
SBSTA-IPCC Special Event

The Wetlands Supplement & the KP Supplement

**New Methodology Reports produced by the
IPCC Task Force on National Greenhouse Gas Inventories (TFI)**

- **Opening Remarks by SBSTA Chair and TFI Co-chair**
- ***The 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement)***
- ***The 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (KP Supplement)***



2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement)

Methodological Guidance on Lands with Wet and Drained Soils, and Constructed Wetlands for Wastewater Treatment

SBSTA–IPCC special event on the Wetlands Supplement and the KP Supplement

UNFCCC COP19/CMP9

13 November 2013, Warsaw, Poland



Outline

1. Background and Development of the *Wetlands Supplement*
2. Introduction and general guidance (Chapters 1 & 7)
3. Drained Inland Organic Soils (Chapter 2)
4. Rewetted Organic Soils (Chapter 3)
5. Coastal Wetlands (Chapter 4)
6. Inland Wetland Mineral Soils (Chapter 5)
7. Constructed Wetlands for Wastewater Treatment (Chapter 6)

1. Background and Development of the *Wetlands Supplement*

Background -- Need for Additional Guidance on Wetlands

- When the TFI produced the *2006 IPCC Guidelines* it was only possible to provide guidance on a few wetland types: organic soils (mainly drained peatlands), peatlands managed for peat extraction, and limited guidance on flooded lands
- Since then scientific knowledge has increased and the IPCC has decided it is now time to cover these missing wetlands types
- In addition, the UNFCCC has decided to include **Wetlands Drainage and Rewetting** as a new elected activity in the second commitment period of the Kyoto Protocol

Background -- SBSTA Invitation and IPCC Decision

- At its 33rd Session (December 2010 in Cancun), SBSTA invited the IPCC:

To undertake further methodological work on wetlands, focusing on the rewetting and restoration of peatland, with a view to filling in the gaps in the 2006 IPCC Guidelines in these areas and to complete this work for the thirty-ninth session of the SBSTA.

- At its 33rd Session (May 2011 in Abu Dhabi), IPCC decided to produce the **2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement)**

Development of the *Wetlands Supplement*

- IPCC produced the *Wetlands Supplement* in 2011-2013 over four Lead Author meetings and two rounds of review followed by a round of written comments by governments.
- The Overview Chapter of the *Wetlands Supplement* was adopted and the entire report accepted at the 37th Session of the IPCC (IPCC 37) held in Batumi, Georgia, 14 - 18 October 2013.
- Pre-publication version of the *Wetlands Supplement* (subject to final copyedit) is available on the TFI website.
- The final publication of the *Wetlands Supplement* is planned for February 2014.

2. Introduction and general guidance (Chapters 1 & 7)

Chapter 1: Introduction to the *Wetlands Supplement*

Introduces and provides background on the *Wetlands Supplement*

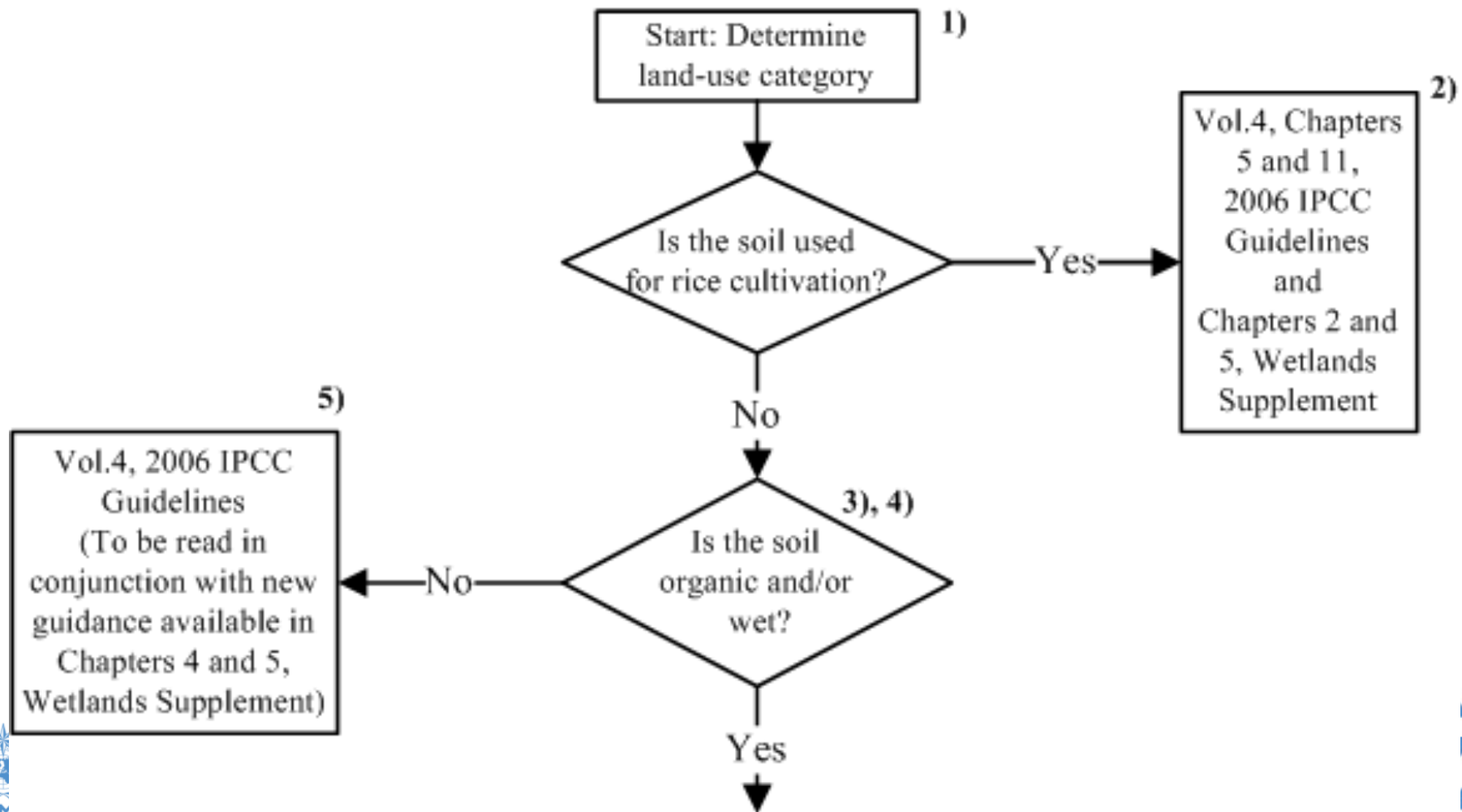
- Guidance in 2006 Guidelines was incomplete for the land use category Wetlands
 - SBSTA invited IPCC to fill the gaps in the 2006 Guidelines
 - Only covered CO₂ and N₂O from peatlands and CO₂ from flooded lands

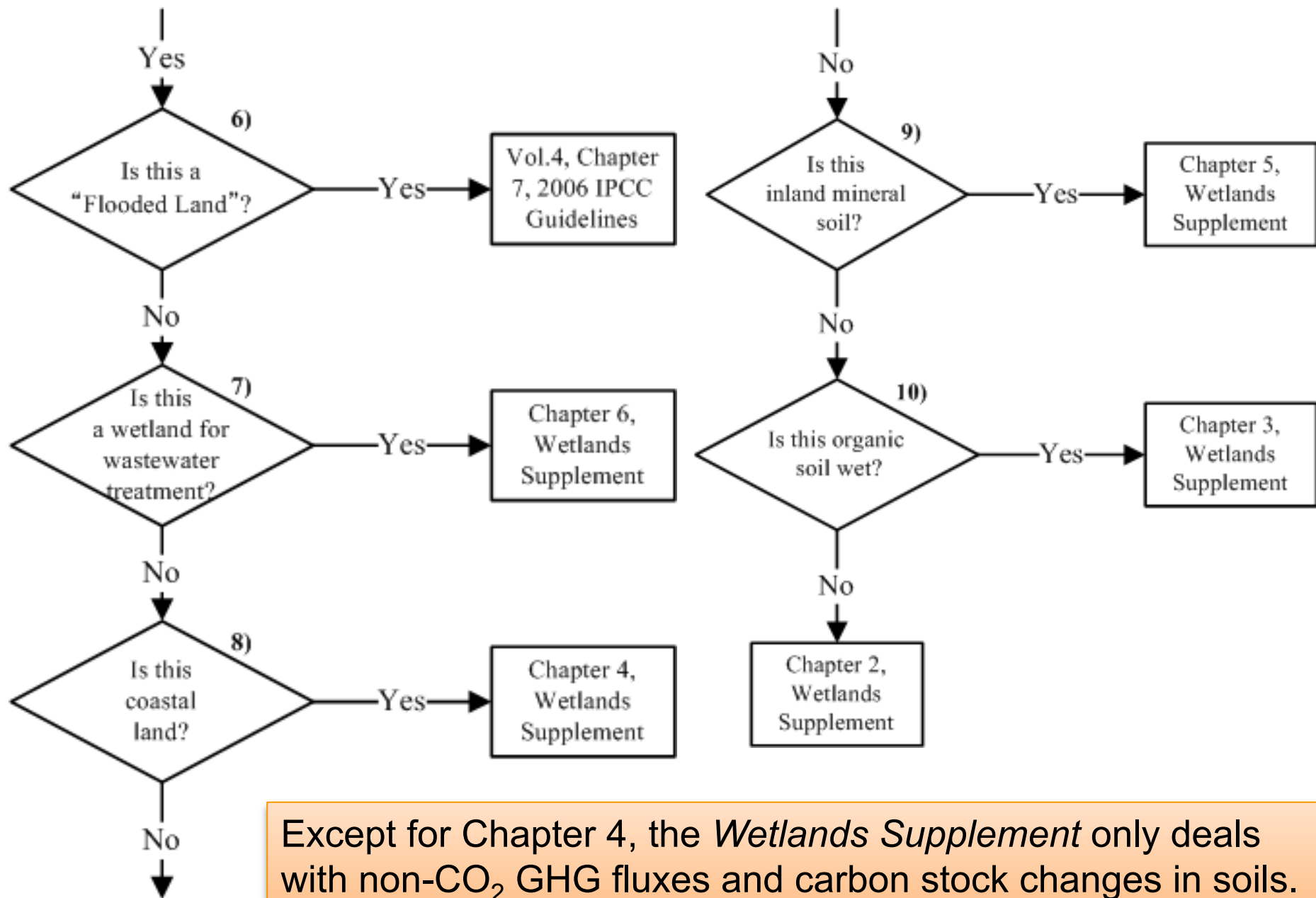
Wetlands Supplement consists of 6 methodological chapters

