

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 Flooded Land and Biochar Amendments to Soils for Cropland and Grassland.

Flooded Land Worksheets:

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Biochar and Soils - CL, GL Worksheets

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Contents

Annex 2 Worksheets

3B2 Cropland.....A2.3

3B3 Grassland.....A2.5

3B4 Wetlands.....A2.9

Sector		Agriculture, Forestry and Other Land Use						
Category		Cropland Remaining Cropland: Annual change in biochar carbon stock in mineral soils receiving biochar additions						
Category code		3B2a (New)*						
Sheet		3 of 3						
Equation		Equation 2.2	Equation 2.26A					
Land-use category		Subcategories for reporting year	Total quantity of biochar added to mineral soil during the inventory year by production type	Organic carbon content of biochar	Fraction of biochar carbon remaining (unmineralised) after 1000 years	Global warming potential of methane produced during pyrolysis	Global warming potential of nitrous oxide produced during pyrolysis	Annual change in biochar carbon stock in mineral soils receiving biochar additions
Initial land use	Land use during reporting year		(tonnes biochar dry matter yr ⁻¹)	(tonnes C tonne ⁻¹ biochar dry matter)	(tonnes sequestered C tonne ⁻¹ biochar C)	(kg CO ₂ -e kg ⁻¹ methane)	(kg CO ₂ -e kg ⁻¹ nitrous oxide)	(tonnes sequestered C yr ⁻¹)
				Table 2.3A	Table 2.3B			$\Delta BC = \sum_{p=1}^n \left[\left(BC_{TOT_p} \bullet F_{C_p} \bullet F_{perm_p} \right) - \left[\left(BC_{TOT_p} \bullet GWP - CH_4 \bullet 0.0110 \right) + \left(BC_{TOT_p} \bullet GWP - N_2O \bullet 0.000022 \right) \right] \right]$
			BC _{TOTp}	F _{Cp}	F _{perm_p}	GWP-CH ₄	GWP-N ₂ O	ΔBC
CL	CL	(a)						
		(b)						
		(c)						
Total								

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Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Cropland: Annual change in biochar carbon stock in mineral soils receiving biochar additions						
Category code		3B2b (New)*						
Sheet		3 of 3						
Equation		Equation 2.2	Equation 2.26A					
Land-use category		Subcategories for reporting year	Total quantity of biochar added to mineral soil during the inventory year by production type	Organic carbon content of biochar	Fraction of biochar carbon remaining (unmineralised) after 1000 years	Global warming potential of methane produced during pyrolysis	Global warming potential of nitrous oxide produced during pyrolysis	Annual change in biochar carbon stock in mineral soils receiving biochar additions
Initial land use	Land use during reporting year		(tonnes biochar dry matter yr ⁻¹)	(tonnes C tonne ⁻¹ biochar dry matter)	(tonnes sequestered C tonne ⁻¹ biochar C)	(kg CO ₂ -e kg ⁻¹ methane)	(kg CO ₂ -e kg ⁻¹ nitrous oxide)	(tonnes sequestered C yr ⁻¹)
				Table 2.3A	Table 2.3B			$\Delta BC = \sum_{p=1}^n \left[\left(BC_{tot_p} \bullet F_{C_p} \bullet F_{perm_p} \right) - \left[\left(BC_{tot_p} \bullet GWP - CH_4 \bullet 0.0110 \right) + \left(BC_{tot_p} \bullet GWP - N_2O \bullet 0.000022 \right) \right] \right]$
			BC _{TOTp}	F _{Cp}	F _{perm_p}	GWP-CH ₄	GWP-N ₂ O	ΔBC
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		Grassland Remaining Grassland: Annual change in carbon stocks in mineral soils										
Category code		3B3a										
Sheet		1 of 3										
Equation		Equation 2.2	Equation 2.25									
Land-use category		Subcategories of unique climate, soil, and management combinations	Area in the last year of an inventory period	Area at the beginning of an inventory period	Reference carbon stock for Climate/Soil Combination	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for C input	Carbon stock in last year of an inventory period	Carbon stock at the beginning of an inventory 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		(ha)	(ha)	(tonnes C ha ⁻¹)	(-)	(-)	(-)	tonnes C	tonnes C	(yr)	(tonnes C yr ⁻¹)
					Table 2.3, Chap. 2, Sec. 2.3.3.1	Table 6.2	Table 6.2	Table 6.2			(default is 20 yr; if T>D then use the value of T)	$\Delta C_{\text{Mineral}}$ as in Equation 2.25
			A₍₀₎	A_(0-T)	SOC_{ref}	F_{LU}	F_{MG}	F_I	SOC₀	SOC_{0-T}	D	$\Delta C_{\text{Mineral}}$
GL	GL	(a)										
		(b)										
		(c)										
		(d)										
		(e)										
		(f)										
		(g)										
		(h)										
Total										20		

