

Innovative Solutions for Controlling Methane Emissions and How to Scale them up: Rice Production

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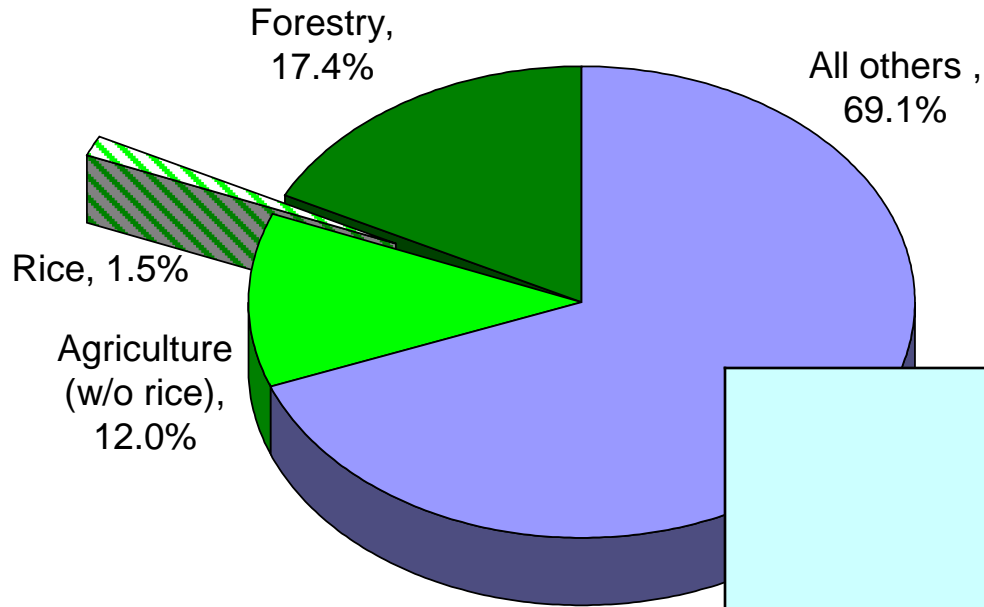


Outline

1. Background: Rice as a source of GHGs
2. Technical options for mitigation in rice
3. Approaches for upscaling
4. Policy support and institutional setting
5. Conclusion



Significance of Rice Fields for GHG budgets

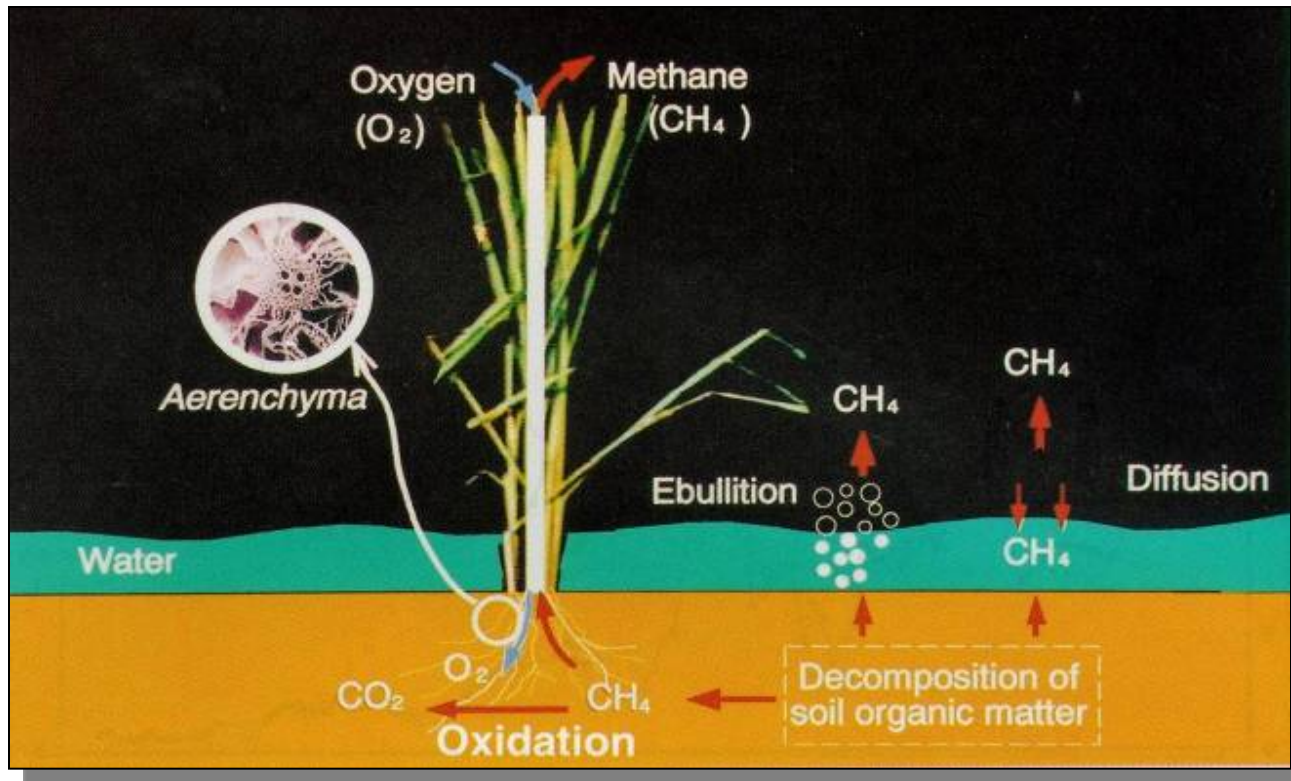


(IPCC 4th AR, 2007)

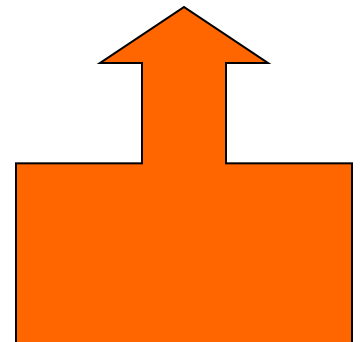
Country	National Scale in Asia: Emissions from rice production	
	(Gg CO ₂ eq)	Perc. of total
Vietnam	37,429	24.8 %
Bangladesh	7,996	7.2 %