- Chapter 2: Drained Inland Organic Soils
- Chapter 3: Rewetted Organic Soils
- Chapter 4: Coastal Wetlands
- Chapter 5: Inland Wetland Mineral Soils
- Chapter 6: Constructed Wetlands for Wastewater Treatment
- Chapter 7: Cross-Cutting Issues and Reporting

Chapter 1: Introduction

General guidance and information on the linkages between the *2006 IPCC Guidelines* and the *Wetlands Supplement*





Except for Chapter 4, the *Wetlands Supplement* only deals with non-CO₂ GHG fluxes and carbon stock changes in soils. For guidance on other pools, refer to the 2006 Guidelines.

Chapter 1: Introduction to the *Wetlands Supplement*

- Decision tree is the key feature of Chapter 1
 - Guides inventory compilers to the relevant chapters within the *Wetlands Supplement* and/or the *2006 IPCC Guidelines*
- The Managed Land Proxy
 - Continues to be applied in the *Wetlands Supplement*
 - For Coastal Wetlands (Chapter 4), the guidance is based on specific management activities (e.g., aquaculture, dredging)
- Overview of the linkages between the *2006 IPCC Guidelines* and the *Wetlands Supplement*.

Chapter 7: Cross-cutting Issues and Reporting

- Provides guidance on cross-cutting issues for Chapters 2 to 6:
 - Reporting and documentation
 - Uncertainty estimation
 - Key category analysis
 - Completeness (incl. avoidance of double-counting)
 - Time series consistency
 - Quality control and quality assurance
- Builds on and summarises guidance in the *2006 IPCC Guidelines*

Chapter 7: Cross-cutting Issues and Reporting

- Includes worksheets to facilitate estimation of emissions/removals using Tier 1 methods
- Addresses reporting within the framework of the *2006 IPCC Guidelines* and includes reporting tables
 - Updates/complements 2006 IPCC AFOLU reporting tables, noting that the UNFCCC will develop separate tables for reporting under the Convention
 - Guidance for reporting emissions/removals in land and sea areas
 - New categories for e.g. CH₄ from organic soils and ditches and from rewetting of organic and mineral soils

3. Drained Inland Organic Soils (Chapter 2)

Chapter 2: Coverage

- Drained inland organic soils in all UNFCCC land-use categories where
 - drainage has started in the past and still persists
 - newly drained lands within the reporting period
- Water table level is at least temporarily below natural levels (near the soil surface with seasonal fluctuations)
- Varying degrees of drainage reflected by different drainage classes if possible and applicable



Chapter 2: Drained Inland Organic Soils

B Drained inland organic soils (Chapter 2)



- Provides updated guidance for managed inland organic soils including land drained for forestry, cropland, grassland, and settlements across climate zones.

- *updated emission factors for CO₂ and N₂O and activity data*
- *new guidance on Dissolved Organic Carbon and CH₄ from drained organic soils and ditches*
- *new guidance on emissions from peat fires*



Chapter 2: Guidance for CO₂ and fire

EQUATION 2.2

CO₂-C EMISSIONS/REMOVALS BY DRAINED ORGANIC SOILS

$$CO_2 - C_{organic,drained} = CO_2 - C_{on-site} + CO_2 - C_{DOC} + L_{fire} - CO_2 - C$$

↓
Same term as in 2006
IPCC Guidelines

↓
As before
updated EFs,
finer
stratification by
land-use
categories,
plantations,
water table
and nutrient
status

↓
NEW:
Off-site CO₂
loss from
dissolved
organic
carbon; by
climate zone

↓
NEW:
CO₂, CO and
CH₄ emissions
from peat fires:
the soil C pool
was not
included in
2006 IPCC
Guidelines, but
is important.

Annex: Detailed methodological background

Chapter 2: New Guidance for CH₄

EQUATION 2.6

ANNUAL CH₄ EMISSION FROM DRAINED ORGANIC SOILS

$$CH_{4_organic} = \sum_{c,n,p} \left(A_{c,n,p} \cdot \left((1 - Frac_{ditch}) \cdot EF_{CH_4_land_{c,n}} + Frac_{ditch} \cdot EF_{CH_4_ditch_{c,p}} \right) \right)$$

Missing in
2006 IPCC
Guidelines

A: Area of drained organic soils.
As before;
additional
guidance for
identifying
drainage levels

Fractional ditch area:
Defaults
provided and
guidance for
national
factors, no
extra national
data needed

NEW:
Emission
factors for CH₄
emissions from
drained
organic soils,
consistent
with, or simpler
than CO₂
stratification.

NEW:
Emission
factors for CH₄
emissions from
drainage
ditches:
important CH₄
source in
drained lands.

Annex: Detailed methodological background

4. Rewetted Organic Soils (Chapter 3)



Chapter 3:

Scope and applications

Rewetting:

- Is the deliberate action of raising the water table of drained soils to re-establish water saturated conditions;
- Can only occur on soils that were previously drained;
- Generally reduces CO₂ and N₂O emissions compared to drained conditions;
- Can promote a vegetation succession leading to a CO₂ sink;
- Generally increases CH₄ emissions;
- Generally reduces losses of dissolved organic carbon;

Default methods apply regardless of:

- Land-use category
- Purposes of rewetting



Net gains or losses of C

$$\Delta C_{\text{rewetted org soil}} = CO_2-C_{\text{rewetted org soil}} + CH_4-C_{\text{rewetted org soil}}$$

$$CO_2-C_{\text{rewetted org soil}} = CO_2-C_{\text{composite}} + CO_2-C_{\text{DOC}} + L_{\text{fire}}-CO_2-C$$

$$CH_4-C_{\text{rewetted org soil}} = CH_4-C_{\text{soil}} + L_{\text{fire}}-CH_4-C$$

The default approach assumes that emissions of nitrous oxides from rewetted soils are negligible

Default EFs for all climatic zones

Using the default values, the net outcome of C gains and losses, excl. C losses due to fires, varies between a small source (0.96 t C ha⁻¹yr⁻¹ for temperate, nutrient-rich organic soils) to a small sink (0.33 t C ha⁻¹yr⁻¹ for boreal, nutrient-rich organic soils).

In comparison, C losses as CO₂ alone for drained organic soils in chapter 2 vary between ≈0.37 t C ha⁻¹yr⁻¹ (nutrient-poor drained org soil under boreal forest) to ≈21 t C ha⁻¹yr⁻¹ (drained org soils with short rotation trees in the tropics).