Note: This worksheet is designed for computations using Formulation A in Box 2.1 of Section 2.3.3.1

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Sector		Agriculture, Forestry and Other Land Use						
Category		Grassland Remaining Grassland: Annual change in biochar carbon stock in mineral soils receiving biochar additions						
Category code		3B3a (New)*						
Sheet		3 of 3						
Equation		Equation 2.2	Equation 2.26A					
Land-use category		Subcategories for reporting year	Total quantity of biochar added to mineral soil during the inventory year by production type	Organic carbon content of biochar	Fraction of biochar carbon remaining (unmineralised) after 1000 years	Global warming potential of methane produced during pyrolysis	Global warming potential of nitrous oxide produced during pyrolysis	Annual change in biochar carbon stock in mineral soils receiving biochar additions
Initial land use	Land use during reporting year		(tonnes biochar dry matter yr ⁻¹)	(tonnes C tonne ⁻¹ biochar dry matter)	(tonnes sequestered C tonne ⁻¹ biochar C)	(kg CO ₂ -e kg ⁻¹ methane)	(kg CO ₂ -e kg ⁻¹ nitrous oxide)	(tonnes sequestered C yr ⁻¹)
				Table 2.3A	Table 2.3B			$\Delta BC = \sum_{p=1}^n \left[\left(BC_{TOT_p} \bullet F_{C_p} \bullet F_{perm_p} \right) - \left[\left(BC_{TOT_p} \bullet GWP - CH_4 \bullet 0.0110 \right) + \left(BC_{TOT_p} \bullet GWP - N_2O \bullet 0.000022 \right) \right] \right]$
			BC _{TOTp}	F _{Cp}	F _{permp}	GWP-CH ₄	GWP-N ₂ O	ΔBC
GL	GL	(a)						
		(b)						
		(c)						
Total								

Sector		Agriculture, Forestry and Other Land Use							
Category		Land Converted to Grassland: Annual change in biochar carbon stock in mineral soils receiving biochar additions							
Category code		3B3b (New)*							
Sheet		3 of 3							
Equation		Equation 2.2	Equation 2.26A						
Land-use category		Subcategories for reporting year	Total quantity of biochar added to mineral soil during the inventory year by production type	Organic carbon content of biochar	Fraction of biochar carbon remaining (unmineralised) after 1000 years	Global warming potential of methane produced during pyrolysis	Global warming potential of nitrous oxide produced during pyrolysis	Annual change in biochar carbon stock in mineral soils receiving biochar additions	
Initial land use	Land use during reporting year		(tonnes biochar dry matter yr ⁻¹)	(tonnes C tonne ⁻¹ biochar dry matter)	(tonnes sequestered C tonne ⁻¹ biochar C)	(kg CO ₂ -e kg ⁻¹ methane)	(kg CO ₂ -e kg ⁻¹ nitrous oxide)	(tonnes sequestered C yr ⁻¹)	
				Table 2.3A	Table 2.3B	$\Delta BC = \sum_{p=1}^n \left[\left(BC_{TOT_p} \bullet F_{C_p} \bullet F_{perm_p} \right) - \left[\left(BC_{TOT_p} \bullet GWP - CH_4 \bullet 0.0110 \right) + \left(BC_{TOT_p} \bullet GWP - N_2O \bullet 0.000022 \right) \right] \right]$			
			BC_{TOTp}	F_{Cp}	F_{permp}	GWP-CH₄	GWP-N₂O	ΔBC	
FL	GL		(a)						
		(b)							
Sub-total									
GL	GL	(a)							
		(b)							
Sub-total									
WL	GL	(a)							
		(b)							
Sub-total									
SL	GL	(a)							
		(b)							
Sub-total									
OL	GL	(a)							
		(b)							
Sub-total									

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Total					
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CHAPTER 7-WETLAND

