ANNEX 2

WORKSHEETS

All the Worksheets in Annex I to Volume 4 of 2006 IPCC Guidelines remain valid. In the 2019 Refinement, 10 new worksheets are added here as new guidance consistent with main chapters of Volume 4 of 2019 Refinement related to Biochar Amendments to Soils for Cropland and Grassland and Flooded Land.

BIOCHAR AND SOILS – CROLAND AND GRASSLAND WORKSHEETS

Authors

Stephen Michael Ogle (USA), Jeffrey Baldock (Australia)

FLOODED LAND WORKSHEETS

Authors

Catherine Ellen Lovelock (Australia), Bradford Sherman (Australia), Jukka Alm (Finland), Nathan Barros (Brazil), David Bastviken (Sweden), Jake J. Beaulieu (USA), Christopher Evans (UK), Michelle Garneau (Canada), Atle Harby (Norway), John Harrison (USA), David Pare (Canada), Yves Prairie (Canada), Hanne Lerche Raadal (Norway), Chengyi Zhang (China)

Contributing Authors

Alistair Grinham (Australia), Bridget Deemer (USA), Zhe Li (China), Marco Aurelio Santos (Brazil)

Contents

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Cropland Remaining Cropland: Annual change in carbon stocks in mineral soils**				
Category code		**3B2a (Updated)**				
Sheet		**1 of 4**				
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**			
Land-use category		Subcategories for reporting year	Mineral Soil Organic C stock in the last year of the inventory time period	Mineral Soil Organic C stock at the beginning of the inventory time period	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Annual change in carbon stocks in mineral soils
Initial land use	Land use during reporting year		(tonnes C)	(tonnes C)	(yr)	(tonnes C yr^{-1})
			$SOC_{(0)}$ in Equation 2.25	$SOC_{(0\text{-}T)}$ in Equation 2.25	(default is 20 yr; if T>D then use the value of T)	$\Delta C_{Mineral}$ as in Equation 2.25
			$SOC_{(0)}$	$SOC_{(0\text{-}T)}$	**D**	**$\Delta C_{Mineral}$**
CL	CL	(a)			20	
		(b)			20	
		(c)			20	
Total						

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Cropland Remaining Cropland: Annual change in carbon stocks in mineral soils**						
Category code		**3B2a (Updated)**						
Sheet		**2 of 4**						
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area in the last year of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock in the last year of the inventory time period
			(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
Initial land use	Land use during reporting year			Table 2.3	Table 5.5	Table 5.5	Table 5.5	$SOC_{(0)}$ in Equation 2.25
			$A_{(0)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0)}$
CL	CL	(a)						
		(b)						
		(c)						
Total								

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Cropland Remaining Cropland: Annual change in carbon stocks in mineral soils**						
Category code		**3B2a (Updated)**						
Sheet		**3 of 4**						
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area at the beginning of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock at the beginning of the inventory time period
			(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
Initial land use	Land use during reporting year			Table 2.3	Table 5.5	Table 5.5	Table 5.5	$SOC_{(0\text{-}T)}$ in Equation 2.25
			$\mathbf{A_{(0\text{-}T)}}$	$\mathbf{SOC_{ref}}$	$\mathbf{F_{LU}}$	$\mathbf{F_{MG}}$	$\mathbf{F_{I}}$	$SOC_{(0\text{-}T)}$
CL	CL	(a)						
		(b)						
		(c)						
Total								

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Cropland Remaining Cropland: Annual change in carbon stocks in organic soils**			
Category code		**3B2a**			
Sheet		**4 of 4**			
Equation		**Equation 2.2**	**Equation 2.26**		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1} yr^{-1})	(tonnes C yr^{-1})
				Table 5.6	**$L_{Organic}$ = A * EF**
			A	**EF**	**$L_{Organic}$**
CL	CL	(a)			
		(b)			
		(c)			
Total					

