1. Activity Reporting.

Activity 571-2014

Adaptation strategies for crops to climate change- Development of climate smart ideotypes for breeding strategies in rice and sorghum

Status	Cancelled	Milestone	1.2.1 2015 (2)
Start date	2011 Nov	End date	2014 Sep

Description: This project serves to develop adaptation strategies for crops to climate change, based on crop improvement through breeding. A crop modeling approach using present and future climate scenarios is to be implemented. Once appropriate crop models have been improved and calibrated/validated, they will be used to (1) measure the impact of climate change scenarios on existing crop varieties, and (2) determine trait combinations (ideotype concepts) that would improve adaptation and performance. A more simple and general, multi-crop, spatialized approach will be implemented by the University of Leeds, whereas detailed zoom-ins will be performed for rice and sorghum by CIRAD and its partners.

Status: Cancelled.

Gender Component: Not defined

Objectives:

1. To develop adaptation strategies for crops to climate change on the basis of a model-assisted analysis of climate change impacts on the performance of current and hypothetical varieties (ideotypes).

Deliverables:

Description	Type	Year	Status	Justification
Scientific leadership on the ideotype concept for breeding for a 2030 world	Other	2014	On going	
• Further development of SAMARA and other suitable models	Platforms - Data Portals for disseminati on	2014	On going	
• Phd student to work on Rice with IRRI and CIRAD	Peer-reviewed journal articles	2014	On going	

Partners:

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2- International Rice Research Institute (IRRI):
Michael Dinkuhn <michael.dingkuhn@cirad.fr>

3- Manila Observatory:

Location(s):

Countries: Brazil, Colombia, India, Mali, Philippines, Senegal,

Activity 574-2014

Promoting mitigation projects in rice-based production systems in South and Southeast Asia (implementation phase)

Status	On going	Milestone	3.3.1 2015 (1)
Start date	2014 Jan	End date	2014 Dec

Description: The adoption of AWD as a viable means for GHG mitigation and water saving in rice production has started to gather steam following extensive dissemination activities which include workshops, training courses, and field demonstrations. Field testing (in farmers' field) of the MRV guidelines that comply with CDM standards associated with implementation of mitigation strategies in SE Asia will continue adding in more rice-growing regions of Vietnam and Philippines. All these as well as the pilot projects (yet to be implemented) on the use of innovative approaches and instrumentation for recording emissions rates will help ease MRV (Measurement, Reporting, and Verification) requirements. The mapping of climatic suitability for AWD will accelerate the selection of these AWD-suitable communities. Nonetheless, extension efforts in collaboration with national partners will continue to address the factors hindering farmers' adoption. A participatory approach will be employed beginning 2014 to promote AWD, giving the farmers some degree of flexibility in terms of the timing and pacing of the suggested water saving technique. This approach will take their socioeconomic characteristics and the agro-climatic conditions of the irrigated service area into consideration. Women integration into natural resource management and later on mitigation activities will remain in the agenda.

Status: On going. The focus of IRRI-CCAFS activities in 2014 was the fine-tuning and testing of the various methods and protocols used for measuring emission rates. Some studies have yielded remarkable findings. However, the smoke collection set-up for analyzing GHG emissions from straw burning was completely destroyed in mid-2014 due to a typhoon that hit IRRI, Philippines. The set-up is currently under reconstruction. The measurement guidelines (as part of MRV guidelines) have been published within SAMPLES project whereas the Reporting and Verification components have yet to be developed. Vietnamese climate change scientists have met several times in 2014 to work on this.

Meantime, the RCM_CIRCLE proves to be a valuable ICT platform for the dissemination of climate smart agriculture practice to rice farmers and extension staff in South Vietnam.

IRRI and its partner institutes in the Greenhouse Gas Mitigation in Irrigated Rice Paddies in Southeast Asia (MIRSA-2 Project) and the Paddy Rice Research Group (PRRG) of the Global Research Alliance on Agricultural Greenhouse Gases (GRA) held their annual meetings at IRRI headquarters on August 18-19 and 21, respectively, to discuss their climate change agendas for reducing the emissions of greenhouse gases that cause climate change.

Gender Component: The previous year saw that women generally are not visible and involved in physical farm production in the Philippines. Hence, engaging them into mitigation projects (such as AWD) – much more participate in the trials – was quite challenging. It is observed however that AWD is more likely to be accepted in households where both husbands and wives are working in the farm – or to a lesser degree where wives have some practical knowledge on farming. Training courses and workshops (on AWD and other natural resource management) thus will be organized especially for women to empower them to make sound decisions on intra-household resource allocation and farm management, particularly on activities linked to mitigation such as nutrient and crop residue management. These will be done in collaboration with local stakeholders.

Objectives:

1. Field testing (in farmers' field) of the MRV guidelines that comply with CDM standards and participatory approaches (with emphasis on gender issues) associated with implementation of mitigation strategies in SE Asia.
2. Conducting field experiments (in experimental fields) to broaden mechanistic understanding and refine sampling procedures.
3. Contributing to the CDM methodology for preventing straw burning by quantifying the GHG emissions.