TABLE 3.1
DEFAULT EMISSION FACTORS (EF_{CO_2}) AND ASSOCIATED UNCERTAINTY, FOR CO₂-C BY REWETTED ORGANIC SOILS (ALL VALUES IN TONNES CO₂-C HA⁻¹ YR⁻¹).

| Climate zone | Nutrient status | EF_{CO_2} | 95% range |
|--------------|-----------------|--------------|---------------|
| Boreal* | Poor | -0.34 (n=26) | -0.59 – -0.09 |
| | Rich | -0.55 (n=39) | -0.77 – -0.34 |
| Temperate** | Poor | -0.23 (n=43) | -0.64 – +0.18 |
| | Rich | +0.50 (n=15) | -0.71 – +1.71 |
| Tropical*** | 0 | | |

TABLE 3.2
DEFAULT DOC EMISSION FACTORS ($EF_{DOC_REWETTED}$ IN TONNES CO₂-C HA⁻¹ YR⁻¹) FOR REWETTED ORGANIC SOILS

| Climate zone | DOC _{FLUX} (tonnes C ha ⁻¹ yr ⁻¹) | Number of sites | $EF_{DOC_REWETTED}$ (tonnes CO ₂ -C ha ⁻¹ yr ⁻¹) |
|--------------|---|-----------------------------|---|
| Boreal* | 0.08 (0.06 – 0.11) | 10 undrained | 0.08 (0.05 – 0.11) |
| Temperate** | 0.26 (0.17 – 0.36) | 12 undrained and 3 rewetted | 0.24 (0.14 – 0.36) |
| Tropical*** | 0.57 (0.49 – 0.64) | 4 undrained | 0.51 (0.40 – 0.64) |

TABLE 3.3
DEFAULT EMISSION FACTORS FOR CH₄ FROM REWETTED ORGANIC SOILS (ALL VALUES IN KG CH₄-C HA⁻¹ YR⁻¹)

| Climate zone | Nutrient Status | EF_{CH_4} | 95% range |
|--------------|-----------------|------------------|-----------|
| Boreal* | Poor | 41 (n=39 sites) | 0.5 – 246 |
| | Rich | 137 (n=35 sites) | 0 – 493 |
| Temperate** | Poor | 92 (n=42 sites) | 3 – 445 |
| | Rich | 216 (n=37 sites) | 0 – 856 |
| Tropical*** | | 41 (n= 11 sites) | 7 – 134 |



The Tier approach

Basic (Tier 1) activity data:

- area of rewetted organic soils;
- the nutrient status (nutrient rich or poor) in temperate or boreal zones;

Country specific information that can be used to improve accuracy:

- Country-specific measurements of CO₂ and CH₄ fluxes
- depth of the water table: monthly, seasonal or annual averages
- land use and management practices prior to rewetting;
- rewetting practices;
- post-rewetting vegetation composition and successional changes over time.



Relating to *GPG-LULUCF*

Important sources of uncertainty:

- Representativeness of default emission factors

Good practice for rewetted organic soils:

- Land area reconciliation:
 - not all drained soils in the national territory may have been rewetted, but all rewetted sites were drained at some point in the past;
 - \sum area rewetted organic soils in each land category = total area of rewetted organic soils in country;
- Comparative analysis of EFs across land categories
- Special attention to avoid double-counting when combining flux and stock-based methods.

5. Coastal Wetlands (Chapter 4)

Chapter 4: Coastal Wetlands

This chapter updates guidance contained in the *2006 IPCC Guidelines* to:

- Provide default data for estimation of C stock changes in mangroves living biomass and dead wood pools for coastal wetlands at Tier 1

This chapter gives new:

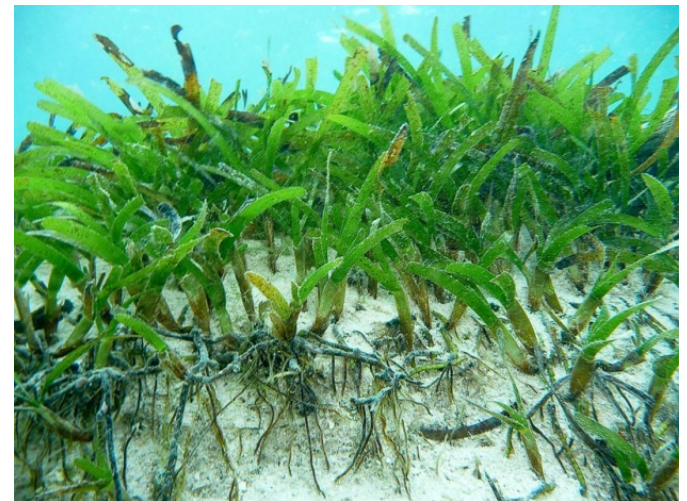
- Guidance for CO₂ emissions and removals from organic and mineral soils for the management activities of extraction (including construction of aquaculture and salt production), drainage and rewetting and revegetation
- Default data for the estimation of anthropogenic CO₂ emissions and removals for soil in mangrove, tidal marsh and seagrass meadows.
- Guidance for N₂O emissions during aquaculture use.
- Guidance for CH₄ emissions for rewetting and revegetation of mangroves and tidal marshes.

Vegetated coastal wetlands

Mangroves



Tidal Marshes



Seagrass Meadows

Management Practices in Coastal Wetlands



- Coastal wetlands that have been modified by anthropogenic activities are often reduced in area.
- Globally about 35% of the area of mangroves has disappeared since 1980, with a current global areal rate of loss of between 0.7 and 3% yr⁻¹ (Pendelton et al., 2012).
- The management activities that have led to the majority of mangrove loss include forestry activities (26%) and aquaculture, comprising the construction (and extraction of soil) for shrimp ponds (38%) and fish farms (14%) (Vaiela et al., 2009).

CO₂ emissions and removals for specific management activities

- Key Features of default methods for *forest management practices** in mangroves
 - Follows the default methodologies of the *2006 IPCC Guidelines* (Volume 4, Chapters 2 and 4) – Gain-Loss method for biomass
 - New Tier 1 biomass and dead wood/litter carbon (C) stock data on:
 - C fraction of aboveground mangrove biomass
 - Aboveground biomass in mangroves by IPCC (climate) domain and region
 - Aboveground biomass growth in mangroves by IPCC domain and region
 - Ratio of belowground to aboveground biomass (R) for mangroves by IPCC domain and region
 - Wood density to be used in computation of BCEF
 - Soil CO₂ emissions and removals are assumed zero where there is no land-use change or management activities that occur.
 - New sources of activity data (e.g. web sources & databases)

N₂O emissions during aquaculture use

- Key Features
 - Provides new default methodologies consistent with the 2006 *IPCC Guidelines* (Chapter 11)
 - Provides a new method whereby an EF is applied based on the mass of fish produced per year to estimate direct N₂O emissions from coastal wetland areas
 - The EF is estimated based on the N content of fish, excretion of N into the water column and the conversion of N to N₂O

DIRECT N₂O EMISSIONS FROM AQUACULTURE USE

$$N_2O-N_{AQ} = F_F * EF_F \text{ (based on fish production)}$$

N_2O-N_{AQ} = annual direct N₂O-N emissions from aquaculture use, kg N₂O-N yr⁻¹

F_F = annual fish production, kg fish yr⁻¹

EF_F = emission factor for N₂O emissions from fish produced, kg N₂O-N (kg fish produced)⁻¹

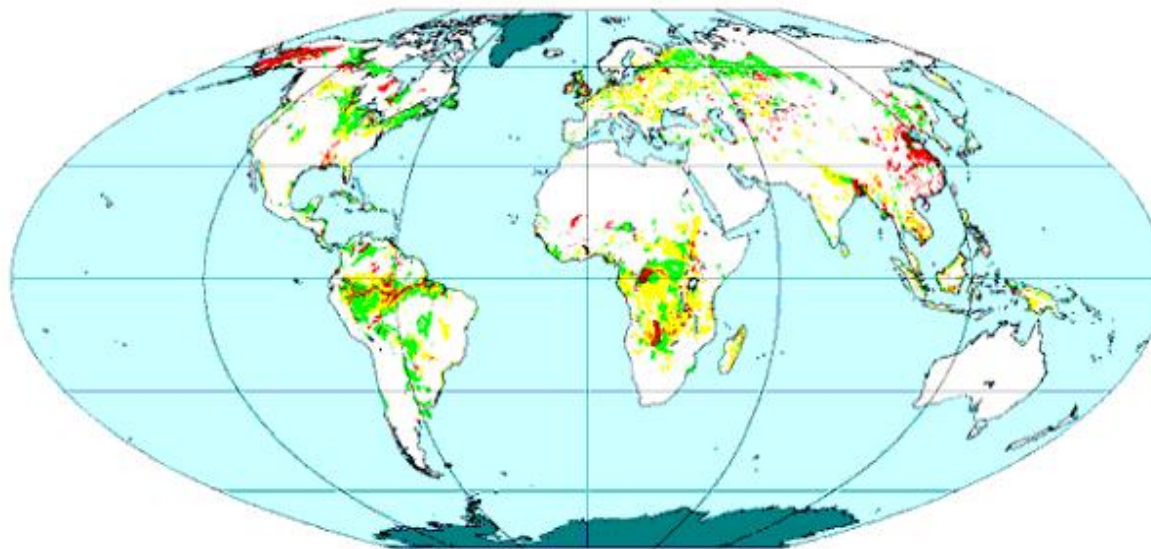
6. Inland Wetland Mineral Soils (Chapter 5)