CHAPTER 2 CROPLAND LAND CONVERTED TO CROPLAND

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Land Converted to Cropland: Annual change in carbon stocks in mineral soils**				
Category code		**3B2b (Updated)**				
Sheet		**1 of 4**				
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**			
Land-use category		Subcategories for reporting year	Mineral Soil Organic C stock in the last year of the inventory time period	Mineral Soil Organic C stock at the beginning of the inventory time period	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Annual change in carbon stocks in mineral soils
Initial land use	Land use during reporting year		(tonnes C)	(tonnes C)	(yr)	(tonnes C yr^{-1})
			$SOC_{(0)}$ in Equation 2.25	$SOC_{(0\text{-}T)}$ in Equation 2.25	(default is 20 yr; if T>D then use the value of T)	$\Delta C_{Mineral}$ as in Equation 2.25
			$SOC_{(0)}$	$SOC_{(0\text{-}T)}$	**D**	$\boldsymbol{\Delta C_{Mineral}}$
FL	CL	(a)			20	
		(b)			20	
Sub-total						
GL	CL	(a)			20	
		(b)			20	
Sub-total						
WL	CL	(a)			20	
		(b)			20	
Sub-total						
SL	CL	(a)			20	
		(b)			20	
Sub-total						
OL	CL	(a)			20	
		(b)			20	
Sub-total						
Total						

Sector	Agriculture, Forestry and Other Land Use							
Category	**Land Converted to Cropland: Annual change in carbon stocks in mineral soils**							
Category code	**3B2b (Updated)**							
Sheet	**2 of 4**							
Equation	**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**						
Land-use category		Subcategories for reporting year	Area in the last year of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock in the last year of the inventory time period
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
				Table 2.3	Table 5.5	Table 5.5	Table 5.5	$SOC_{(0)}$ in Equation 2.25
			$A_{(0)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0)}$
FL	CL	(a)						
		(b)						
Sub-total								
GL	CL	(a)						
		(b)						
Sub-total								
WL	CL	(a)						
		(b)						
Sub-total								
SL	CL	(a)						
		(b)						
Sub-total								
OL	CL	(a)						
		(b)						
Sub-total								
Total								

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Land Converted to Cropland: Annual change in carbon stocks in mineral soils**						
Category code		**3B2b (Updated)**						
Sheet		**3 of 4**						
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area at the beginning of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock at the beginning of the inventory time period
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
				Table 2.3	Table 5.10	Table 5.10	Table 5.10	$SOC_{(0\text{-}T)}$ in Equation 2.25
			$A_{(0\text{-}T)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0\text{-}T)}$
FL	CL	(a)						
		(b)						
Sub-total								
GL	CL	(a)						
		(b)						
Sub-total								
WL	CL	(a)						
		(b)						
Sub-total								
SL	CL	(a)						
		(b)						
Sub-total								
OL	CL	(a)						
		(b)						
Sub-total								
Total								

Sector	Agriculture, Forestry and Other Land Use			
Category	**Land Converted to Cropland: Annual change in carbon stocks in organic soils**			
Category code	**3B2b**			
Sheet	**4 of 4**			
Equation	**Equation 2.2**	**Equation 2.26**		
Land-use category	Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use[1] / Land use during reporting year		(ha)	(tonnes C ha^{-1} yr^{-1})	(tonnes C yr^{-1})
			Table 5.6	$L_{Organic} = A * EF$
		A	**EF**	**$L_{Organic}$**
FL / CL	(a)			
	(b)			
Sub-total				
GL / CL	(a)			
	(b)			
Sub-total				
WL / CL	(a)			
	(b)			
Sub-total				
SL / CL	(a)			
	(b)			
Sub-total				
OL / CL	(a)			
	(b)			
Sub-total				
Total				

[1] If data by initial land use are not available, use only "non-CL" in this column.