Data from the 2nd National
Communication of respective country

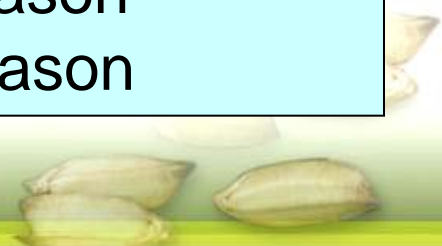
Greenhouse Gas Emissions from Rice



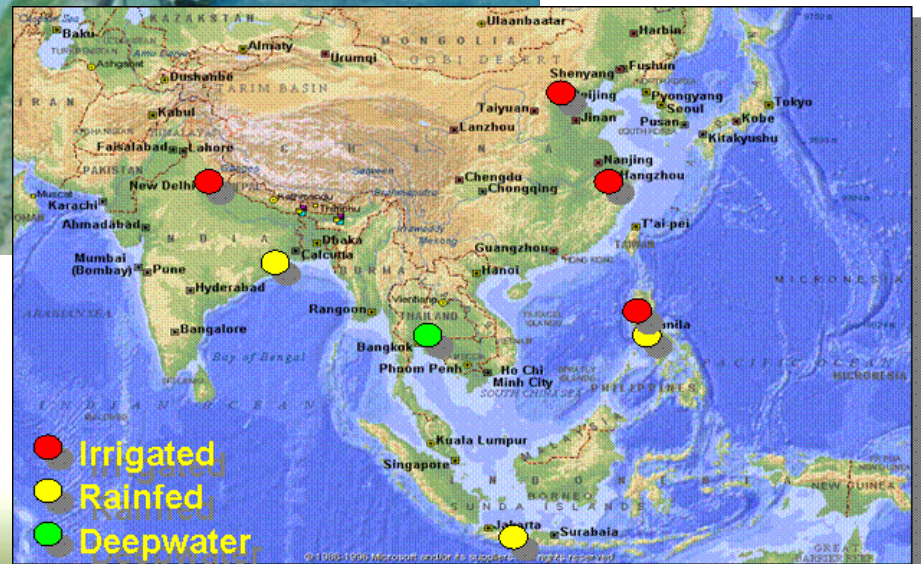
**Nitrous Oxide
Emissions from
Fertilizer
Application**



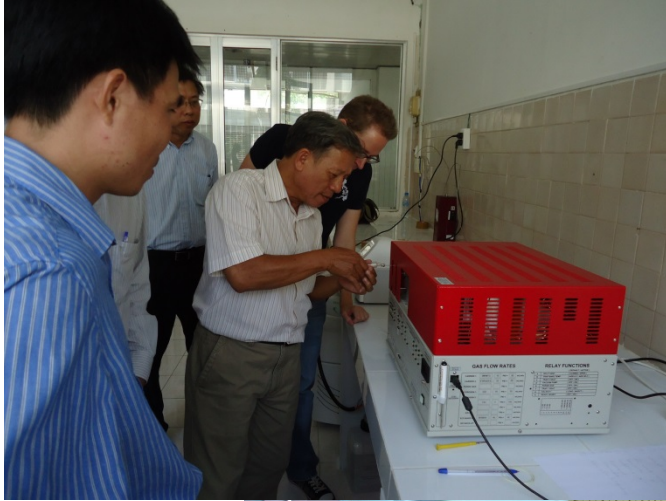
Methane emissions: 100 – 500 kg CH₄/ ha season
=> 2 – 12 tCO₂eq/ ha season



IRRI Climate Change projects since 1991



Capacity building



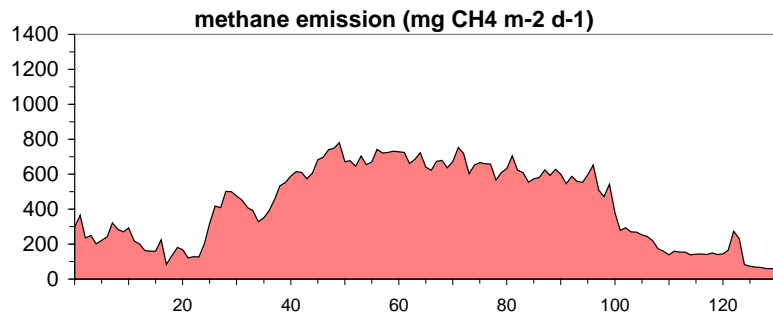
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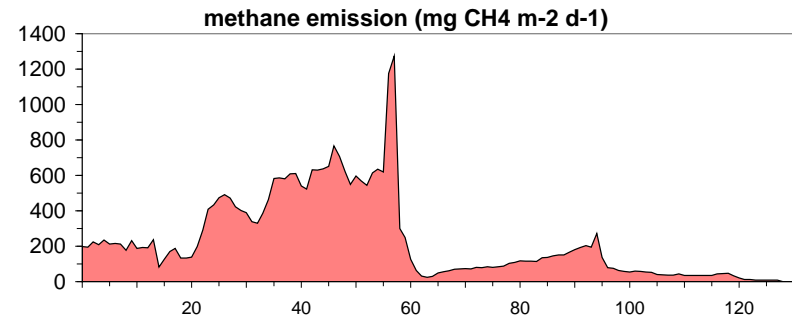
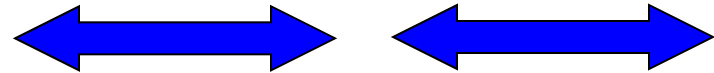


Impact of Mid-season Drainage on Methane Emissions

Continuous Flooding



Mid-season Drainage



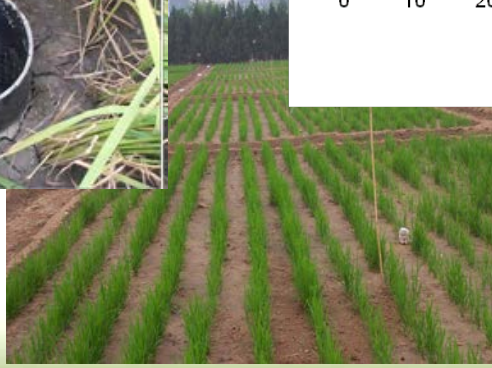
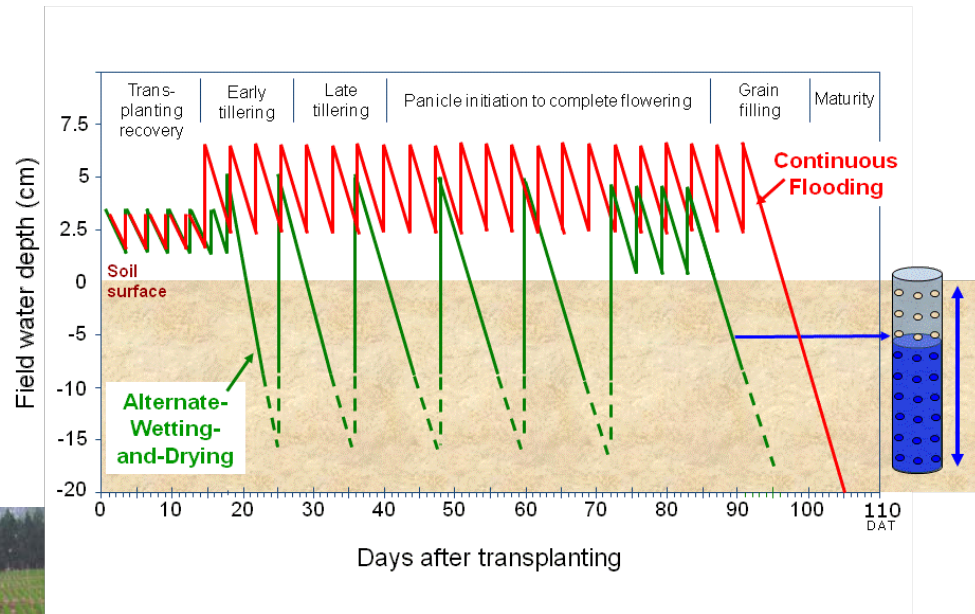
Days after planting