Chapter 5: Inland Wetland Mineral Soils

- **Definition:**
 - Soils that *are not* classified as organic soils;
 - Have restricted drainage, leading to periodic flooding and anaerobic conditions;
 - Aquic soil (US Department of Agriculture)
 - Gleysol (World Reference Base)
 - Are *not* in coastal zones;
 - Chapter 4 of *Wetlands Supplement*
 - Can occur in any of the six land-use categories.
 - Forest Land, Grassland, Cropland, Wetlands, Settlements, Other Land

Chapter 5: Inland Wetland Mineral Soils

- Found throughout the world in a variety of landscape settings
 - Riparian wetlands, marshes, forested swamps



<http://www.isric.org>

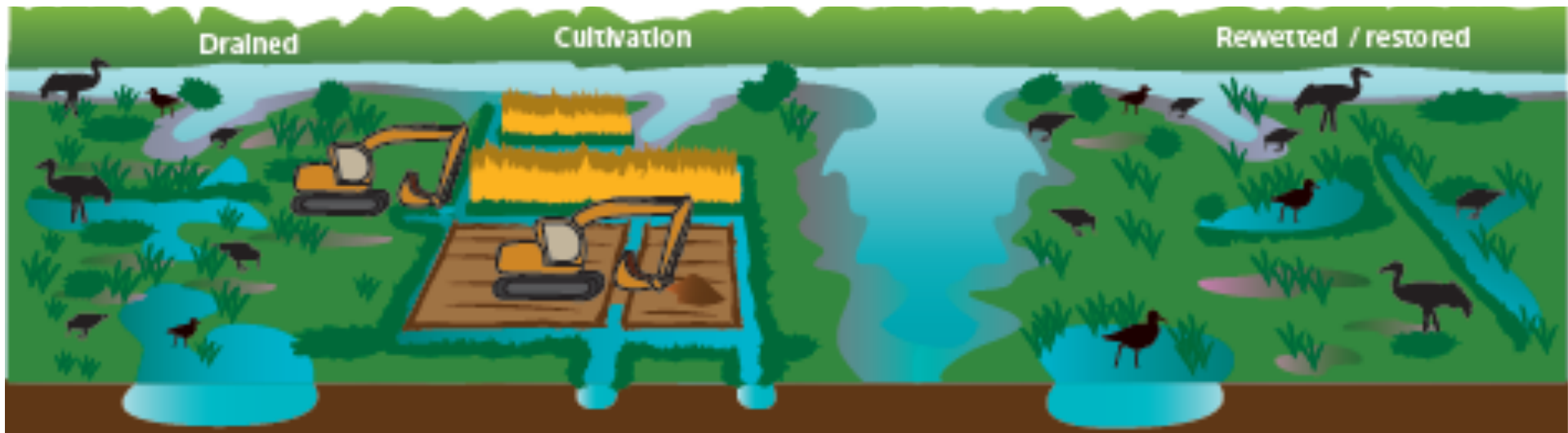
Red Dominant **Green** Associated **Yellow** Inclusions **Dark Blue** Miscellaneous lands

Flat Polar Quartic Projection

FAO-GIS, February 1998

Chapter 5: Inland Wetland Mineral Soils

- Common management activities include:
 - Drainage
 - Cultivation
 - Rewetting



Chapter 5: Inland Wetland Mineral Soils

- **Existing guidance in the 2006 IPCC Guidelines:**
 - Default reference Soil Organic Carbon stocks (SOC_{REF}) for broad climate regions;
 - Boreal, Cold Temperate, Warm Temperate, Tropical
 - SOC stock change factors for all mineral soils in general (including wetland mineral soils);
 - Cropland, Grassland
 - CH_4 emissions from rice cultivation (including on wetland mineral soils).

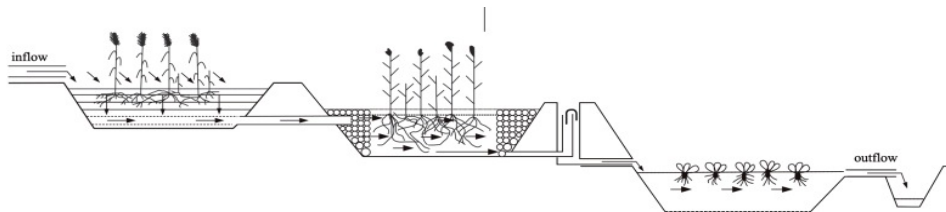
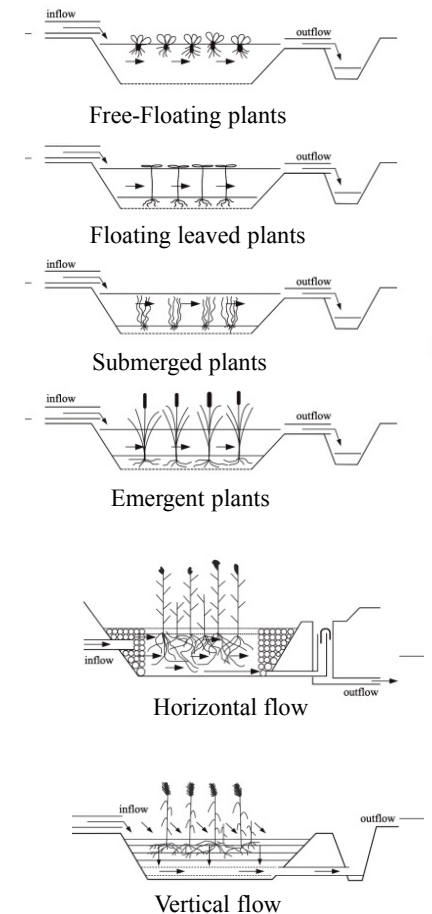
Chapter 5: Inland Wetland Mineral Soils

- **Updated guidance**
 - SOC_{REF} stocks
 - All six IPCC land-use categories; all climate regions
 - SOC stock change factor for long-term cultivation
 - Specific to wetland mineral soils; boreal & temperate climate regions
- **New guidance**
 - SOC stock change factor for rewetting of drained soils classified as cropland
 - Boreal, temperate, & tropical climate regions
 - CH₄ emission factors for rewetting of drained soils, and created wetlands on mineral soils
 - Boreal, temperate, & tropical climate regions

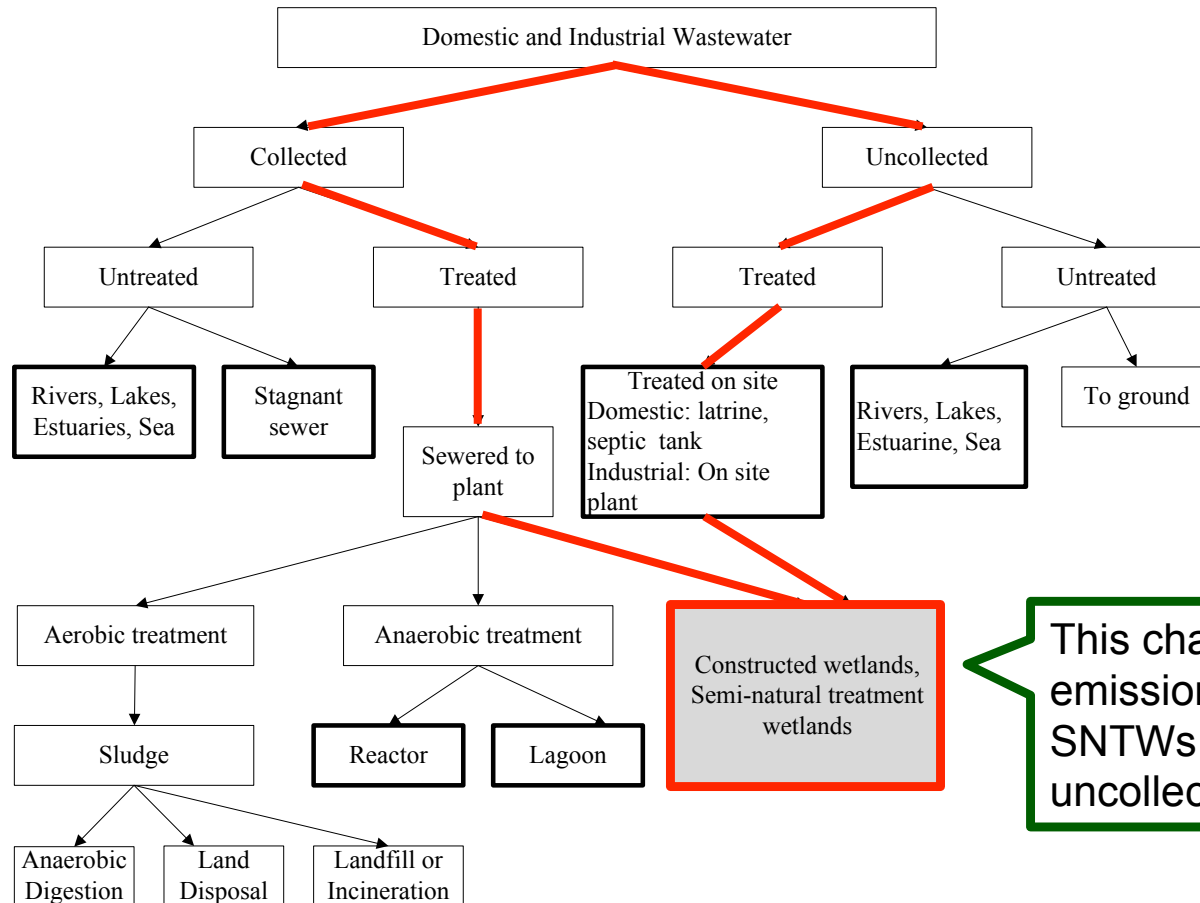
7. Constructed Wetlands for Wastewater Treatment (Chapter 6)

