New tools for Monitoring, Reporting and Verification in rice production

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CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

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forestry and land use

Webinar agenda

Time	Content	Presenter
0-10min	Welcome and Introduction	GRA PRRG Co-chairs
10-17min	Overview of new tools Introduction to GHG calculator tool – **SECTOR**	Bjoern Ole Sander, IRRI
17-25min	Carbon Footprint analysis along the rice value chain – **DISPLAY**	Katie Nelson, IRRI
25-32 min	Mapping suitability area for Alternate Wetting and Drying irrigation – **MapAWD**	Bui Tan Yen, IRRI
32-40min	Cost-benefit analysis tool – **COMPARE**	Lincoln Davis, UNIQUE
40-55min	Q/A and Discussion	All participants
55-60min	Summary and wrap-up	Bjoern Ole Sander, IRRI

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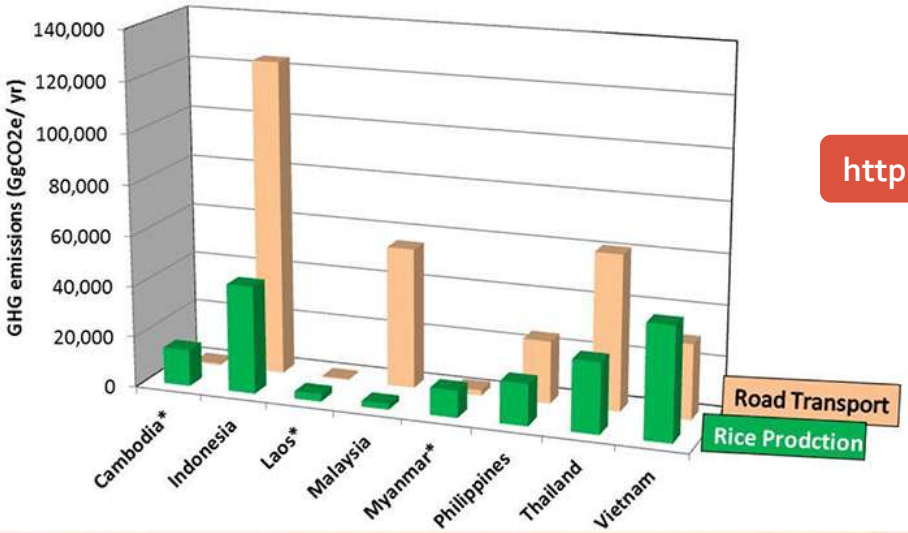
GHG emissions in rice production (SEA)

National GHG budgets (Southeast Asia)



https://www.agmrv.org/

http://GHGmitigation.irri.org/

Wassmann, 2019, Oxford Res. Encycl.

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Overview

Planning

Monitoring

Reporting

Verification

RiceMo
Rice Monitoring and Reporting

SECTOR
Source-selective and Emission-adjusted GHG CalculaTOr for Rice Production

DISPLAY
Digital Information System for rice Product Labeling of carbon-Footprints based on Yield Recovery

MapAWD
Mapping suitable area of the AWD practice

COMPARE
Cost Impact Analysis for Rice Emissions

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Source-selective and Emission-adjusted GHG Calculator for Rice Production

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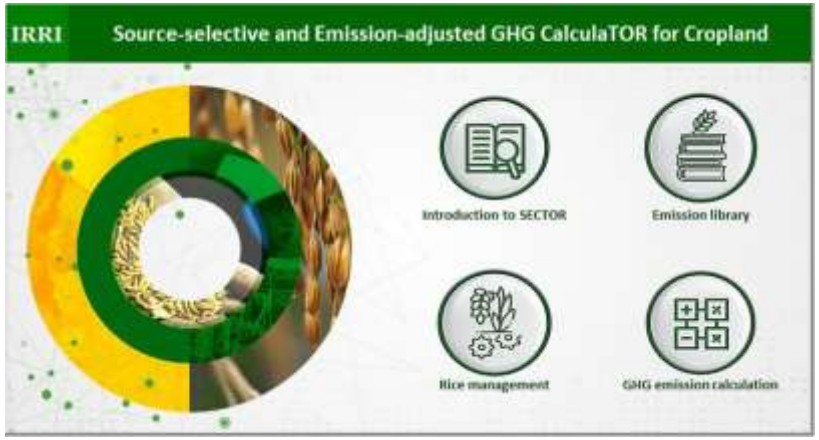
SECTOR

Source-selective and Emission-adjusted GHG Calculator for Rice Production

Free download at https://ghgmitigation.irri.org/knowledge-products/mrv-toolbox/sector



Wassmann et. al (2019): Introducing a new tool for greenhouse gas calculation tailored for cropland: rationale, operational framework and potential application. Carbon Management. 10. 1-14. 10.1080/17583004.2018.1553436.