Field experiment at Hangzhou, China (Wassmann et al., 2000)

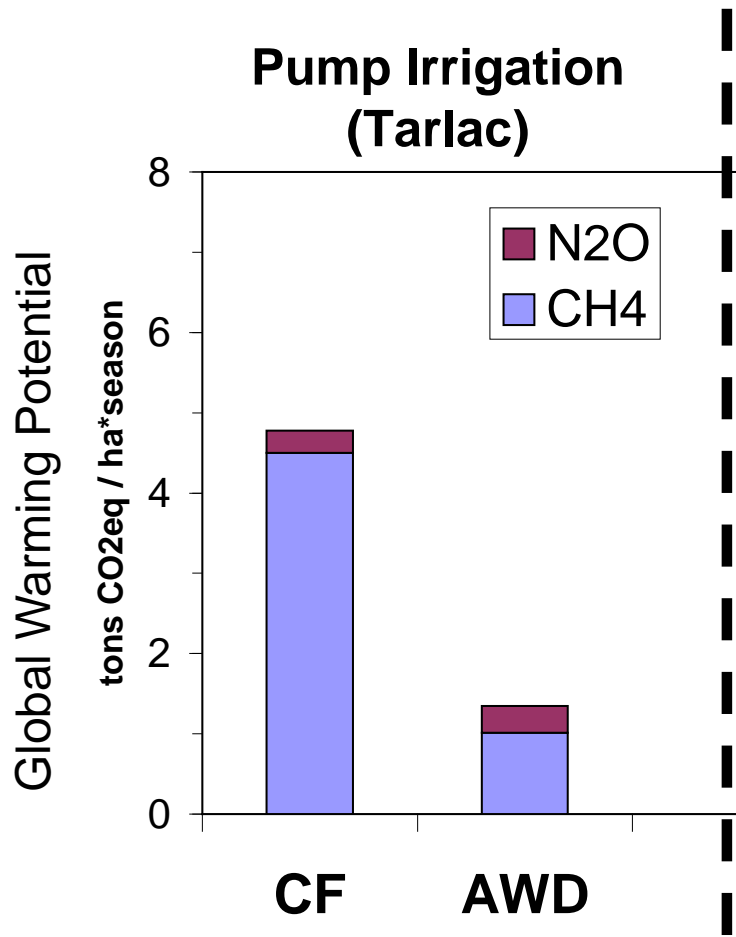


Alternate-Wetting-and-Drying (AWD)

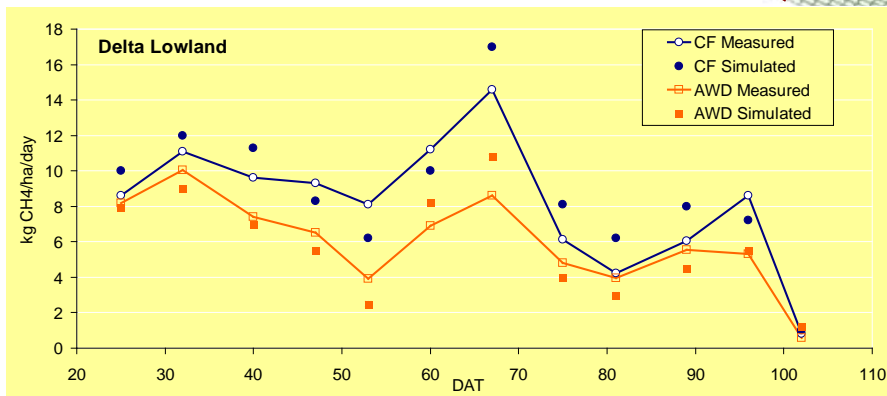
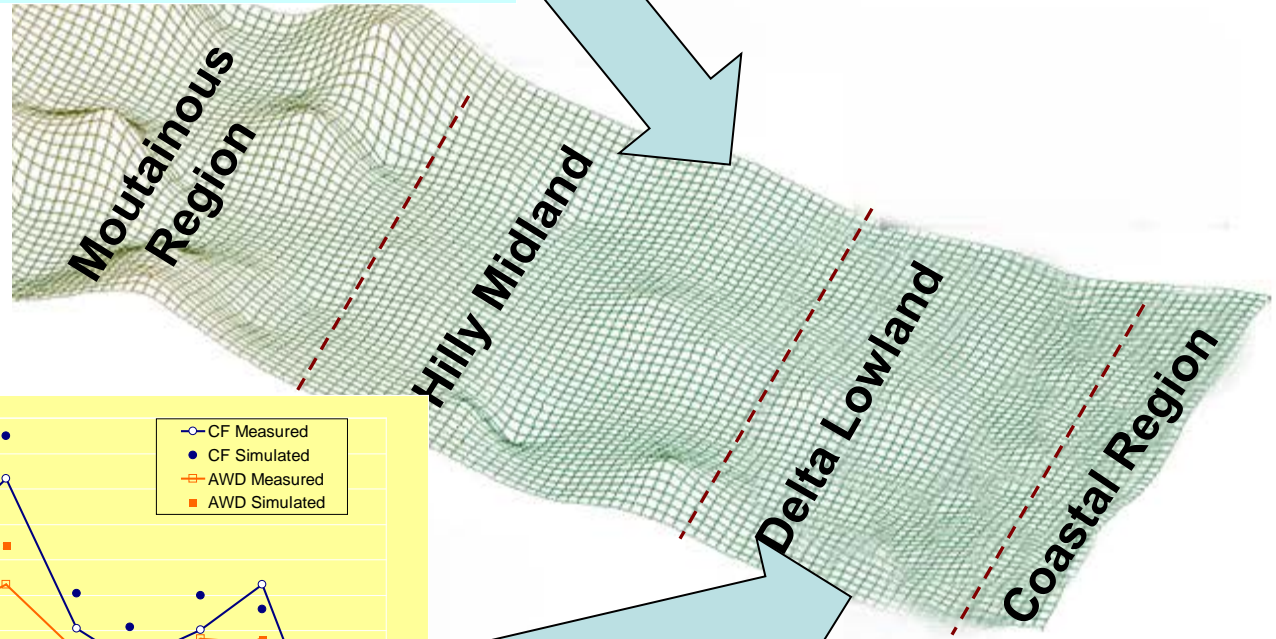
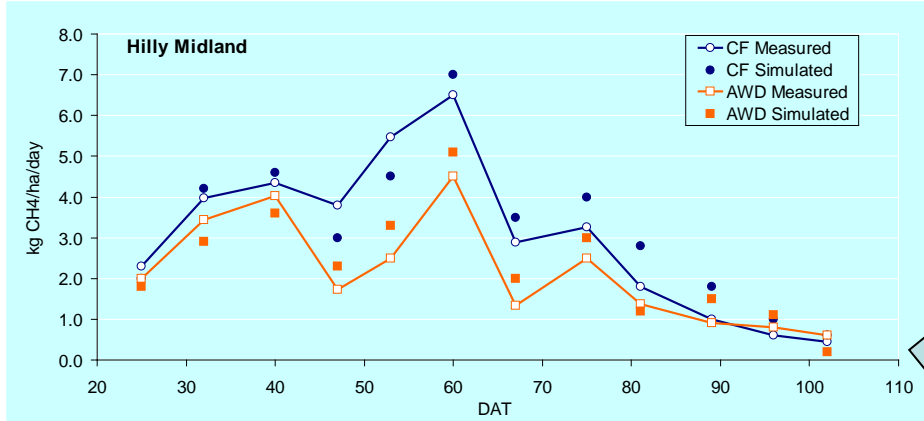
- Irrigation technique for water saving: periods of flooded and non-flooded conditions



AWD vs. Continuous Flooding (CF): Examples from the Philippines



AWD Experiment in Central Vietnam



Minh et al. (in prep.)