Chapter 6: Constructed Wetlands for Wastewater Treatment

- Guidance on wetlands constructed for wastewater treatment
 - This chapter is a supplement to Chapter 6 Wastewater Treatment and Discharge of the Volume 5 of the *2006 IPCC Guidelines*.
 - This chapter provides emission factors for “Constructed wetlands” (CWs) and “Semi-natural treatment wetlands” (SNTWs).
 - This chapter deals with CH₄ and N₂O.



Wastewater treatment systems and discharge pathways



- This figure has been modified from the 2006 IPCC Guidelines.
- Emissions from boxes with black bold frames are accounted for in the 2006 IPCC Guidelines.

This chapter provides CH₄ and N₂O emission factors for CWs and SNTWs treating collected and uncollected wastewater

Thank you very much!!

The pre-publication version of the *Wetlands Supplement* is available at the IPCC TFI website.

<http://www.ipcc-nggip.iges.or.jp/home/wetlands.html>



2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (KP Supplement)

SBSTA–IPCC special event on the Wetlands Supplement and the KP Supplement

UNFCCC COP19/CMP9

13 November 2013, Warsaw, Poland



Outline

1. Background
2. Introduction and general guidance
3. Afforestation, Reforestation, Deforestation and Forest Management
4. Disturbances
5. Harvested Wood Products
6. Cropland Management, Grazing Land Management, Revegetation, and Wetland Drainage and Rewetting

1. Background

Background

- *The 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (KP Supplement)* provides supplementary methods and *good practice* guidance for estimating and reporting anthropogenic greenhouse gas (GHG) emissions and removals resulting from LULUCF activities under Article 3.3 and Article 3.4 of the Kyoto Protocol for the second commitment period, 2013-2020.
- Supplementary methods are additional guidance to produce the supplementary information needed in greenhouse gas inventories to meet the LULUCF rules for the Kyoto Protocol.

Background (2)

- The UNFCCC CMP7 invited the IPCC “...to review and, if necessary, update supplementary methodologies for estimating anthropogenic greenhouse gas emissions by sources and removals by sinks resulting from land use, land-use change and forestry (LULUCF) activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP), related to the annex to 2/CMP.7, on the basis of, inter alia, Chapter 4 of IPCC’s 2003 Good Practice Guidance for Land-use, Land-use Change and Forestry.” (paragraph 8, Decision 2/CMP.7, FCCC/KP/CMP/2011/10/Add.1)

Development of the *KP Supplement*

- Work on the production of the *KP Supplement* was carried out in 2012-13. It involved four Lead Author meetings, two rounds of reviews, first by experts and later by governments and experts of the First Order Draft (FOD) and Second Order Draft (SOD) respectively, and a round of written comments from governments on the Final Draft (FD).
- The *KP Supplement* was adopted/accepted by IPCC37 in Batumi, Georgia, 14-18 October 2013.
- Pre-publication version of the *KP Supplement* (subject to final copyedit) is available on the TFI website.
- The final publication of the *KP Supplement* is planned for February 2014.

2. Introduction and General Guidance

Terms Of Reference

- IPCC will update and augment the existing Chapter 4 of the *GPG-LULUCF*, to take account of:
 - The *2006 IPCC Guidelines* and other IPCC products;
 - The Annex to Decision 2/CMP.7;
 - Other relevant COP and CMP decisions (e.g. 15/CMP.17, 2/CMP.8);
 - new scientific literature and methods;
 - Outcomes of the scoping meeting held in Geneva in May 2012.
- The report will:
 - maintain the structure and content of the existing Chapter 4;
 - replace references to *GPG-LULUCF* by those to 2006 IPCC Guidelines;
 - add material to existing sections or add new sections.

Structure and Content

2 Chapters and 1 Annex in the *KP Supplement*:

- Chapter 1: Introduction:
 - Overview of steps to estimate and report supplementary information for KP-LULUCF activities;
 - General rules for categorisation of lands under KP-LULUCF activities.
- Updates to Chapter 1 include:
 - Changes to steps to estimate and report supplementary information (new provisions e.g. Natural Disturbances, C Equivalent Forests, Conversion of natural forests to planted forests);
 - Changes to categorization of lands under KP-LULUCF activities (including the reporting hierarchy of activities), due to Forest Management reporting now mandatory and inclusion of Wetland Drainage and Rewetting;
 - Updated decision trees and figures to reflect Decision 2/CMP.7.

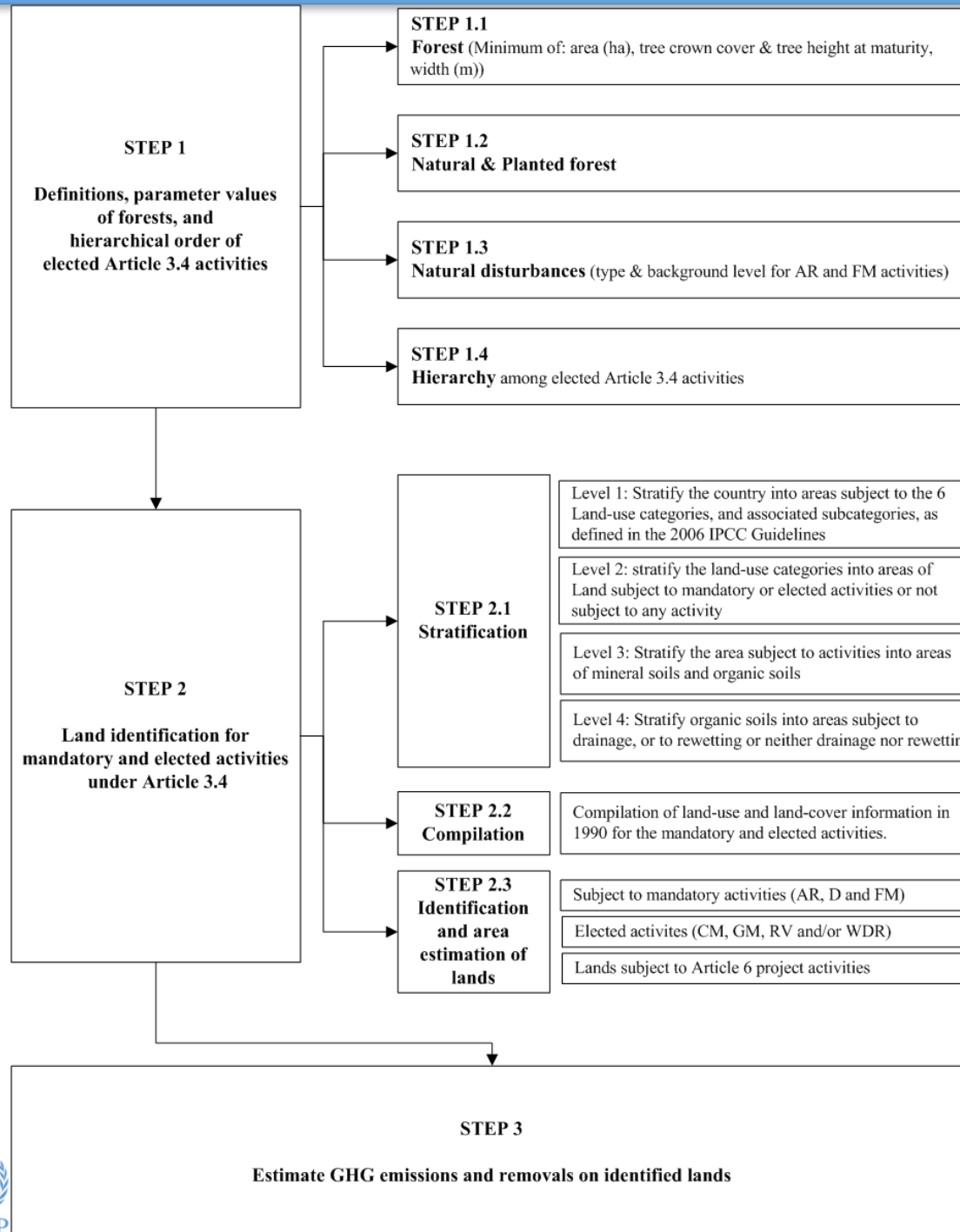
Structure and Content (2)

- Chapter 2: Methods for estimation, measurement, monitoring and reporting of LULUCF activities under Articles 3.3 and 3.4:
 - Generic and activity-specific methodological guidance on:
 - area identification, stratification and reporting;
 - estimation of C stock changes and non-CO₂ GHG emissions.
- Updates to Chapter 2 include:
 - Revision of section on Disturbances for treatment of emissions from natural disturbances in AR and FM lands;
 - Addition of new sections on:
 - Forest Management Reference Level (Section 2.7.5);
 - Technical Corrections (Section 2.7.6);
 - Carbon Equivalent Forests (Section 2.7.7);
 - Harvested Wood Products (Section 2.8);
 - Wetland Drainage and Rewetting (Section 2.12).