FLOODED LAND REMAINING FLOODED LAND
BASED ON MANAGED LAND PROXY

Sector		Agriculture, Forestry and Other Land Use					
Category		Non CO ₂ emissions for Flooded Land remaining Flooded Land					
Category code		3B4aii					
Sheet		1 of 2					
Equation		Equation 2.2	Non CO ₂ emissions/removals from <i>Flooded Land remaining Flooded Land</i> Equation 7.12				
Land-use category		Subcategories for reporting year	Total Area of <i>Flooded Land remaining Flooded Land</i> (Reservoir > 20 yrs old “i”) located in a climate zone “j”	Emission factor for CH ₄ emitted from <i>Flooded Land</i> 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.	A constant equal to the ratio of total downstream emission of methane to the total flux of methane from the reservoir surface	Total annual CH ₄ emissions (removals) for Reservoirs >20 years old (<i>Flooded Land remaining Flooded Land</i>)
Initial land use	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ yr ⁻¹	Dimensionless	Dimensionless	
				Table 7.10	1.0 for Tier1	0.09 for Tier 1	$F_{CH_4tot} = \sum_{j=1}^6 \sum_{i=1}^{nres_j} \alpha_i \left(EF_{CH_4age>20,j} (1 + R_d) \cdot A_{total,j,i} \right)$
			A	EF	α _i	R _d	F _{CH4tot}
FL	FL						
Total							

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CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
BASED ON MANAGED LAND PROXY

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 <i>Flooded Land remaining Flooded Land</i> from other constructed water bodies Equation 7.19			
Land-use category		Subcategories for reporting year	Area of other waterbody 'i' of type 'w' in climate zone 'j'	Emission factor for other waterbody of type 'w'	Emission factor adjustment for trophic state (α _i) other waterbody 'i' of type 'w' located in climate zone 'j'	Total annual flux of CH ₄ from ponds and channels
Initial land use	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ yr ⁻¹	Dimensionless	kg CH ₄ yr ⁻¹
				Table 7.15	1.0 for all Tiers	$F_{CH_4,other} = \sum_{j=1}^6 \sum_{w=1}^3 \sum_{i=1}^{n_{other_{w,j}}} \left(A_{j,w,i} \cdot EF_{CH_4,w} \cdot \alpha_{j,w,i} \right)$
			A	EF	α _i	F _{CH4other}
FL	FL					
Total						

CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		CO ₂ emissions for Flooded Land remaining Flooded Land			
Category code		3B4a ⁱⁱ			
Sheet		1 of 2			
Equation		Equation 2.2	Annual net CO ₂ -C emissions/removals from <i>Flooded Land with factoring out</i>		
Land-use category		Subcategories for reporting year	Equation 7.10		
			Total annual emission (removal) of CO ₂ -C from <i>Flooded Land remaining Flooded Land</i> [tonnes CO ₂ -C yr ⁻¹]	Total annual emission (removal) of CO ₂ -C from all unmanaged wetlands that would have otherwise occurred if the land remained unmanaged	Net annual emission (removal) of CO ₂ -C from <i>Flooded Land remaining Flooded Land</i>
			tonnes CO ₂ -C yr ⁻¹	tonnes CO ₂ -C yr ⁻¹	tonnes CO ₂ -C yr ⁻¹
			Assumed to be zero for Flooded Land Remaining Flooded Land	Table 7.9	$F_{CO_2net} = F_{CO_2tot} - F_{CO_2otherwise}$
Initial land use	Land use during reporting year		F _{CO2tot}	F _{CO2otherwise}	F _{CO2net}
FL	FL				
Total					

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CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		CO ₂ emissions for Flooded Land remaining Flooded Land			
Category code		3B4aii			
Sheet		2 of 2			
Equation		Equation 2.2	Annual CO ₂ -C emissions/removals that would have otherwise occurred if the land remained unmanaged Equation 7.11		
Land-use category		Subcategories for reporting year	Area of previously existing unmanaged wetland element “l” of type “r” inundated as a result of reservoir/other water body construction for reservoir/other water body “K” located in a climate zone “j”	Emission factor for CO ₂ -C emitted from unmanaged wetland of type 'r' located in climate zone 'j'	Total annual emissions/removals of CO ₂ -C from all unmanaged wetland types that would have otherwise occurred if land remained unmanaged
Initial land use	Land use during reporting year		ha	tonnes CO ₂ -C ha ⁻¹ yr ⁻¹	tonnes CO ₂ -C yr ⁻¹
				Table 7.9	$F_{CO_2 otherwise} = \sum_{j=1}^6 \sum_{k=1}^{n_{wb,j}} \sum_{r=1}^5 \sum_{i=1}^{n_{luc_{k,r}}} \left(EF_{CO_2_luc_{j,r}} \cdot A_{luc_{k,r,i}} \right)$
			A	EF	F _{CO2otherwise}
FL	FL				
Total					

CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO ₂ emissions for Flooded Land remaining Flooded Land			
Category code		3B4a _{ii}			
Sheet		1 of 5			
Equation		Equation 2.2	Annual net CH ₄ emissions/removals from <i>Flooded Land Remaining Flooded Land with factoring out</i> Equation 7.14		
Land-use category		Subcategories for reporting year	Total annual emission (removal) of CH ₄ from <i>Flooded Land remaining Flooded Land</i>	Total annual emission (removal) of CH ₄ on the unmanaged land without conversion to Managed Flooded Land	Net annual emission (removal) of CH ₄ from <i>Flooded Land remaining Flooded Land</i>
Initial land use	Land use during reporting year		kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹
			Use estimate for <i>Flooded Land remaining Flooded Land</i> based on Managed Land Proxy		$F_{CH_4net} = F_{CH_4tot} - F_{CH_4otherwise}$
			F _{CH4tot}	F _{CH4otherwise}	F _{CH4net}
FL	FL				
Total					

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CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use		
Category		Non CO ₂ emissions for Flooded Land remaining Flooded Land		
Category code		3B4aii		
Sheet		2 of 5		
Equation		Equation 2.2	Total Annual CH ₄ emissions/removals that would have otherwise occurred from Unmanaged Flooded Land Equation 7.15	
Land-use category		Subcategories for reporting year	Total annual emission (removal) of CH ₄ from single flooded area 'K' (e.g. a single reservoir) in climate zone 'j' that otherwise would have occurred if the land remained unmanaged	Total annual emission (removal) of CH ₄ from all waterbody classes that otherwise would have occurred if these lands remained unmanaged
Initial land use	Land use during reporting year		kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹
			Sum all of the total emission (removal) for each individual flooded areas in climate zone “j”	$F_{CH_4 otherwise} = \sum_{j=1}^6 \sum_{k=1}^{n_{fl_a_j}} F_{CH_4 otherwise_fl_a_k_j}$
			FCH4otherwise_fl_a,k,j	FCH4otherwise
FL	FL			
Total				

CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO ₂ emissions for Flooded Land remaining Flooded Land			
Category code		3B4a ⁱⁱ			
Sheet		3 of 5			
Equation		Equation 2.2	Annual CH ₄ emissions/removals that would have otherwise occurred from Unmanaged Waterbodies and Other Unmanaged land Equation 7.16		
Land-use category		Subcategories for reporting year	Total annual emission (removal) of CH ₄ from waterbodies, including lakes, rivers, and streams, that would otherwise occur if the land remained unmanaged	Total annual emission (removal) of CH ₄ from other unmanaged land, including unmanaged wetland, mangroves, and tidal marshes that would otherwise occur if the land remained unmanaged	Total annual emission (removal) of CH ₄ that would otherwise occur if the land remained unmanaged
Initial land use	Land use during reporting year		kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹
					$F_{CH_4 otherwise_fl_a} = F_{CH_4 otherwb} +$
			FCH ₄ otherwb	FCH ₄ otherland	FCH ₄ otherwise_fl_a
FL	FL				
Total					

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CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use				
Category		Non CO ₂ emissions for Flooded Land remaining Flooded Land				
Category code		3B4aii				
Sheet		4 of 5				
Equation		Equation 2.2	Annual CH ₄ emissions/removals that would have otherwise occurred from Unmanaged Waterbodies (Lakes, Rivers and Streams) Equation 7.17			
Land-use category		Subcategories for reporting year	Area of unmanaged waterbody, element 'i' of class 'r' inundated as a result of reservoir/other waterbody construction for reservoir/other waterbody	Emission factor for CH ₄ emitted from waterbody class of type 'r' located in climate zone 'j'	Emission factor adjustment for trophic state (α _i) in waterbody 'i' of class 'r' located in climate zone 'j'.	Total annual emissions (removal) of CH ₄ from unmanaged waterbodies (lakes, rivers and streams) that would otherwise occur if the land remained unmanaged
Initial land use	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ y ⁻¹	Dimensionless	kg CH ₄ yr ⁻¹
				Table 7.13	1.0 for Tier 1	$F_{CH_4 otherwb} = \sum_{r=1}^2 \sum_{i=1}^n \alpha_i \left(EF_{CH_4 wb_{jr}} \cdot Awb_{r,i} \right)$
			A	EF	α _i	F _{CH4otherwb}
FL	FL					
Total						