Mitigation through Optimized Fertilizer Applications

Rice fields are typically small and can substantially differ from each other



Farmers need to know

- Correct timing...
 - Correct amounts...
 - Correct sources...
- ... of fertilizer applications



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Introducing AWD

Guide to participatory varietal selection for submergence-tolerant rice



T. Fariña, D. Manzanilla,
C. Tandingan, R. Labra,
A. Guano, and D. Villanueva



IRRI Project in Flagship 2: Agro-advisory through Mobile Phone Apps



Obtain site-specific information
from farmer/ operator

Rice Crop Manager (RCM)

Established Modules:

- Nutrients
- Crop Health Diagnosis
- Irrigation (AWD)
-

New Modules:

- Weather forecasting and cropping calendar
- GHG calculation and mitigation options

Provide
management
recommen-
dation

'CIRCLE' Toolkit for Decision Support
(Climate-Informed Rice Production with Low Emission)



Incentives from Carbon Crediting?

Small Scale Methodology Approved by UNFCCC (May 2011):

The screenshot shows a Mozilla Firefox browser window displaying the UNFCCC website. The page title is "CDM: Methane emission reduction by adjusted water management practice in rice --- Version 2.0". The URL is <http://cdm.unfccc.int/methodologies/DB/0FB1W5ATAUPXN7HKKG3E060T8CN7C4>. The page content includes a search bar, navigation links, and a table of methodology details.

Title	Methane emission reduction by adjusted water management practice in rice (251 KB)
Version number	2.0
Scale	Small scale
Type	III
Status	Active
Validity	Valid from 16 Mar 12 onwards
Sectoral scope(s)	15

Previous Versions

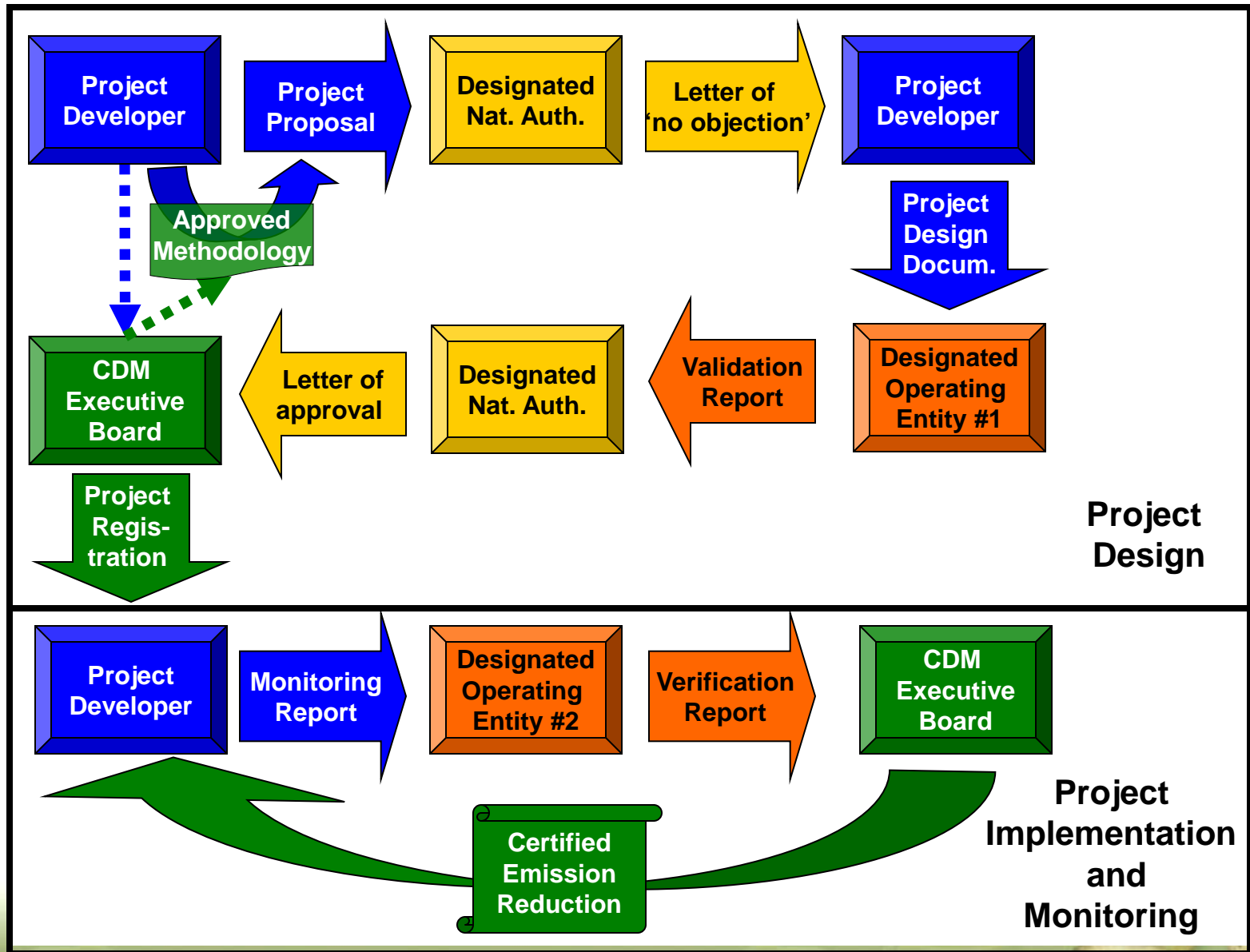
Title	Methane emission reduction by adjusted water management practice in rice (245 KB)
Version number	1.0
Validity	Valid from 15 Apr 11 to 15 Mar 12

Requests for registration can be submitted until 16 Nov 2012 23:59:59 GMT

A callout box points to the title of the methodology, containing the text: "Methane emission reduction by adjusted water management practice in rice".

<http://cdm.unfccc.int/methodologies/DB/D6MRRHNU5RUHJXWKHN87IUXW5F5N0/view.html>

CDM Pipeline



Methodology AMS-III.AU.