Structure and Content (3)

- Annex 2A.1: Reporting Tables for LULUCF activities under the Kyoto Protocol
 - Draft tables to support development of reporting tables by SBSTA
 - To accommodate all new information requirements specified in CMP decisions:
 - All tables have been revised
 - The following tables have been added:
 - 1 Table for Conversion of natural forests to planted forests under FM
 - 2 Tables for Non-CO₂ GHG emissions from drainage and rewetting
 - 1 Table for Forest Management Reference Level
 - 1 Table for Carbon Equivalent Forests
 - 7 Tables for Natural Disturbances

Chapter 1



Forest definition

- In applying definition of forest during the first CP, some countries excluded certain types of land e.g., fruit orchards, grazed savannas, urban trees, and some types of plantations, even if these lands meet the thresholds for forest.
- In case of such exclusion, to achieve transparency, it is *good practice*:
 - To document the rationale of criteria used to exclude from forest those areas which meet the thresholds for forest (e.g., consistency with national forest inventories, with reporting to FAO), and how these criteria are applied consistently across the country and CPs;
 - To describe the consequences on accounting of this exclusion of emissions by reporting information about their magnitude and net balance.

Chapter 2

- In particular updates made include the following new sections:
 - Section 2.2.3: Reporting Methods for lands subject to additional accounting provisions for CP2 (e.g., lands with ND followed by D and CEF's lands);
 - Section 2.3.3: Correct implementation of C stock change estimation methods when areas are changing (to avoid artifacts in C stock change estimates due to area transfer);
 - Section 2.3.5: Interannual variability (in GHG estimates);
 - Section 2.4.2: Recalculation of time series (e.g. ensuring consistency between reference's estimates and CP's estimates).

Interannual Variability in GHG estimates

- Interannual Variability is determined by 3 factors:
 - Natural disturbances (when accounting: FMRL and ND provisions factor out their contribution);
 - Climate and other non-dhi factors (IPCC default methods and factors are insensitive to variability of these factors, while Tier 3 methods are sensitive);
 - Human activities (the goal when accounting for mitigation).
- It is *good practice*:
 - to document whether the method used (for FMRL, or BY, and for CP's estimates) is sensitive to climate and environmental variability;
 - to use the same climate and environmental data for FMRL/BY and for CP's estimates, when a Tier 3 method responsive to climate and environmental variability is used;
 - to report how interannual variation was addressed in the inventory calculations.

3. Afforestation, Reforestation, Deforestation and Forest Management

ipcc
INTERGOVERNMENTAL PANEL ON climate change



Afforestation/Reforestation (AR; Section 2.5), Deforestation (D; Section 2.6)

- No big changes in the *KP Supplement*. Clarifications on:
 - Implementation of country's definition of forest;
 - Information demonstrating direct human-induced AR activities:
 - Relevant information includes documentation which demonstrates that a decision has been taken that aimed at replanting or promoting or allowing forest regeneration, for example referencing laws, policies, regulations, management decisions or practices. [...] In the absence of such information, forest regrowth as a consequence of abandonment or of environmental change does not qualify as AR.
 - Lands subject to D which subsequently gain forest cover still reported under D, as a separate subcategory;
 - Clarification on discriminating between deforestation and temporary loss of forest cover.

Forest Management (FM; Section 2.7)

- This section addresses the new elements introduced by Decision 2/CMP.7:
 - Reporting of emissions arising from the conversion of natural forests to planted forest (Section 2.7.1);
 - Methodological requirements related to the Forest Management Reference Level (FMRL; Section 2.7.5);
 - Performance of Technical Corrections for accounting purposes (Section 2.7.6);
 - Reporting and accounting of lands under the Carbon Equivalent Forest Conversion provision (Section 2.7.7).

Forest Management Reference Level (FMRL)

- The FMRL is a value of average annual net emissions and removals from FM in the 2nd CP, against which the net emissions and removals reported for FM during the 2nd CP will be compared for accounting purposes.
- The *KP supplement* includes:
 - Short overview of approaches/methods used and elements considered for FMRL (this information provides the basis for assessing the methodological consistency) (2.7.5.1);
 - Methodological consistency related to the FMRL (Section 2.7.5.2);
 - Technical Corrections (Section 2.7.6).
- The guidance on how to construct the FMRL is provided by the Appendix II to the Decision 2/CMP.6 and is not repeated in the *KP Supplement*.

Forest Management Reference Level (FMRL) (2)

- In the context of FMRL **methodological consistency** refers to the need for consistency, during the CP, between the methodological elements used in the FMRL submission and those used in the reporting of FM, i.e.:
 - (i) *Method* used for FMRL (models or elaboration of historical time series);
 - (ii) *Historical data* used for FMRL, e.g. (forest area, harvest, increment, etc.);
 - (iii) Other elements used for FMRL (pools/gases, HWP, natural disturbances etc.).
- A change in methodological elements used in the construction of FMRL triggers a methodological inconsistency → **Technical Correction**
- By contrast, a deviation in policy assumptions under business-as-usual scenario from those assumed in constructing the FMRL does not represent a methodological inconsistency → no Technical Correction.
- Policy assumptions include economic assumptions/responses (e.g. harvesting decisions), assumptions on future FM area, on harvesting rates (including variations in harvesting rates as compared to historical period) or amounts, etc.

Technical Correction

- The **Technical Correction** is a net value of emissions /removals, which is added at the time of accounting to the original FMRL to ensure that accounted emissions / removals will not reflect the impact of methodological inconsistencies.

$$\text{Technical Correction} = \text{FMRL}_{\text{corr}} - \text{FMRL} \rightarrow \text{Appendix of Decision 2/CMP.7}$$

↓
FMRL recalculated (no methodological inconsistencies)

- Table 2.7.1 provides a check-list to detect methodological inconsistencies and the need for technical correction. Box 2.7.2 gives concrete examples.
- Technical Correction shall be applied when accounting. Information on technical corrections and methodological consistency shall be reported as part of the *annual* GHG inventories and inventory reports. To this aim, it is *good practice* to assess annually the need for technical corrections and to report transparent information in the annual NIR.

Carbon Equivalent Forests (Section 2.7.7)

- Decision 2/CMP.7: Parties may account for emissions / removals resulting from the harvest and conversion of some forest plantations to non-forest land under FM, provided that certain requirements are met (i.e. that a new forest of at least equal area and carbon stock is created on non-forest land).
- Carbon Equivalent Forest Conversion (CEFC) is the practice of converting a forest plantation to non-forest land while establishing a “Carbon Equivalent Forest” on non-forest land elsewhere.
- CEFC requires two land components – the existing forest land to be harvested and converted to non-forest land (CEF-hc) and the non-forest land on which a forest is to be newly established (CEF-ne).