- An Excel-based tool
- Based on the IPCC Tier II approach
- Highly flexible in data input and defining rice management practices
- Calculating both on-site and off-site GHG emissions
- Take into account pre-, within- and end-season managements
- Support multi-scenario calculation

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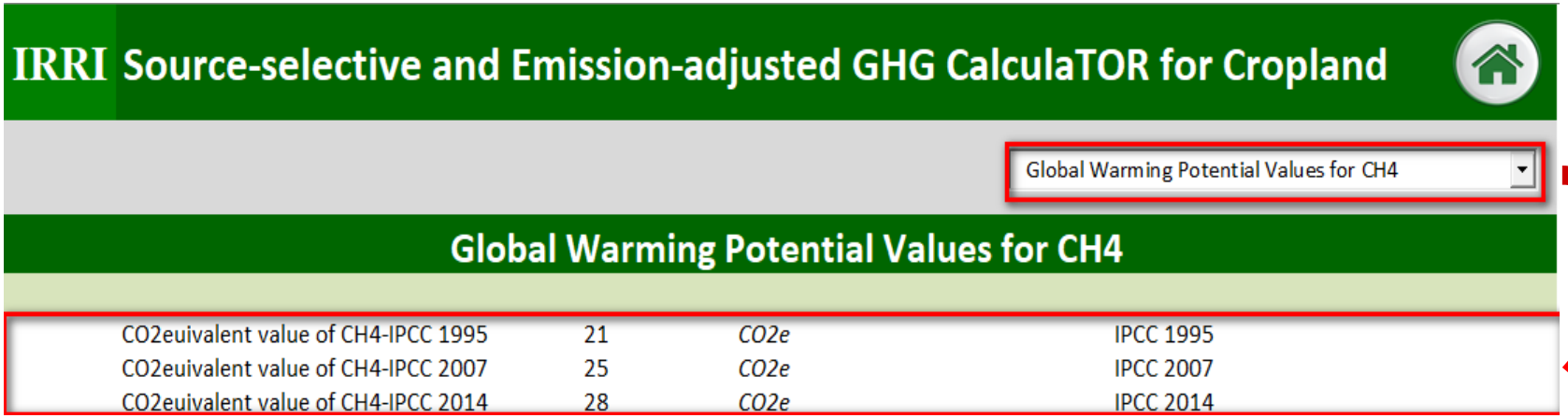
SECTOR
Emission Library

Select coefficients and parameters to calculate GHG emission from the built-in list

- IPCC guideline
- Field studies



SECTOR
Rice management

Input parameters and options

		Default values	User-defined values	Unit
General definitions				
CO2e of CH4	CO2euivalent value of CH4-IPCC 2014	28	28	CO2e
CO2e of N2O	CO2euivalent value of N2O-IPCC 2014	265	265	CO2e
Emission factor of CH4	Mean global default EF for rice	1.3	1.3	kg CH4 /ha/day
Emission factor of fuel	Not considered	0	0	t CO2e/ha/season
Singular N2O emission factor	No adjustment	0	0	kg N2O/ha/season
Pre-season management				
Pre-season water treatment	Non-flooded <= 180 days before season	1	1	N/A
Organic amendment	Residue incorporated shortly (<=30 days) bef	1	1	N/A
Residue incorporation (from previous season)	Leave 20cm of stubbles on the field (16%)	0.8	0.8	t residue/ha/season
Within season management				
Diect emission factor of N2O	Flooded soils: 0.47% of N as N2O	0.0047	0.0047	kg N2O/kg N fert
Indirect emission factor of N2O	Carbon footprint per kg product	0.001	0.001	kg N2O/kg N fert
Emission factor of fertilizer product	GWP from fert manufacturing	4.77	4.77	kg CO2/kg fert
Water management	Irrigated - continuously flooded	1	1	N/A
Nitrogen fertilizer use	Total amount of nitrogen fertilizer	100	100	kg N/ha/ season
End season management				
Residue management	Straw burning	0.259	0.259	t CO2e/t straw
Weight of burnt straw (Grain:straw=1:1)		3.20	3.2	t straw /ha/season

Defining management practices and their associated input parameters

- IPCC default values
- Field measurements

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GHG emission calculation

- Calculate potential on-site and off-site GHG emissions for
  - Rice seasons
  - Practices
- Support multi-scenarios and GIS linkage

IRRI — **Source-selective and Emission-adjusted GHG CalculaTOR for Cropland**

Generate output table | Export output table | GHG unit: kt CO2e | Total emission | On-site emission | Off-site emission

Name	Description	Planted area, ha			Practice			Yearly GHG	GHG intensity	Total emission, kt CO2e: Seasonally GHG emission		
		Season 1	Season 2	Season 3	Season 1	Season 2	Season 3	kt CO2e/year	kt CO2e/kg paddy	Season 1	Season 2	Season 3
Example	Province 1	2,500	1,000	-	Default	Default	NotPlanted	24.76	2.48	17.69	7.08	-
Region a	Province 1	1,000	1,000	500	Default_AWD	ault_1M5R	Default_CP	12.60	0.84	4.53	4.51	3.56
Region b	Province 1	500	300	300	Default_A	ault_CP	Default_CP	6.54	0.44	2.26	2.14	2.14
Region c	Province 1	1,000	2,000	500	Default_C	ault_SRP	Default_CP	18.04	1.20	7.12	7.36	3.56
Region d	Province 2	1,000	1,000	-	Default_SR	ault_SRP	NotPlanted	7.36	0.74	3.68	3.68	-
Region e	Province 2	2,000	1,500	-	Default_1M5R	ault_1M5R	NotPlanted	15.78	1.58	9.02	6.76	-