CHAPTER 3 GRASSLAND GRASSLAND REMAINING GRASSLAND

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Grassland Remaining Grassland: Annual change in carbon stocks in mineral soils**				
Category code		**3B3a (Updated)**				
Sheet		**1 of 4**				
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**			
Land-use category		Subcategories for reporting year	Mineral Soil Organic C stock in the last year of the inventory time period	Mineral Soil Organic C stock at the beginning of the inventory time period	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Annual change in carbon stocks in mineral soils
Initial land use	Land use during reporting year		(tonnes C)	(tonnes C)	(yr)	(tonnes C yr^{-1})
			$SOC_{(0)}$ in Equation 2.25	$SOC_{(0\text{-}T)}$ in Equation 2.25	(default is 20 yr; if T>D then use the value of T)	$\Delta C_{Mineral}$ as in Equation 2.25
			$SOC_{(0)}$	$SOC_{(0\text{-}T)}$	**D**	$\boldsymbol{\Delta C_{Mineral}}$
GL	GL	(a)				
		(b)				
		(c)				
Total						

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Grassland Remaining Grassland: Annual change in carbon stocks in mineral soils**						
Category code		**3B3a (Updated)**						
Sheet		**2 of 4**						
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area in the last year of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock in the last year of the inventory time period
			(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
Initial land use	Land use during reporting year			Table 2.3	Table 6.2	Table 6.2	Table 6.2	$SOC_{(0)}$ in Equation 2.25
			$A_{(0)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0)}$
GL	GL	(a)						
		(b)						
		(c)						
Total								

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Grassland Remaining Grassland: Annual change in carbon stocks in mineral soils**						
Category code		**3B3a (Updated)**						
Sheet		**3 of 4**						
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area at the beginning of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock at the beginning of the inventory time period
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
				Table 2.3	Table 6.2	Table 6.2	Table 6.2	$SOC_{(0-T)}$ in Equation 2.25
			$A_{(0-T)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0-T)}$
GL	GL	(a)						
		(b)						
		(c)						
Total								

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Grassland Remaining Grassland: Annual change in carbon stocks in organic soils**			
Category code		**3B3a**			
Sheet		**4 of 4**			
Equation		**Equation 2.2**	**Equation 2.26**		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1} yr^{-1})	(tonnes C yr^{-1})
				Table 6.3	$\mathbf{L_{Organic} = A * EF}$
			A	**EF**	$\mathbf{L_{Organic}}$
GL	GL	(a)			
		(b)			
		(c)			
Total					

CHAPTER 3 GRASSLAND LAND CONVERTED TO GRASSLAND

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Land Converted to Grassland: Annual change in carbon stocks in mineral soils**				
Category code		**3B3b (Updated)**				
Sheet		**1 of 4**				
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**			
Land-use category		Subcategories for reporting year	Mineral Soil Organic C stock in the last year of the inventory time period	Mineral Soil Organic C stock at the beginning of the inventory time period	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Annual change in carbon stocks in mineral soils
Initial land use	Land use during reporting year		(tonnes C)	(tonnes C)	(yr)	(tonnes C yr^{-1})
			$SOC_{(0)}$ in Equation 2.25	$SOC_{(0\text{-}T)}$ in Equation 2.25	(default is 20 yr; if T>D then use the value of T)	$\Delta C_{Mineral}$ as in Equation 2.25
			$SOC_{(0)}$	$SOC_{(0\text{-}T)}$	**D**	$\Delta C_{Mineral}$
FL	GL	(a)			20	
		(b)			20	
Sub-total						
CL	GL	(a)			20	
		(b)			20	
Sub-total						
WL	GL	(a)			20	
		(b)			20	
Sub-total						
SL	GL	(a)			20	
		(b)			20	
Sub-total						
OL	GL	(a)			20	
		(b)			20	
Sub-total						
Total						