4. Disturbances

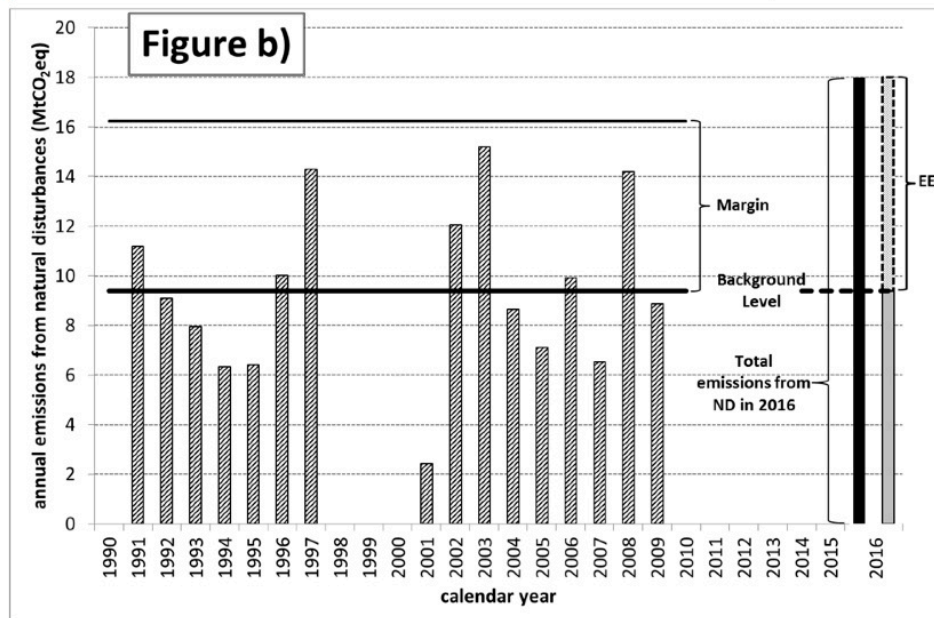
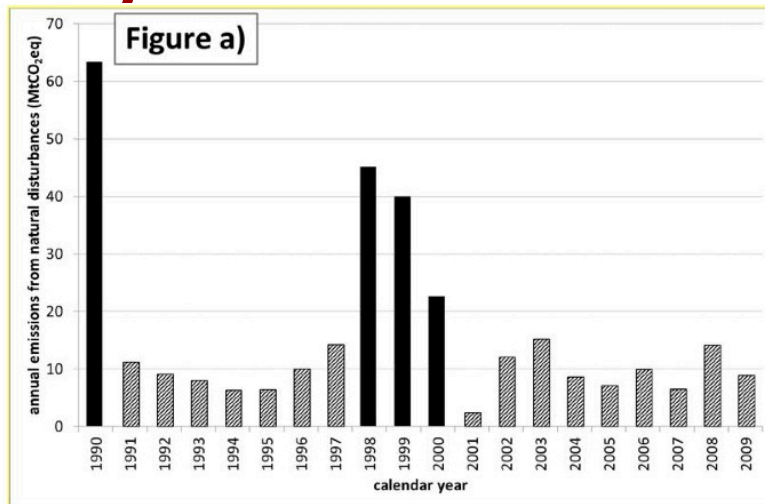
Treatment of natural disturbances (ND)

- First commitment period (Decision 16/CMP.1)
 - All emissions and subsequent removals from natural disturbances on (units of) lands subject to Afforestation or Reforestation, or Forest Management (if elected) are to be accounted.
- Second commitment period (Decision 2/CMP.7)
 - Natural disturbances are defined as non-anthropogenic events or non-anthropogenic circumstances. For the purposes of this decision, these events or circumstances are those that cause significant emissions in forests and are beyond the control of, and not materially influenced by, a Party. These may include wildfires, insect and disease infestations, extreme weather events and/or geological disturbances, beyond the control of, and not materially influenced by, a Party. These exclude harvesting and prescribed burning.

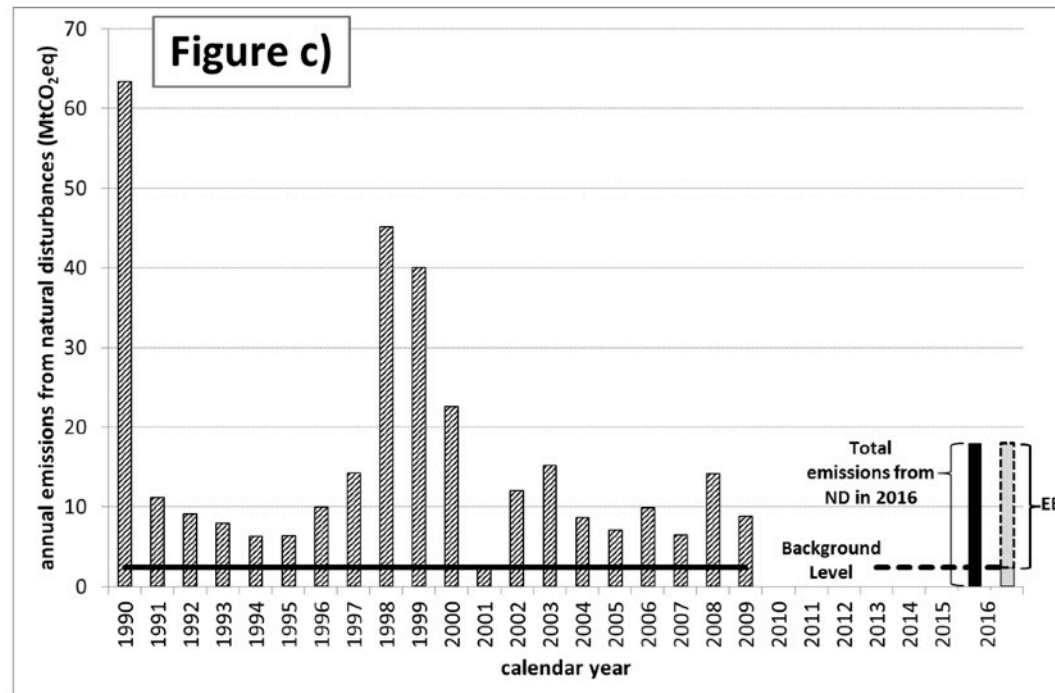
Treatment of ND (2nd CP KP)

- Parties may exclude from the accounting of Afforestation and Reforestation and Forest Management (either annually or at the end of second commitment period) emissions from natural disturbances that in any single year exceed a background level provided certain conditions are met.
- *KP Supplement* gives:
 - Guidance on how Parties can demonstrate that conditions of the natural disturbances provision are met.

Treatment of ND – Default method (2nd CP KP)



Treatment of ND – Alternative method (2nd CP KP)



Treatment of ND – net credits or net debits

(2nd CP KP)

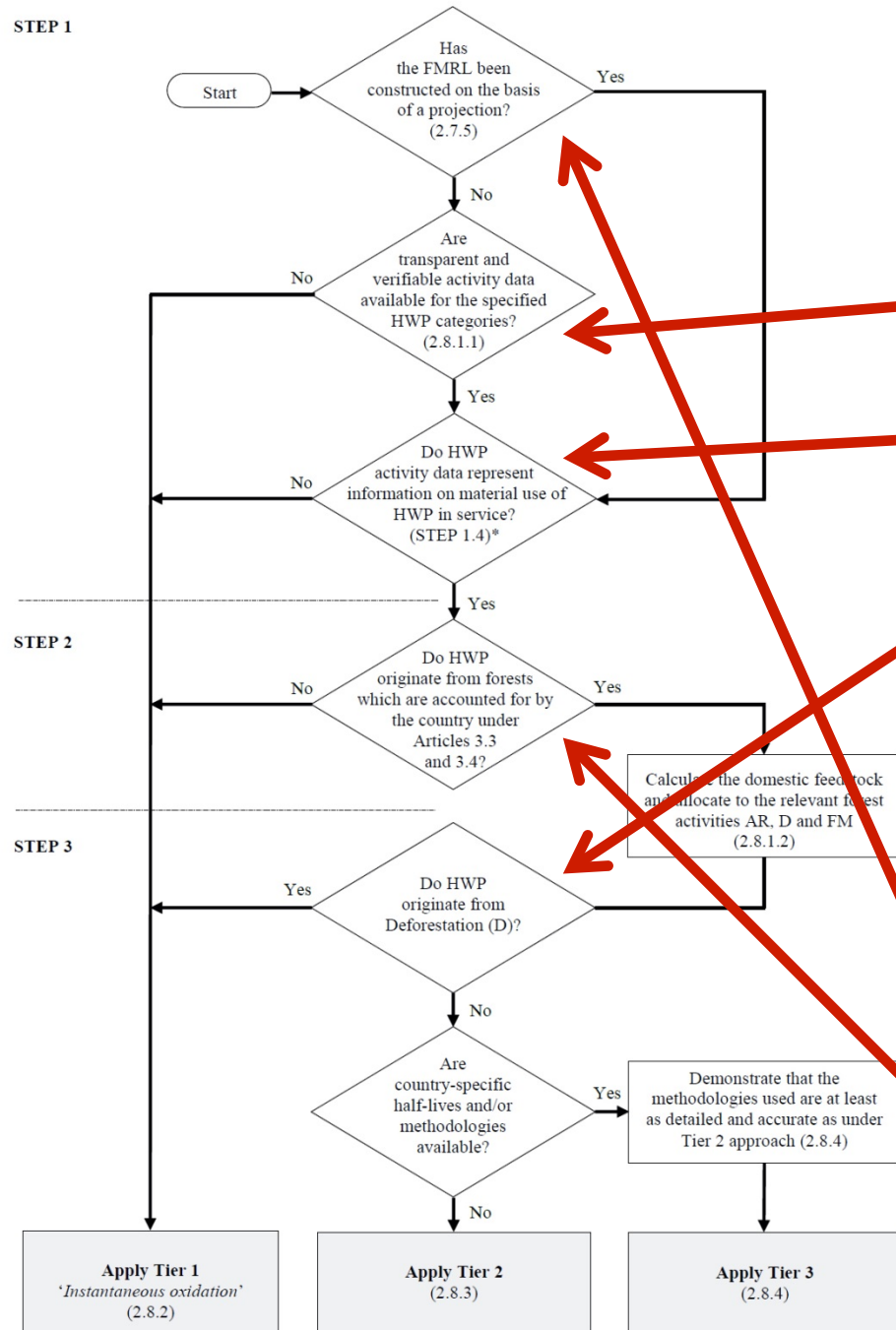
- Any approach (default or alternative) will avoid the expectation of net credits or net debits so long as:
 - There is no observed trend in ND emissions during the calibration period that is not considered in the background level estimation, or expected during the commitment period.
 - The background level of emissions for FM or AR, included in the FMRL, or associated with AR, respectively, is equal to the average of the annual emissions from ND during the calibration period which are in the background group.
 - Any emission from ND during the commitment period that falls into the background group is not separately excluded from accounting. During the commitment period, emissions are only excluded from accounting when the annual emissions are greater than the background level plus the margin. When this occurs, emissions are only excluded which are greater than the background level.
 - A test application of the constructed background level and the margin to the annual emissions in the calibration period leads to the same background group as used during the construction of the background level.