CHAPTER 7—WETLANDS

FLOODED LAND REMAINING FLOODED LAND WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO ₂ emissions for Flooded Land remaining Flooded Land			
Category code		3B4aii			
Sheet		5 of 5			
Equation		Equation 2.2	Annual CH ₄ emissions/removals that would have otherwise occurred from Other unmanaged Lands (Wetlands, Mangroves and Marshes) Equation 7.18		
Land-use category		Subcategories for reporting year	Area of previously existing wetland element 'i' of class 'r' inundated by the flooded area	Emission factor for CH ₄ emitted from wetland class of type 'r' located in climate zone 'j'	Total annual emissions (removal) of CH ₄ from all wetland classes that would otherwise occur if the land remained unmanaged
Initial land use	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ y ⁻¹	kg CH ₄ yr ⁻¹
				Table 7.14	$F_{CH_4 otherland} = \sum_{r=3}^7 \sum_{i=1}^{n_{luc_r}} \left(EF_{CH_4_{luc_{jr}}} \cdot Alc_{r,i} \right)$
			A	EF	F _{CH4otherland}
FL	FL				
Total					

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CHAPTER 7—WETLANDS

LAND CONVERTED TO FLOODED LAND
BASED ON MANAGED LAND PROXY

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 <i>Land converted to Flooded Land</i> Equation 7.20		
Land-use category ¹		Subcategories for reporting year	Total area of reservoir water surface for reservoir 'j' 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 <i>Land Converted to Flooded Land</i> (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 7.16	$F_{CO2tot} = \sum_{j=1}^6 \sum_{i=1}^{nres_j} A_{total,j,i} \cdot EF_{CO2age \leq 20,j}$
			A	EF	F _{CO2tot}
	FL				
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
BASED ON MANAGED LAND PROXY

Sector		Agriculture, Forestry and Other Land Use				
Category		Non CO₂ emissions for Land Converted to Flooded Land				
Category code		3B4bii				
Sheet		1 of 2				
Equation		Equation 2.2	Non CO₂ emissions/removals <i>Land Converted to Flooded Land</i> from other constructed water bodies Equation 7.19			
Land-use category ¹		Subcategories for reporting year	Area of other waterbody 'i' of type 'w' in climate zone 'j'	Emission factor for other waterbody of type 'w'	Emission factor adjustment for trophic state (α_i) other waterbody 'i' of type 'w' located in climate zone 'j'.	Total annual flux of CH ₄ from other constructed water bodies (ponds and channels)
Initial land use ²	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ yr ⁻¹	Dimensionless	kg CH ₄ yr ⁻¹
				Table 7.15	1.0 for all Tiers	$F_{CH_4 other} = \sum_{j=1}^6 \sum_{w=1}^3 \sum_{i=1}^{n_{other w,j}} \left(A_{j,w,i} \cdot EF_{CH_4,w} \cdot \alpha_{j,w,i} \right)$
			A	EF	α_i	F_{CH4other}
	FL					
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.