Sector	Agriculture, Forestry and Other Land Use						
Category	**Land Converted to Grassland: Annual change in carbon stocks in mineral soils**						
Category code	**3B3b (Updated)**						
Sheet	**2 of 4**						
Equation	**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area in the last year of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock in the last year of the inventory time period
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
				Table 2.3	Table 6.2	Table 6.2	Table 6.2	$SOC_{(0)}$ in Equation 2.25
			$A_{(0)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0)}$
FL	GL	(a)						
		(b)						
Sub-total								
CL	GL	(a)						
		(b)						
Sub-total								
WL	GL	(a)						
		(b)						
Sub-total								
SL	GL	(a)						
		(b)						
Sub-total								
OL	GL	(a)						
		(b)						
Sub-total								
Total								

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Land Converted to Grassland: Annual change in carbon stocks in mineral soils**						
Category code		**3B3b (Updated)**						
Sheet		**3 of 4**						
Equation		**Equation 2.2**	**Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1**					
Land-use category		Subcategories for reporting year	Area at the beginning of an inventory period	Reference carbon stock	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Mineral Soil Organic C stock at the beginning of the inventory time period
Initial land use	Land use during reporting year		(ha)	(tonnes C ha^{-1})	(-)	(-)	(-)	(tonnes C)
				Table 2.3	Table 5.5 (Cropland); 1 for other uses	Table 5.5 (Cropland); 1 for other uses	Table 5.5 (Cropland); 1 for other uses	$SOC_{(0\text{-}T)}$ in Equation 2.25
			$A_{(0\text{-}T)}$	**SOC_{ref}**	**F_{LU}**	**F_{MG}**	**F_I**	$SOC_{(0\text{-}T)}$
FL	GL	(a)						
		(b)						
Sub-total								
CL	GL	(a)						
		(b)						
Sub-total								
WL	GL	(a)						
		(b)						
Sub-total								
SL	GL	(a)						
		(b)						
Sub-total								
OL	GL	(a)						
		(b)						
Sub-total								
Total								

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Land Converted to Grassland: Annual change in carbon stocks in organic soils**			
Category code		**3B3b**			
Sheet		**4 of 4**			
Equation		**Equation 2.2**	**Equation 2.26**		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use[1]	Land use during reporting year		(ha)	(tonnes C ha^{-1} yr^{-1})	(tonnes C yr^{-1})
				Table 6.3	$L_{Organic} = A * EF$
			A	**EF**	**$L_{Organic}$**
FL	GL	(a)			
		(b)			
Sub-total					
CL	GL	(a)			
		(b)			
Sub-total					
WL	GL	(a)			
		(b)			
Sub-total					
SL	GL	(a)			
		(b)			
Sub-total					
OL	GL	(a)			
		(b)			
Sub-total					
Total					

[1] If data by initial land use are not available, use only "non-GL" in this column.

CHAPTER 7 WETLANDS FLOODED LAND REMAINING FLOODED LAND

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Non CO_2 emissions for Flooded Land remaining Flooded Land**			
Category code		**3B4aii**			
Sheet		**1 of 3**			
		Equation 2.2	**Non CO_2 emissions/removals from *Flooded Land remaining Flooded Land* Equation 7.10B**		
Land-use category		Subcategories for reporting year	Annual surface reservoir CH_4 emissions (for Reservoirs >20 years old	Annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old	Annual total reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
Initial land use	Land use during reporting year		kg CH_4 yr^{-1}	kg CH_4 yr^{-1}	kg CH_4 yr^{-1}
			Equation 7.10B	Equation 7.10C	$F_{CH_4tot} = F_{CH_4res} + F_{CH_4downstreame}$
			F_{CH4res}	**$F_{CH4downstream}$**	**F_{CH4tot}**
$WL_{Flooded}$	$WL_{Flooded}$				
Total					