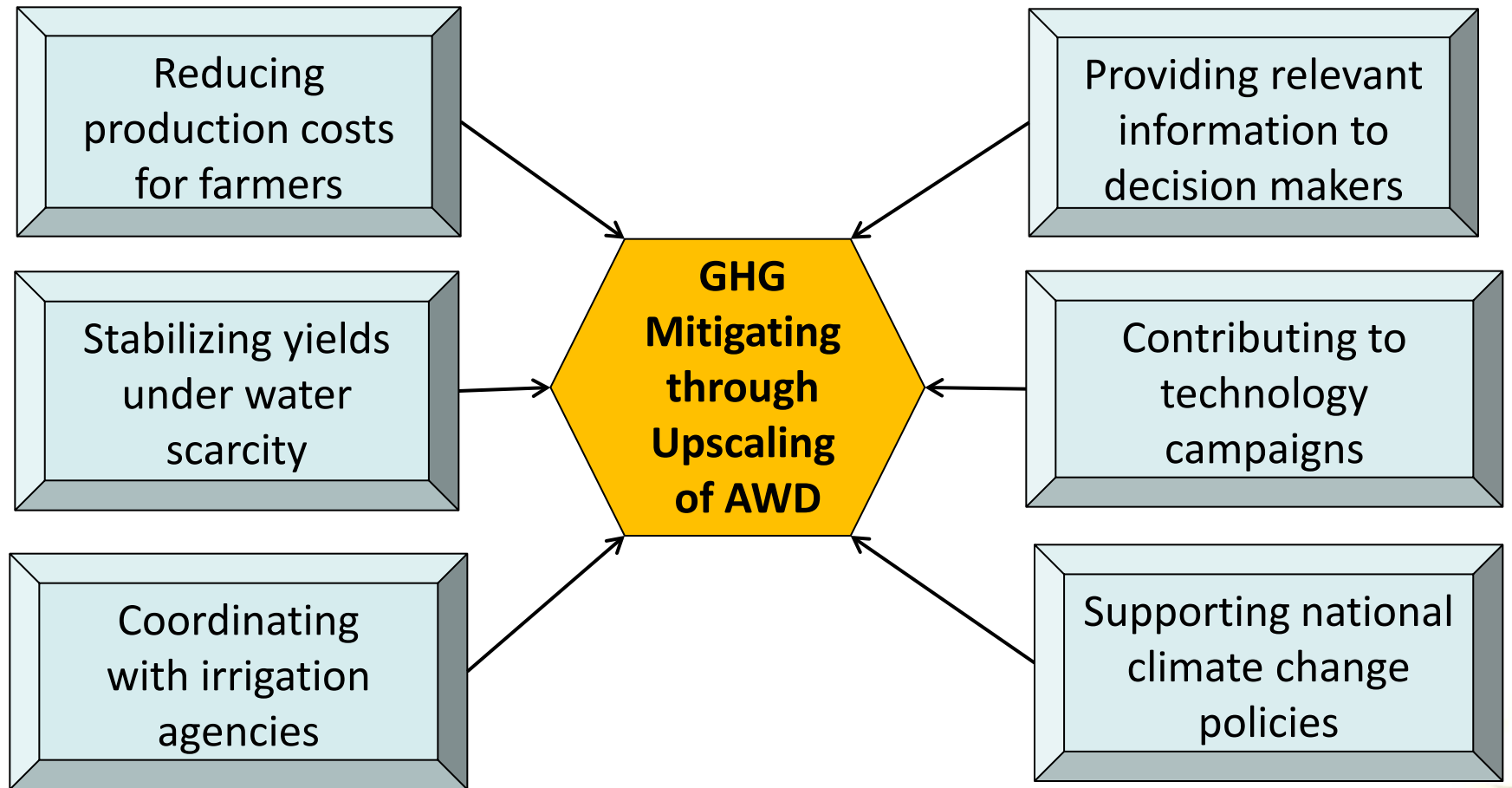
Version 3.0 (since 03 Aug. 2012)

Example:

- AWD in dry season
 - Multiple aeration (1.8 kg ha/d)
 - 100 d period
-
- 180 kg CH₄/ ha season
= 3.78 t CO₂ eq/ ha season
 - @ 0.50 \$/ t CO₂ eq.
= < 2 \$/ ha season



IRRI Project funded by Climate and Clean Air Coalition (CCAC)