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CHAPTER 7—WETLANDS

LAND CONVERTED TO FLOODED LAND
BASED ON MANAGED LAND PROXY

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO₂ emissions from Land converted to Flooded Land			
Category code		3B4bii			
Sheet		2 of 2			
Equation		ANNUAL CH₄ EMISSIONS/REMOVALS FOR RESERVOIRS < 20 YEARS FOR LAND CONVERTED TO FLOODED LAND EQUATION 7.22			
Land-use category ¹		Subcategories for reporting year	Total area of reservoir water surface for reservoir ≤ 20 years old 'i' located in climate zone 'j'	Emission factor for CH ₄ emitted from the reservoir surface for reservoir ≤ 20 years old located in climate zone 'j'	Total annual emissions (removal) of CH ₄ from <i>Land converted to Flooded Land</i> from all reservoirs ≤ 20 years old
Initial land use ²	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ yr ⁻¹	kg CH ₄ yr ⁻¹
				Table 7.18	$F_{CH_4 tot} = \sum_{j=1}^6 \sum_{i=1}^{nres_j} \alpha_i \left(EF_{CH_4 age \leq 20, j} (1 + R_d) \cdot A_{total, j, i} \right)$
			A	EF	F_{CH4tot}
	FL				
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
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		CO ₂ emissions for Land Converted to Flooded Land			
Category code		3B4a ⁱⁱ			
Sheet		1 of 2			
Equation		Equation 2.2	Annual net CO ₂ -C emissions/removals from <i>Flooded Land with factoring out</i> Equation 7.10		
Land-use category ¹		Subcategories for reporting year	Total annual emission (removal) of CO ₂ -C from flooded land [tonnes CO ₂ -C yr ⁻¹]	Total annual emission (removal) of CO ₂ -C from all unmanaged wetlands that would have otherwise occurred if the land remained unmanaged	Net annual emission (removal) of CO ₂ -C from flooded land
			tonnes CO ₂ -C yr ⁻¹	tonnes CO ₂ -C yr ⁻¹	tonnes CO ₂ -C yr ⁻¹
Initial land use ²	Land use during reporting year		Use estimate for <i>Land Converted to Flooded Land</i> Based on Managed Land Proxy	Table 7.9	$F_{CO_2net} = F_{CO_2tot} - F_{CO_2otherwise}$
			F _{CO2tot}	F _{CO2otherwise}	F _{CO2net}
	FL				
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.

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CHAPTER 7—WETLANDS

LAND CONVERTED TO FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		CO ₂ emissions for Land Converted to Flooded Land			
Category code		3B4aii			
Sheet		2 of 2			
Equation		Equation 2.2	Annual CO ₂ emissions/removals that would have otherwise occurred if the land remained unmanaged		
Land-use category ¹		Subcategories for reporting year	Area of previously existing unmanaged wetland element “ <i>r</i> ” of type “ <i>r</i> ” inundated as a result of reservoir/other water body construction for reservoir/other water body “ <i>K</i> ” located in a climate zone “ <i>j</i> ”	Emission factor for CO ₂ emitted from unmanaged wetland of type ' <i>r</i> ' located in climate zone ' <i>j</i> '	Total annual emissions/removals of CO ₂ -C from all unmanaged wetland types that would have otherwise occurred if land remained unmanaged
Initial land use ²	Land use during reporting year		ha	tonnes CO ₂ -C ha ⁻¹ yr ⁻¹	tonnes CO ₂ -C yr ⁻¹
				Table 7.9	$F_{CO_2 otherwise} = \sum_{j=1}^6 \sum_{k=1}^{n_{wb,j}} \sum_{r=1}^5 \sum_{i=1}^{n_{luc_{k,r}}} \left(EF_{CO_2-luc_{j,r}} \cdot A_{luc_{k,r,i}} \right)$
			A	EF	F _{CO2otherwise}
	FL				
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
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO₂ emissions for Land Converted to Flooded Land			
Category code		3B4aii			
Sheet		1 of 5			
Equation		Equation 2.2	Annual net CH₄ emissions/removals from <i>Flooded Land Remaining Flooded Land with factoring out</i> Equation 7.14		
Land-use category ¹		Subcategories for reporting year	Total annual emission (removal) of methane from flooded land	Total annual emission (removal) of methane from all land use classes that would otherwise occur on the unmanaged land without conversion to Managed Flooded Land	Net annual emission (removal) of methane from flooded land
			kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹
Initial land use ²	Land use during reporting year		Use estimate for Land Converted to Flooded Land Based on Managed Land Proxy		$F_{CH_4net} = F_{CH_4tot} - F_{CH_4otherwise}$
			F_{CH4tot}	F_{CH4otherwise}	F_{CH4net}
	FL				
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 WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use		
Category		Non CO ₂ emissions for Land Converted to Flooded Land		
Category code		3B4aii		
Sheet		2 of 5		
Equation		Equation 2.2	Total Annual CH ₄ emissions/removals that would have otherwise occurred from Unmanaged Flooded Land Equation 7.15	
Land-use category ¹		Subcategories for reporting year	Total annual emission (removal) of methane from single flooded area 'k' (e.g. a single reservoir) in climate zone 'j' that otherwise would have occurred if the land remained unmanaged	Total annual emission (removal) of CH ₄ from all waterbody classes that otherwise would have occurred if these lands remained unmanaged
Initial land use ²	Land use during reporting year		kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹
			Sum all of the total emission (removal) for each individual flooded areas in climate zone "j"	$F_{CH_4 otherwise} = \sum_{j=1}^6 \sum_{k=1}^{n_{fl_a,j}} F_{CH_4 otherwise_fl_a_{k,j}}$
			F_{CH4otherwise_fl_a,k,j}	F_{CH4otherwise}
	FL			
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
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO ₂ emissions for Land Converted to Flooded Land			
Category code		3B4a ⁱⁱ			
Sheet		3 of 5			
Equation		Equation 2.2	Annual CH ₄ emissions/removals that would have otherwise occurred from Unmanaged Waterbodies and Other Unmanaged land Equation 7.16		
Land-use category ¹		Subcategories for reporting year	Total annual emission (removal) of methane from waterbodies, including lakes, rivers, and streams, that would otherwise occur if the land remained unmanaged	Total annual emission (removal) of methane from other unmanaged land, including unmanaged wetland, mangroves, and tidal marshes that would otherwise occur if the land remained unmanaged	Total annual emission (removal) of methane that would otherwise occur if the land remained unmanaged
			kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹	kg CH ₄ yr ⁻¹
Initial land use ²	Land use during reporting year				$F_{CH_4 otherwise_fl_a} = F_{CH_4 otherwb} +$
			F _{CH₄otherwb}	F _{CH₄otherland}	F _{CH₄otherwise_fl_a}
	FL				
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.