Select a scenario from the list

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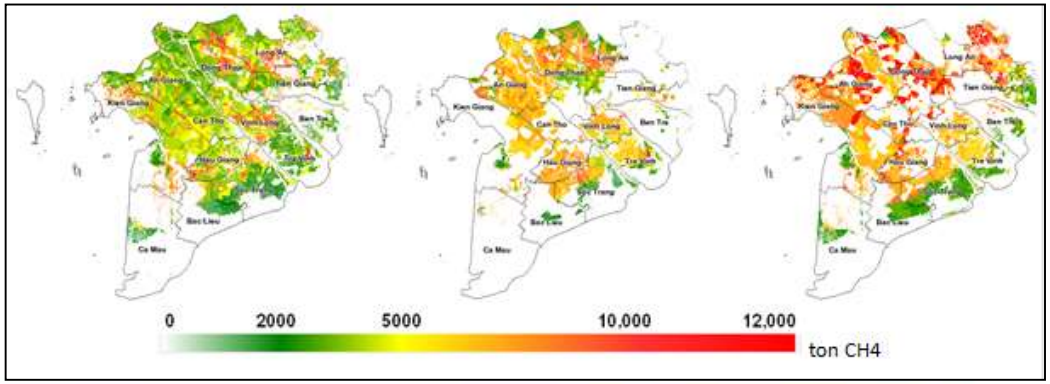
Outputs

- Outputs in tabular format

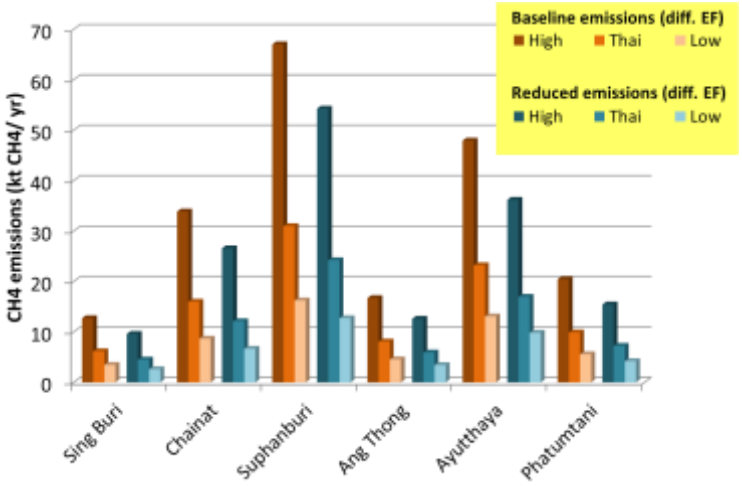
Total emission, kt CO2e			On-site emission, ton GHG									Off-site emission, ton GHG		
Seasonally GHG emission			Methane (tCH4/season)			Nitrous oxide (tN2O/season)			Carbon dioxide (tCO2/season)			CO2 from Fertilizer production		
Season 1	Season 2	Season 3	Season 1	Season 2	Season 3	Season 1	Season 2	Season 3	Season 1	Season 2	Season 3	Season 1	Season 2	Season 3
2,866	2,797	2,767	84,301	90,234	92,311	112	108	80	355,807	126,358	75,812	113,765	109,771	81,176
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
169	254	1,069	4,982	8,202	35,669	7	10	31	21,028	11,486	29,294	6,724	9,978	31,366
890	1,121	917	24,432	34,769	29,788	46	59	36	145,240	68,575	34,456	46,439	59,572	36,894
961	608	255	24,699	18,184	8,078	60	40	13	189,538	46,298	12,062	60,603	40,220	12,915

- Support GIS linkage



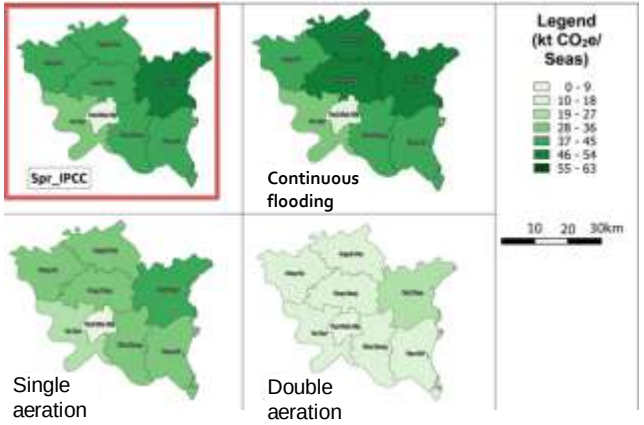
SECTOR in use

National GHG mitigation Planning



CH_4 emissions calculation in Thai Rice NAMA project

GHG calculation for scenario development



GHG emissions in Thai Binh Province from rice in the spring season for continuous flooding, single aeration, and double aeration

https://ghgmitigation.irri.org/knowledge-products/mrv-toolbox/

Thank you for your attention!

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