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Non CO_2 emissions for Flooded Land remaining Flooded Land**				
Category code		**3B4aii**				
Sheet		**2 of 3**				
		Equation 2.2	**Non CO_2 emissions/removals from *Flooded Land remaining Flooded Land* Equation 7.10B**			
Land-use category		Subcategories for reporting year	Total Area of *Flooded Land remaining Flooded Land* (Reservoir > 20 yrs old "*i*") located in a climate zone "*j*"	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	Annual surface reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
Initial land use	Land use during reporting year		ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}
				Table 7.9	1.0 for Tier1	$F_{CH_4res} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i \left(EF_{CH_4age>20,j} \bullet A_{tot\,j,i} \right)$
			A_{tot}	**EF**	**α_i**	**F_{CH4res}**
$WL_{Flooded}$	$WL_{Flooded}$					
Total						

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Non CO_2 emissions for Flooded Land remaining Flooded Land**				
Category code		**3B4aii**				
Sheet		**3 of 3**				
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Flooded Land remaining Flooded Land* Equation 7.10C**			
Land-use category		Subcategories for reporting year	Total Area of *Flooded Land remaining Flooded Land* (Reservoir > 20 yrs old "*i*") located in a climate zone "*j*"	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	Annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
			ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}
Initial land use	Land use during reporting year			Table 7.9	1.0 for Tier 1	$F_{CH_4 downstreame} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i \left(EF_{CH_4 age>20,j} \bullet A_{tot\,j,i} \right) \bullet R_{d,i}$
			A_{tot}	**EF**	**α_i**	**$F_{CH4downstream}$**
$WL_{Flooded}$	$WL_{Flooded}$					
Total						

CHAPTER 7 WETLANDS LAND CONVERTED TO FLOODED LAND

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**CO_2 emissions from Land converted to Flooded Land**			
Category code		**3B4bii**			
Sheet		**1 of 1**			
Equation		**Equation 2.2**	**CO_2-C emissions/removals for *Land converted to Flooded Land* Equation 7.13**		
Land-use category[1]		Subcategories for reporting year	Total area of reservoir water surface for reservoir *'i'* located in climate zone *'j'*	Emission factor for CO_2-C for reservoir ≤ 20 years old in climate zone *'j'*	Total annual emission (removal) of CO_2-C from *Land Converted to Flooded Land* (Reservoirs ≤ 20 years old)
Initial land use[2]	Land use during reporting year		ha	tonnes CO_2-C ha^{-1} y^{-1}	tonnes CO_2-C yr^{-1}
				Table 7.13	$F_{CO_2tot} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} A_{total,j,i} \bullet EF_{CO_2 age \leq 20, j}$
			A_{total}	**EF**	**F_{CO2tot}**
	$WL_{Flooded}$				
Total					

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.

[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Non CO_2 emissions for Land Converted to Flooded Land**			
Category code		**3B4bii**			
Sheet		**1 of 3**			
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Land Converted to Flooded Land* Equation 7.15A**		
Land-use category[1]		Subcategories for reporting year	Annual surface reservoir CH_4 emissions (for Reservoirs >20 years old	Annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old	Annual total reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
Initial land use[2]	Land use during reporting year		kg CH_4 yr^{-1}	kg CH_4 yr^{-1}	kg CH_4 yr^{-1}
			Equation 7.15B	Equation 7.15C	$F_{CH_4tot} = F_{CH_4res} + F_{CH_4downstreame}$
			F_{CH4res}	**$F_{CH4downstream}$**	**F_{CH4tot}**
	$WL_{Flooded}$				
Total					

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.
[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Non CO_2 emissions for Flooded Land remaining Flooded Land**				
Category code		**3B4bii**				
Sheet		**2 of 3**				
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Land Converted to Flooded Land* Equation 7.15B**			
Land-use category[1]		Subcategories for reporting year	Total Area of *Flooded Land remaining Flooded Land* (Reservoir > 20 yrs old "*i*") located in a climate zone "*j*"	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	Annual surface reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
			ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}
Initial land use[2]	Land use during reporting year			Table 7.15	1.0 for Tier1	$F_{CH_4res} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i (EF_{CH_4\ age \le 20, j} \bullet A_{tot\ j,i})$
			A_{tot}	**EF**	**α_i**	**F_{CH4res}**
	$WL_{Flooded}$					
Total						