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CHAPTER 7—WETLANDS

LAND CONVERTED TO FLOODED LAND
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use				
Category		Non CO ₂ emissions for Land Converted to Flooded Land				
Category code		3B4aii				
Sheet		4 of 5				
Equation		Equation 2.2	Annual CH ₄ emissions/removals that would have otherwise occurred from Unmanaged Waterbodies (Lakes, Rivers and Streams) Equation 7.17			
Land-use category ¹		Subcategories for reporting year	Area of unmanaged waterbody, element 'i' of class 'r' inundated as a result of reservoir/other waterbody construction for reservoir/other waterbody	Emission factor for methane emitted from waterbody class of type 'r' located in climate zone 'j'	Emission factor adjustment for trophic state (α _i) in waterbody 'i' of class 'r' located in climate zone 'j'.	Total annual emissions (removal) of CH ₄ from unmanaged waterbodies (lakes, rivers and streams) that would otherwise occur if the land remained unmanaged
Initial land use ²	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ y ⁻¹	Dimensionless	kg CH ₄ yr ⁻¹
				Table 7.13	1.0 for Tier 1	$F_{CH_4 otherwb} = \sum_{r=1}^2 \sum_{i=1}^{n_{wb_r}} \alpha_i \left(EF_{CH_4 wb_{j,r}} \cdot Awb_{r,i} \right)$
			A	EF	EF	F _{CH4otherwb}
	FL					
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
WITH FACTORING OUT

Sector		Agriculture, Forestry and Other Land Use			
Category		Non CO₂ emissions for Land Converted to Flooded Land			
Category code		3B4aii			
Sheet		5 of 5			
Equation		Equation 2.2	Annual CH₄ emissions/removals that would have otherwise occurred from Other unmanaged Lands (Wetlands, Mangroves and Marshes) Equation 7.18		
Land-use category ¹		Subcategories for reporting year	Area of previously existing wetland element 'i' of class 'r' inundated by the flooded area	Emission factor for CH ₄ emitted from wetland class of type 'r' located in climate zone 'j'	Total annual emissions (removal) of CH ₄ from all wetland classes that would otherwise occur if the land remained unmanaged
Initial land use ²	Land use during reporting year		ha	kg CH ₄ ha ⁻¹ y ⁻¹	kg CH ₄ yr ⁻¹
				Table 7.14	$F_{CH_4 otherland} = \sum_{r=3}^7 \sum_{i=1}^n (EF_{CH_4 - luc_{j,r}} \cdot Alc_{r,i})$
			A	EF	F_{CH4otherland}
	FL				
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.

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