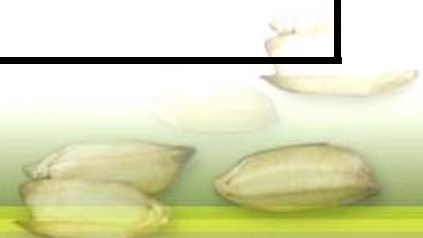
Opportunities for Change of Practice



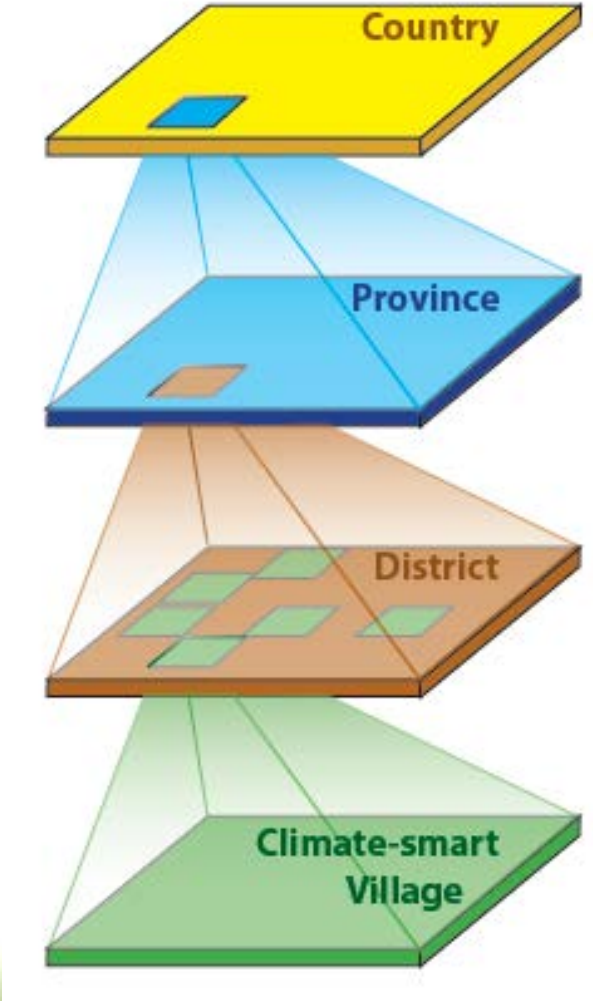
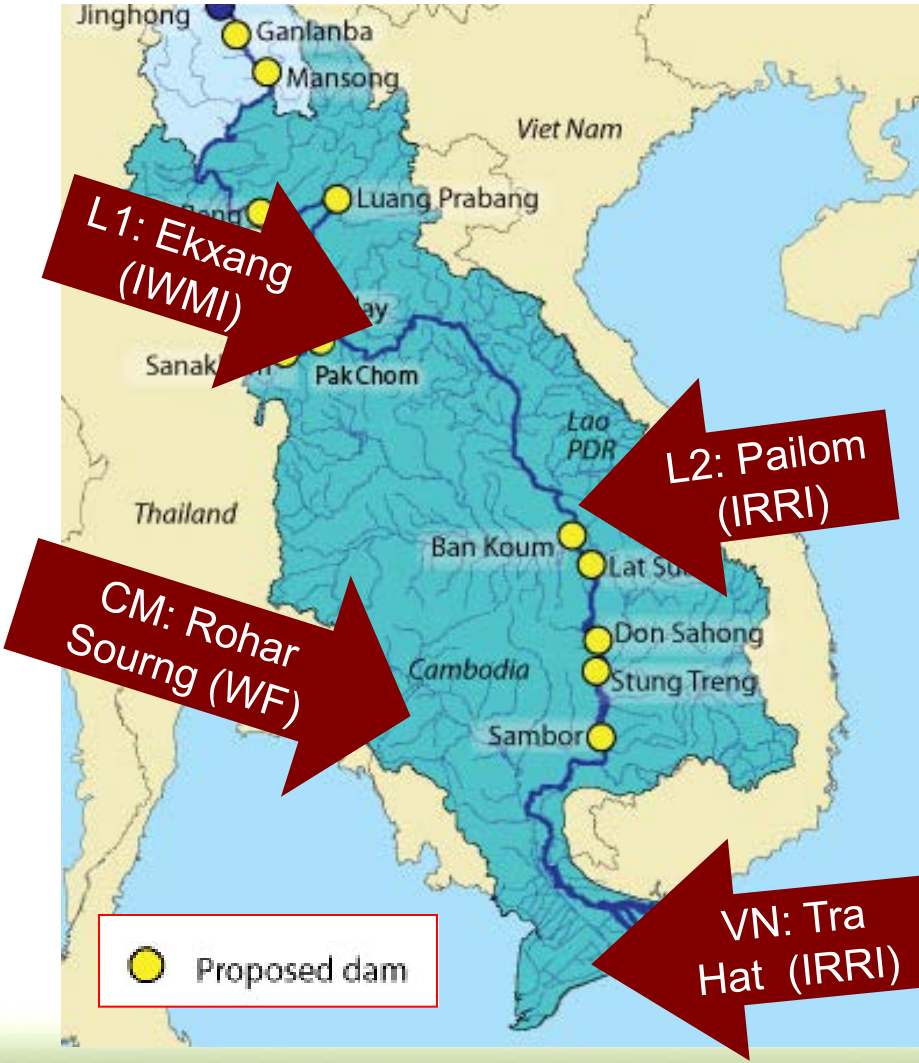
Mitigation as one Component of Climate-smart Agriculture

Examples for CSA in rice production (Mekong Delta):

Carbon-smart	Water-smart	Yield-smart	Risk-smart
Site-specific nutrient management	Rotation with upland crop	Tolerant rice varieties (floods, salinity)	Salinity monitoring and land use planning
Alternate Wetting and Drying			
Mobile phone applications			



Scaling-up of CSA through Climate-smart Villages (Lower Mekong Basin)

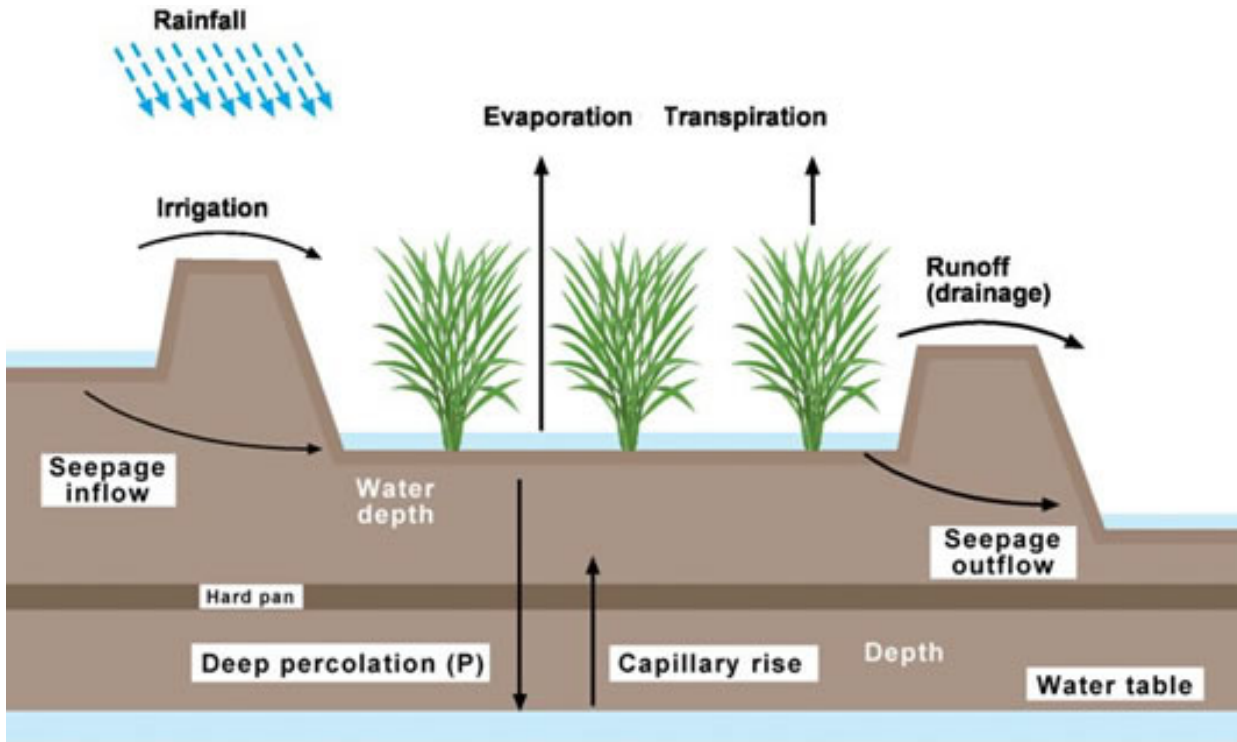


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Climatic AWD Suitability: Water Balance