1 Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.
2 For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Non CO_2 emissions for Flooded Land remaining Flooded Land**				
Category code		**3B4bii**				
Sheet		**3 of 3**				
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Land Converted to Flooded Land* Equation 7.15C**			
Land-use category[1]		Subcategories for reporting year	Total Area of *Flooded Land remaining Flooded Land* (Reservoir > 20 yrs old "*i*") located in a climate zone "*j*"	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	Annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
Initial land use[2]	Land use during reporting year		ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}
				Table 7.15	1.0 for Tier1	$F_{CH_4 downstream} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i (EF_{CH_4\ age \le 20, j} \bullet A_{tot\ j,i}) \bullet R_{d,\ i}$
			A_{tot}	**EF**	**α_i**	**$F_{CH4downstream}$**
	$WL_{Flooded}$					
Total						

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.
[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

CHAPTER 7 WETLANDS **FLOODED LAND REMAINING FLOODED LAND**

INDICATIVE ESTIMATES OF THE ANTHROPOGENIC COMPONENT OF TOTAL EMISSIONS

Sector		**Agriculture, Forestry and Other Land Use**					
Category		**Non CO_2 emissions for Flooded Land Remaining Flooded Land**					
Category code		**3B4aii** [1]					
Sheet		**1 of 2**					
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Flooded Land remaining Flooded Land* Equation 7.16**				
Land-use category		Subcategories for reporting year	Areas of reservoir water surface for reservoir > 20 years old 'i' located in climate zone 'j' , but excluding areas that were unmanaged waterbodies (lakes and rivers) and unmanaged wetlands	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old	Indicative estimates of the anthropogenic component of total CH_4 emissions (for Reservoirs >20 years old (Flooded *Land Remaining Flooded Land*)
Initial land use	Land use during reporting year		ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}	kg CH_4 yr^{-1}
				Table 7.9	1.0 for Tier1	Eq. 10C	$F_{CH_4anthrop} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i \left(EF_{CH_4age>20,j} \bullet A_{anthrop,j,i} \right) + F_{CH_4downstream}$
			$A_{Anthrop}$	**EF**	**α_i**	**$F_{CH4downstream}$**	**F_{CH4res}**
$WL_{Flooded}$	$WL_{Flooded}$						
Total							

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Non CO_2 emissions for Flooded Land Remaining Flooded Land**				
Category code		**3B4aii**				
Sheet		**2 of 2**				
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Flooded Land Remaining Flooded Land* Equation 7.10C**			
Land-use category[1]		Subcategories for reporting year	Total Area of *Flooded Land remaining Flooded Land* (Reservoir > 20 yrs old "*i*") located in a climate zone "*j*"	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	Annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old (*Flooded Land remaining Flooded Land*)
			ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}
Initial land use[2]	Land use during reporting year			Table 7.9	1.0 for Tier1	$F_{CH_4 downstream} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i (EF_{CH_4\ age>20,j} \bullet A_{tot\,j,i}) \bullet R_{d,i}$
			A_{tot}	**EF**	**α_i**	**$F_{CH4downstream}$**
	$WL_{Flooded}$					
Total						

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.
[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