5. Harvested Wood Products

Harvested Wood Products (Section 2.8)

- 2.8.1 Initial steps to estimate the HWP contribution (Section 2.8.1)
 - 2.8.1.1 Availability of transparent and verifiable activity data
 - 2.8.1.2 Allocation of HWP to domestic forest activities under Article 3, paragraphs 3 and 4
- 2.8.2 Tier 1: “Instantaneous oxidation”
- 2.8.3 Tier 2: First order decay
 - 2.8.3.1 Activity data
 - 2.8.3.2 Emission factors
- 2.8.4 Tier 3: Tier 3: Country-specific methods
 - 2.8.4.1 Country-specific activity data
 - 2.8.4.2 Country-specific emission factors
- 2.8.5 Consideration of the HWP pool in FMRLs
- 2.8.6 Uncertainty assessment
- 2.8.7 Quality Assurance/Quality Control

Figure 2.8.1 Decision tree for selection of a correct tier method for estimating HWP carbon stock change



Decision tree (2.8.1)

Default: Instantaneous oxidation (2/CMP.7, paragraph 28)

- No transparent and verifiable activity data (2/CMP.7, paragraph 29 and 30)
- HWP in solid waste disposal sites and wood harvested for energy purposes (2/CMP.7, paragraph 31)
- HWP from deforestation (2/CMP.7, paragraph 32)

Accounting of HWP on the basis of change of the pool (2/CMP.7, paragraphs 29 and 30)

- Mandatory if projected FMRL has been used (2/CMP.7, paragraph 16)
- HWP removed from forests which are accounted for by the country (2/CMP.7, paragraph 27)

Initial Steps (Section 2.8.1)

STEP 1: “Check the construction of the forest management reference level (FMRL) and the availability of transparent and verifiable activity data on HWP”

→ *Sections 2.8.1.1 & 2.8.4.1*

STEP 2: “Check whether HWP categories originate from forests that are accounted for by the country and allocate HWP to the particular forest related activity”

→ *Section 2.8.1.2*

STEP 3: Check availability of country-specific information and estimate carbon stock in HWP and its annual change

→ *Section 2.8.2 for Tier 1*

→ *Section 2.8.3 for Tier 2*

→ *Section 2.8.4 for Tier 3*

Initial Steps (Section 2.8.1) (2)

Section 2.8.1.1 on transparent and verifiable activity data

- Guidance on internationally agreed classification system of wood products (FAO) (incl. Figure 2.8.2) and definitions of semi-finished wood products (sawnwood, wood-based panels, paper and paperboard) and of feedstock categories to be used as default for estimating HWP from domestic forests (roundwood, industrial roundwood, pulp)
- Examples of different processing stages of wood products along the process and value chain (Figure 2.8.3) in order to avoid double counting

Section 2.8.1.2 on allocation of HWP to domestic forest activities under Article 3, Paragraphs 3 and 4

- STEP 2.1: Estimation of share of carbon in HWP coming from domestic forests
- STEP 2.2: Allocation of HWP to the particular forest activities FM, AR and D
- STEP 2.3: Combination of results from Steps 2.1 and 2.2 to obtain the annual fractions of HWP entering the accounting framework

Estimation methods (Tier 2 and 3)

- Description of methods with detailed sections on activity data and emission factors (i.e. half-life and service life information)
 - First order decay method for Tier 2 (cf. *2006 IPCC Guidelines*, Equation 12.1 and 2/CMP.7, paragraph 29, footnote 4) using default half-lives
 - Tier 3 section (Section 2.8.4) provides examples for country-specific methods (flux data methods and combined HWP stock inventory and flux data methods), guidance for country-spec. activity data and emission factors in line with requirements of Decision 2/CMP.7

HWP pool in FMRLs (Section 2.8.5)

- Description of approaches and methods for consideration of HWP in FMRL (incl. example in Box 2.8.2 on estimating HWP contribution to Parties' FMRL)
- Guidance on methodological consistency between HWP in FMRL and the reporting during CP2 (incl. decision tree, Fig. 2.8.5)

6. Cropland Management, Grazing Land Management, Revegetation, and Wetland Drainage and Rewetting

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INTERGOVERNMENTAL PANEL ON climate change



Cropland Management (CM) & Grazing Land Management (GM)

- Update from *GPG-LULUCF*:
 - CM and GM as stand-alone text sections;
 - Clarifications on identification of lands and management activities;
 - Country examples of CM and GM implementation;
 - Examples of national approaches for perennial crops (woody biomass pool);
 - Examples how to quantify effects of discontinuous measures with spatially non-explicit data and Tier 1 methodologies (soil carbon pool).



Revegetation (RV)

- Update from *GPG-LULUCF*:
 - Some clarifications;
 - Country examples of RV implementation;
 - Updated guidance considering *2006 IPCC Guidelines*.



Wetland Drainage and Rewetting (WDR)

- A new eligible Activity
- Definitional issues and guidance for the hierarchy:
 - Drainage and rewetting measures can occur in any Activity;
 - Drainage and rewetting measures since 1990 on land not accounted for under any other Activity is eligible as WDR.



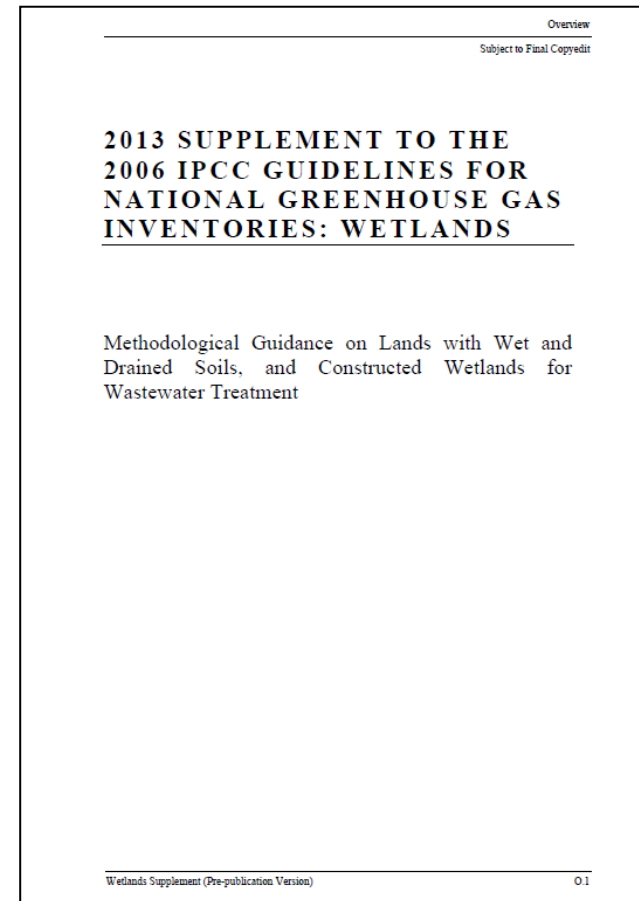
Wetland Drainage and Rewetting (WDR)

- Land identification in 1990 and commitment period:
 - 1990 approach differs from other Activities;
 - To account for emission reductions by rewetting, land in 1990 must be the same as in commitment period;
 - Land area in 1990 and commitment period grow over time when new measures that change the drainage / wetness state of land are performed.



Wetland Drainage and Rewetting (WDR)

- Guidance for methodologies:
 - *Wetlands Supplement* applies here.
 - Where to find guidance in the *Wetlands Supplement* for:
 - each carbon pool
 - greenhouse gas



Thank you very much!!

The pre-publication version of the *KP Supplement* is available at the IPCC TFI website.

http://www.ipcc-nggip.iges.or.jp/home/2013KPSupplementaryGuidance_inv.html