Rainfall

Pot_ET

Pot_S&P

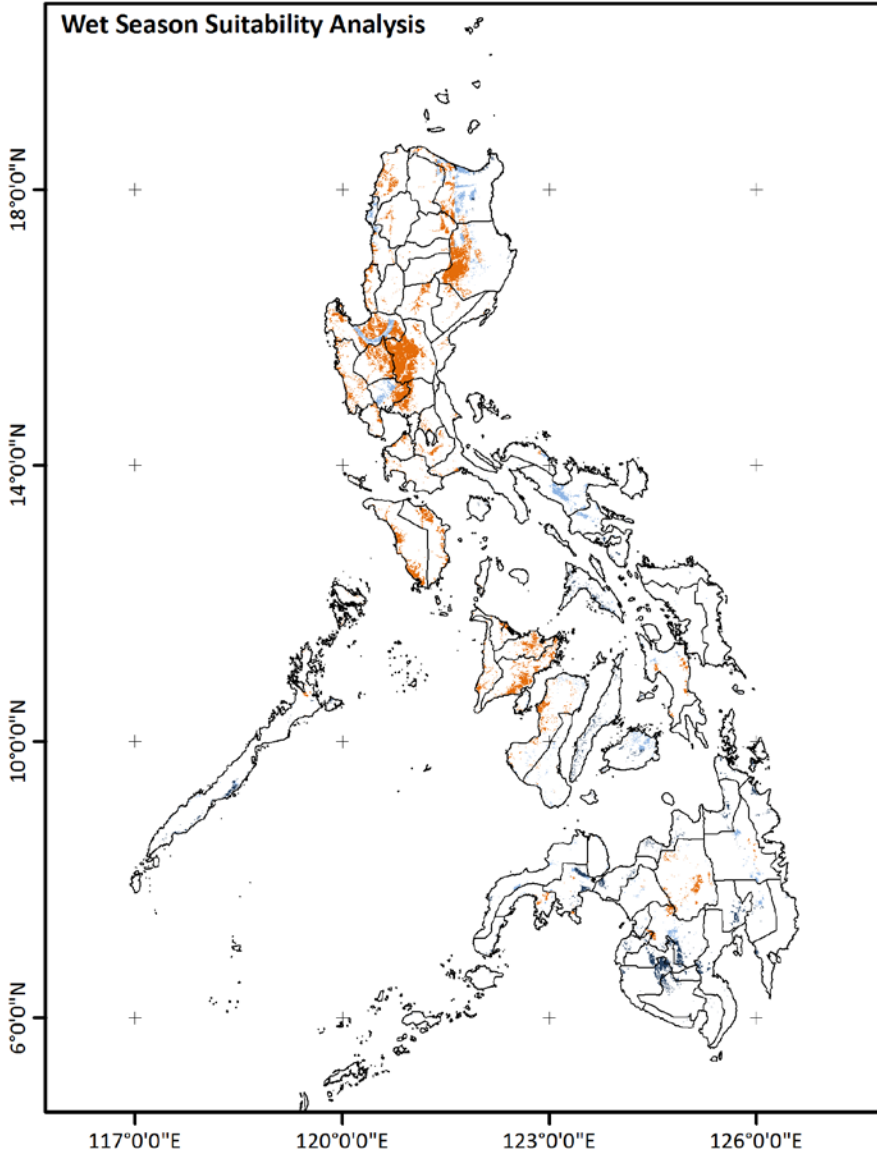


EXC

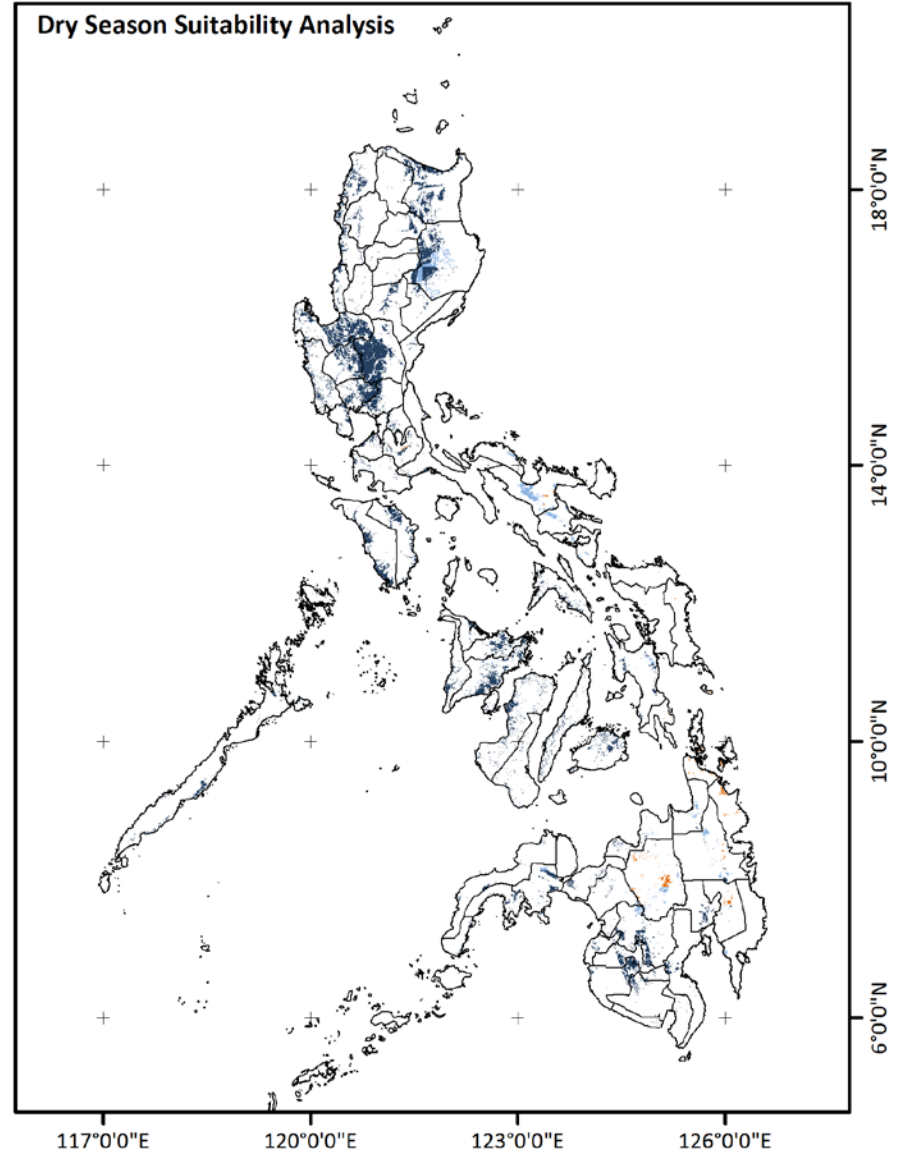
DEF



Wet Season Suitability Analysis

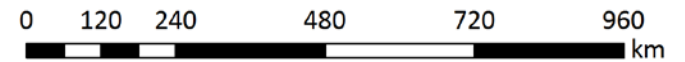


Dry Season Suitability Analysis

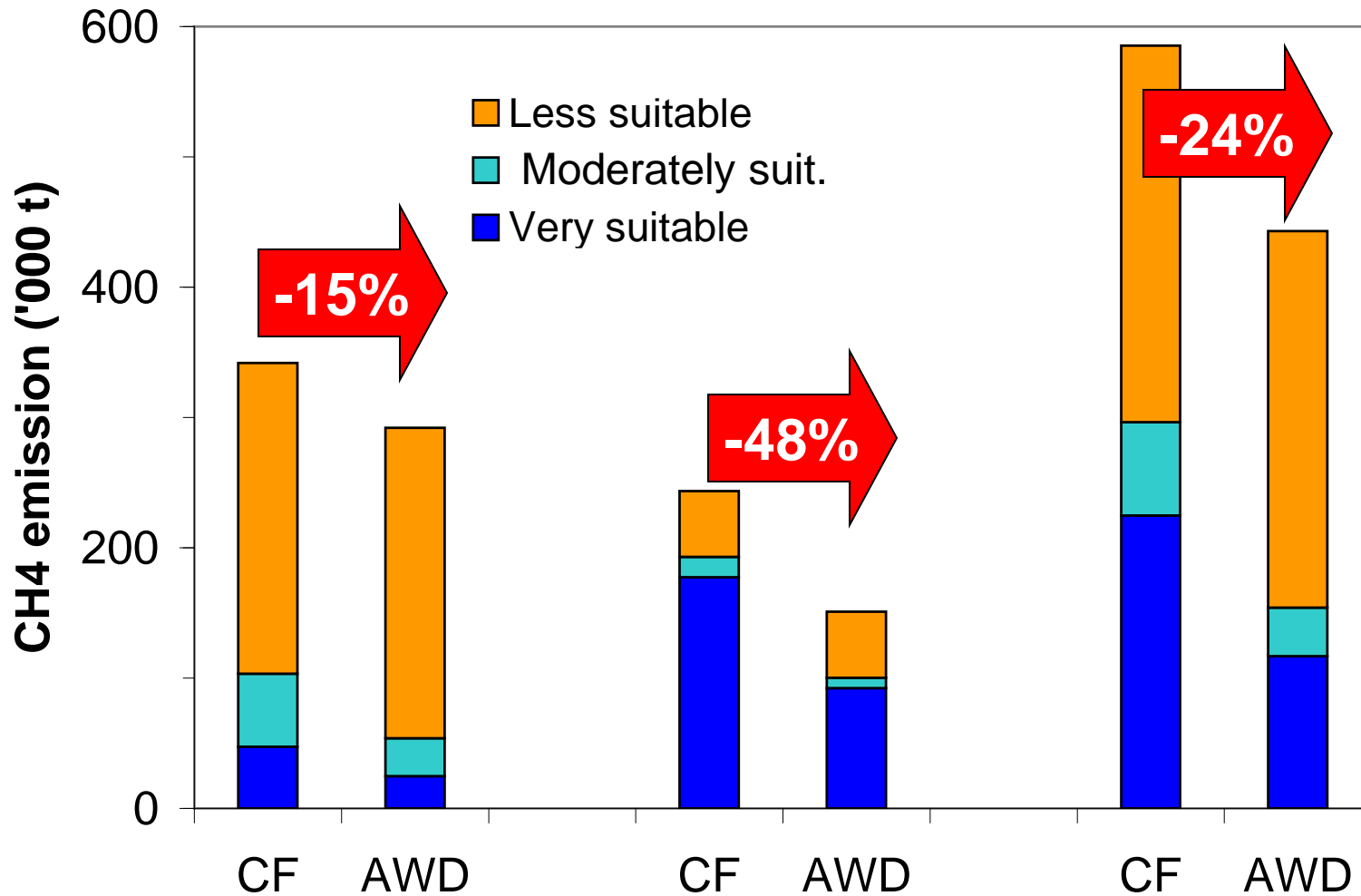


Legend

- High Suitability
- Moderate Suitability
- Low Suitability



Climate-driven AWD suitability in the Philippines



Good Agricultural Practice (GAP) Guidelines

Examples:



Vietnam

Mot Phai/
Nam Giam

(1 Must Do/
5 Reductions)

Philippines

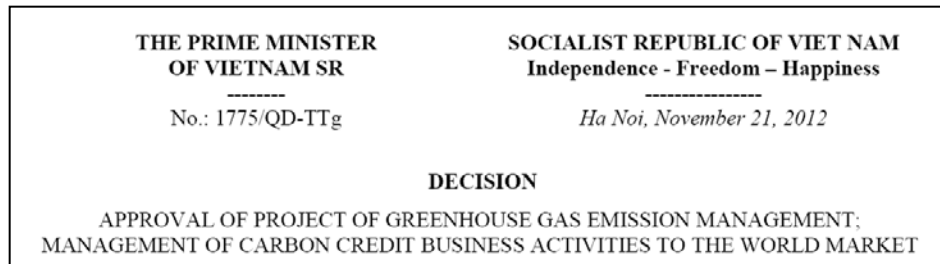
Palay
Check



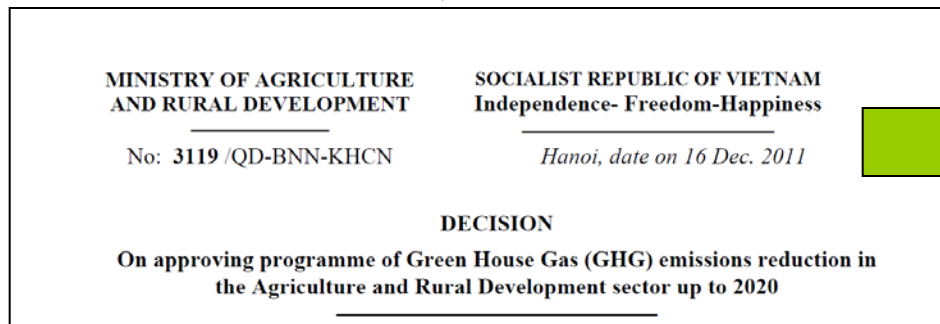
New Policy on Mitigation in Agricultural Sector in VN

From national level...

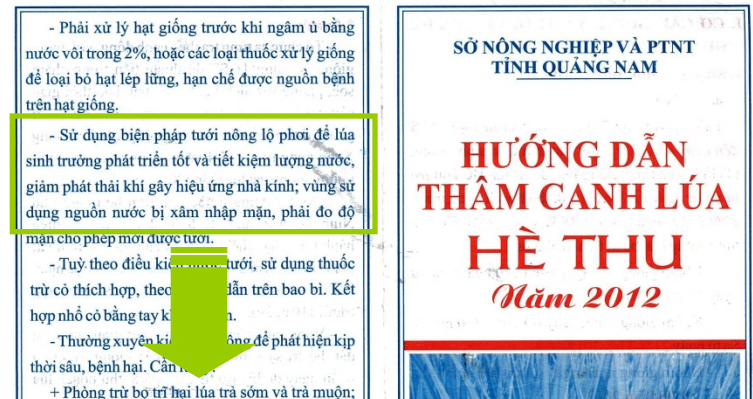
to implementation at provincial level.



**20-20-20
Decision**



AWD is directly mentioned as one
mitigation option by Ministry of
Agriculture



**Farmers should use/apply
AWD irrigation technology to
not only greatly save water
consumption and reduce
GHGs emissions in irrigated
rice fields, but also increase
rice productivity.**

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Conclusions

Policy makers are getting increasingly interested to integrate mitigation into development targets

... BUT ...

different stakeholders will need diversified information packages and decision support tools



Conclusions

Scientific findings and publications will NOT be sufficient as such to stimulate mitigation

... BUT ...

should be translated into clear spatial and temporal priorities at different scales



Thank you

Rice
Science
for a Better
World

