New Technologies for Crop Irrigation with Special Reference to Mitigating Emissions from Rice Cultivation

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Links to Climate Change





Emissions from Rice Fields

Methane



Significance of Rice Fields for GHG budgets



Data from the most recent National Communication submitted to UNFCCC

Measurement Approaches



GHG Measurements: Automated and Manual





On-line gas sampling using the photo-acoustic gas monitor (PAS)



Eddy covariance technique

- Standard micrometeorological method
- direct monitoring of fluxes of CO₂, water vapor, and heat
- \succ new sensor: CH₄





Alternate-Wetting- and-Drying (AWD)



Synonyms:

- Intermittent Flooding/ Drainage
- Single or Multiple Flooding/ Drainage

Benefits of AWD

Irrigation water savings of up to 33% No yield difference



Farmers' practice vs AWD using RC80 at TGIS, Dapdap, DS2008

Adopted from: Wiangsamut (2010)

Global Warming Potential under Continuous Flooding (CF) and AWD



Introducing AWD



Clean Development Mechanism: Approved Baseline Methodology

CDM: Methane emission red	uction by adjusted water management practice in rice Version 2.0 - Mozilla Firefox				
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Obstacles of CDM in rice production

Involvement of many stakeholders/ transaction costs

Unclear guidelines on Measurement/ Reporting/ Verification (MRV)

Emission savings based per area unit – and not per unit of food produced

Certification/Labeling Forest Conservation Organic Farming Forest Stewardship Japar European Union Council USD/ AUSTRALIAN CERTIFIED ORGANIC Australia Programme United States for the Endorsement of FSC **Forest Certification** BIOLOGIQUE Canada France

Labeling Carbon Footprint for Food???



NAMA

Nationally Appropriate Mitigation Actions

- NAMAs are voluntary country engagement proposals
- They are expected to become the main vehicle for mitigation action in developing countries in the future
- Funding should come from the newly established "Green Fund" (target: 100 bn USD by 2020)

National Policy: 1775/PM Decision

THE PRIME MINISTER OF VIETNAM SR SOCIALIST REPUBLIC OF VIET NAM Independence - Freedom – Happiness

No.: 1775/QD-TTg

Ha Noi, November 21, 2012

DECISION

APPROVAL OF PROJECT OF GREENHOUSE GAS EMISSION MANAGEMENT; MANAGEMENT OF CARBON CREDIT BUSINESS ACTIVITIES TO THE WORLD MARKET

- Agricultural area

Target of reducing greenhouse gas emission compared to 2005: 20%

Activities and measures to reduce emissions:

+ Applying advanced measures of rice cultivation in the direction of saving water and reducing input costs;

+ Applying technical measures to improve the efficiency of fertilizer use, reduce N2O emissions in rice cultivation;

+ Applying solutions to save energy and fuel in soil preparation, watering industrial plants, developing and applying minimum cultivation measures to reduce greenhouse gas emission;

+ Collecting, recycling, re-using agricultural by-products. Developing and applying organic waste treatment technology in the cultivation of vegetables, sugar cane, short and long-term industrial crops;

+ Changing the diet in livestock and poultry raising. Providing nutrition MUB cake for dairy cows;

+ Applying process of good agricultural practices in Vietnam (VIETGAP) in animal husbandry;

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.

Feasibility of technology and operational necessities top:

•The practice requires that the irrigation systems must accommodate precise control of the timing of the irrigations and the depths of water in the paddies. Therefore, farmers need to be trained in its use.

•The benefits towards GHG mitigation do not accrue any financial return to the farmers.

ADW have been officially integrated into **DARD's** guideline for rice cultivation in Quang Nam



http://climatetechwiki.org/technology/rice-alternate-wetting-and-drying

'Site-Specific Nutrient Management' (SSNM)



- Applying nutrients as and when needed
- Adjusting nutrient application to crop needs in given location and season

Mobile Phone Application for Rice Crop Management



The Rice Blaster



Typhoon Effects in Philippines vs. Myanmar

Xangsane (Sep. 06)		> 150 km/h wind speed:	1022 km
<u>~.</u>	Track over	land	
23		> 180 km/h wind speed:	365 km
July 2		Standing rice crop:	33,000 ha
	Area affecte	ed	
		Salinity intrusion:	?
Nargis (May 08)		> 150 km/b wind speed:	348 km
	Track over	land	
+12		> 180 km/h wind speed:	55 km
	Area affect	Standing rice crop:	16,000 ha
		Salinity intrusion:	1,750,000 ha*

* http://www.pecad.fas.usda.gov/highlights/2008/05/Burma_Cyclone_Nargis_Rice_Impact

New Sub1 lines after 17 days submergence



What is more important? Climate Scenario or Adaptation Scenario?

Mega-Deltas of Asia



Impact of Cyclone Nargis in Myanmar (May 2008)



Satellite photography of the Irrawaddy Delta

Before Nargis

-Pegu -Bassein Moulmein-

May 5, 2008

After Nargis



Climate risks – 20 million hectares of rice are vulnerable to flooding





Conclusion 1

- 1. Irrigation is an important factor in determining both, the GHG emission potential as well as the resilience of rice production to Climate Change
- 2.In turn, improved irrigation is a very promising option for mitigation and adaptation in rice fields

Conclusion 2

- 3.However, the beneficial effects of irrigation are often impaired by extreme events, e.g. weather hazards, so that stress-tolerant rice varieties are needed as accompanying adaptation strategy
- 4.Recent climatic extremes can be taken as entry points for identifying geographic 'hot spots' for needed interventions in given rice systems

Thank you