CHAPTER 7 WETLANDS LAND CONVERTED TO FLOODED LAND

INDICATIVE ESTIMATES OF THE ANTHROPOGENIC COMPONENT OF TOTAL EMISSIONS

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**CO_2 emissions from Land converted to Flooded Land**			
Category code		**3B4bii**			
Sheet		**1 of 1**			
Equation		**Equation 2.2**	**CO_2-C emissions/removals for *Land converted to Flooded Land* Equation 7.17**		
Land-use category[1]		Subcategories for reporting year	Areas of reservoir water surface for reservoir > 20 years old 'i' located in climate zone 'j' but excluding areas that were unmanaged waterbodies (lakes and rivers) and unmanaged wetlands	Emission factor for CO_2-C for reservoir ≤ 20 years old in climate zone '*j*'	Indicative estimates of the anthropogenic component of total emissions of CO_2-C from Land Converted to Flooded Land (Reservoirs ≤ 20 years old)
Initial land use[2]	Land use during reporting year		ha	tonnes CO_2-C ha^{-1} y^{-1}	tonnes CO_2-C yr^{-1}
				Table 7.13	$F_{CO_2anthrop} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \left(EF_{CO_2age \le 20, j} \bullet A_{anthrop, j, i} \right)$
			$A_{anthrop}$	**EF**	**F_{CO2tot}**
	$WL_{Flooded}$				
Total					

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.

[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

Sector		**Agriculture, Forestry and Other Land Use**					
Category		**Non CO_2 emissions for Land converted Flooded Land**					
Category code		**3B4bii** [1]					
Sheet		**1 of 2**					
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Land Converted to Flooded Land* Equation 7.18**				
Land-use category[1]		Subcategories for reporting year	Areas of reservoir water surface for reservoir > 20 years old 'i' located in climate zone 'j' , but excluding areas that were unmanaged waterbodies (lakes and rivers) and unmanaged wetlands	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	annual downstream reservoir CH_4 emissions (for Reservoirs >20 years old	Indicative estimates of the anthropogenic component of total CH_4 emissions (for Reservoirs ≤20 years old (*Land converted to Flooded Land*)
			ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}	kg CH_4 yr^{-1}
Initial land use[2]	Land use during reporting year			Table 7.15	1.0 for Tier1	Eq. 10C	$F_{CH_4anthrop} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i \left(EF_{CH_4age \le 20, j} \bullet A_{anthrop, j, i} \right) + F_{CH_4downstream}$
			$A_{Anthrop}$	**EF**	**α_i**	**$F_{CH4downstream}$**	**F_{CH4res}**
	$WL_{Flooded}$						
Total							

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.
[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.

Sector		**Agriculture, Forestry and Other Land Use**				
Category		**Non CO_2 emissions for Flooded Land remaining Flooded Land**				
Category code		**3B4bii**				
Sheet		**2 of 2**				
Equation		**Equation 2.2**	**Non CO_2 emissions/removals from *Land Converted to Flooded Land* Equation 7.15C**			
Land-use category[1]		Subcategories for reporting year	Total Area of *Flooded Land remaining Flooded Land* (Reservoir > 20 yrs old "*i*") located in a climate zone "*j*"	Emission factor for CH_4 emitted from *Flooded Land* for reservoir > 20 yrs located in a climate zone "*j*"	Emission factor adjustment for trophic state (α_i) in reservoir *i* within a given climate zone.	Annual downstream reservoir CH_4 emissions (for Reservoirs ≤20 years old (Land Converted to *Flooded Land*)
Initial land use[2]	Land use during reporting year		ha	kg CH_4 ha^{-1} yr^{-1}	Dimension-less	kg CH_4 yr^{-1}
				Table 7.15	1.0 for Tier1	$F_{CH_4 downstream} = \sum_{j=1}^{6} \sum_{i=1}^{nres_j} \alpha_i (EF_{CH_4\ age \le 20, j} \bullet A_{tot\ j,i}) \bullet R_{d,\ i}$
			A_{tot}	**EF**	**α_i**	**$F_{CH4downstream}$**
	$WL_{Flooded}$					
Total						

[1] Sub-totals of emissions for each land pre-conversion land-use category will have to be calculated for conversion categories.
[2] For conversion categories, insert initial land use here. If data by initial land use are not available, use only "non-LU" in this column.