wetland drainage and rewetting). As is mentioned: this paragraph is not finished yet. It needs major revisions.

Line 6155: ‘....a system for practices for draining and rewetting.....’ This sentence does not make sense. What is meant?

Line 6156: ‘....organic soil...’. This excludes drainage and rewetting of other soils than organic soils. This is contradictory to line (305) that states: ‘WDR can take place on wetlands and/or organic soils...’.

Line 6156: ‘The activity....’ = rewetting?

Lines 6195 onwards: a decision tree is missing. Shall be added.

Lines 6200-6201: stratification for wetland drainage and rewetting indeed can be based on WT, however, if LU can coupled to WT, this coupling could also be used to determine the WT depth.

Lines 6239-6241: similar approach as described in section 2.9.1? Suggestion: refer to the Wetlands Supplement and create a box like box 2.9.1 here as well. Reference to this box is not appropriate, since it does not represent the WDR case, which is different in terms of definitions/overlap/stratification, and its organic soil only.

Line 6243: 3. shall be 1.

Line 6247: 4. shall be 2.

Lines 6250-6251: it is good practice to ensure that lands drained and rewetted since 1990 are completely included. This sound contradictory to the lowest location in the hierarchy of Wetlands and the voluntary inclusion of WDR in the inventories.

Line 6306 onwards: suggestion: relocate this section to page 2.187 just below the explanation of the two approaches. Be consequent in using ‘approach 1 and 2’ or ‘option 1 and 2’.

The remaining sections will be reviewed in a next review round.