Deliverables:

Description	Type	Year	Status	Justification
Country-specific action plans for CDM (or CDM-like) projects in different rice growing regions to improve smallholders' livelihoods	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	Extended	See summary below (which is also reported under section 'Summary by outputs' explaining lack of interest from stakeholders as a result of the collapse of the carbon market. Activity plans for CDM did not materialize because of lack of interest from stakeholders as a result of the collapse of the carbon market. In general terms, the situation of the carbon market is very volatile which could go into both directions – upward and downward price developments. Thus, we will closely observe the situation before and after the forthcoming COP in Paris (Dec. 2015) that is expected to provide principle decisions on the future carbon market.
Implementing pilot projects for improved female engagement into mitigation projects (such as AWD) in rice-based production systems	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	On going	The report is still work in progress. During the earlier stage of the study, women's involvement in rice field operations, more so mitigation projects, was found to be rather limited. Thus, the activity has been put off for some time until a window for their engagement into mitigation became more apparent.
Assessment report of the socioeconomic impact of integrating women into natural resource management on food security and livelihood across different irrigation systems	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	On going	The report is still work in progress.

Description	Type	Year	Status	Justification
Implementing pilot projects on the use of innovative approaches and instrumentation for recording emission rates as a means to ease future MRV requirements	Peer-reviewed journal articles	2014	Complete	
Facilitating a CDM methodology for preventing straw burning: responding to UNFCCC reviews	Peer-reviewed journal articles	2014	On going	Typhoon Glenda completely destroyed the equipment for analyzing smoke samples. Thus, the deliverable will be delayed.
Improving the mechanistic understanding of mitigation effects in rice- based systems in terms of element cycles and ecosystem functions: continued field experiments and model application	Peer-reviewed journal articles	2014	Complete	
Developing 'Low Emissions Manager' as add-on to the mobile phone App 'Rice Crop Manager'	Other	2014	Complete	
Mapping of climatic suitability for AWD	Peer-reviewed journal articles	2014	On going	The methodology has been finalized and tested in a case study for the “Philippines”. The manuscript is in preparation.

Partners:

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Location(s):

Countries: India, Indonesia, Philippines, Vietnam,

Benchmark Site: Karnal,

Activity 570-2014

Implementing adaptation pathways in major rice-growing areas with specific vulnerabilities in South and Southeast Asia

Status	On going	Milestone	1.1.1 2015 (2)
Start date	2014 Jan	End date	2014 Dec

Description: This activity will see 2014 as the phase in which the synergies between the site-specific adaptation options in rice-based systems and other trends towards higher productivity and resource use efficiency, such as technology campaigns run by national agencies identified in 2013 will be implemented. The geographic focus remains on mega-deltas of S and SE Asia, in particular Mekong in Vietnam and Ganges-Brahmaputra in Bangladesh where “lighthouse projects” will be set up. Regional action plans will be realized via targeted dissemination of heat-resilient rice varieties as well as potential adjustment of cropping calendar in heat-affected areas. A gender-sensitive multi-level stakeholder analysis supported by participatory impact adaptation pathways will ensure gender integration into these climate change projects for improved adaptation and risk-coping strategies.

Status: On going. IRRI-CCAFS has taken further steps to disseminate alternate wetting and drying (AWD) technology to the farmers in the Mekong River Delta in Winter-Spring 2014 . It was in this cropping season when AWD was introduced in the province of Bac Lieu through large scale field models (LSFM) within which all farm activities are managed in the same manner and at the same time across all fields. This mechanism effectively paved the way for easier and faster implementation of the One Must-Five Reductions program (1M5R) of the Department of Agriculture and Rural Development. In the previous years, AWD was targeted to individual farmers only. GIZ Bac Lieu and Bac Lieu Plant Protection Sub Department organized the training and demonstration while IRRI-CCAFS conducted the assessment of the effectiveness of promoting AWD through LSFM. Graduate students from Vietnamese universities (Can Tho University andHo Chi Minh’s University of Agriculture and Forestry)are conducting the assessment which is still in progress. The results of this study in Bac Lieu province could be used as a prototype for water saving initiative during water-scarce seasons in other provinces in MRD.

The spatial assessments of rice areas that are vulnerable to heat stress (at several rice growth stages) have been completed but will undergo further refinements.

The envisaged work in Ganges-Brahmaputra delta in Bangladesh did only start at the end of 2014. Through a newly funded project that focuses on Bangladesh and Vietnam, these mega-deltas will receive special attention in 2015 encompassing a wide range of case studies to test and highlight the potential of alternate wetting and drying. While the rationale of this new project is mainly on mitigation, it is obvious that water saving is one of the key drivers for adoption of this technique and that, in turn this feature is vital for adaptation in the dry season.

Gender Component: This activity employs a gender-sensitive stakeholder analysis throughout the project cycle, most importantly in the assessment and project design. In the context of climate change adaptation project in smallholder rice farming systems, stakeholder analysis is key to understanding the interplay between gender roles and gender-differentiated risk perceptions (which presuppose awareness and to some extent knowledge) toward climate change and variability including extreme climate events and their impacts. This relation can be used for improved adaptation and risk-coping strategies that will be implemented in the subsequent phases of the project (2014 onwards). Impact adaptation pathways will be formulated together with local, provincial, and whenever possible, national stakeholders.

Objectives:

1. Formulating regional action plans for adaptation strategies, adjusted to the idiosyncrasies of each socioeconomic and/or biophysical environment with emphasis on rice-based systems in mega-deltas of S and SE Asia.
2. Assessing the vulnerability heat stress (in space and time) of rice production systems as a means to identify target areas for intervention.
3. Developing a clear and concrete gender strategy for adaptation options among farming households challenged by extreme climate conditions.

Deliverables:

Description	Type	Year	Status	Justification
"Lighthouse projects" on adaptation strategies in selected sites in mega deltas of S and SE Asia	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	Complete	
Regional action plans for targeted dissemination of heat-resilient rice varieties in heat-affected areas	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	Complete	
Integrating gender-specific roles in farm households into an overall framework for adaptation projects in rice-based production systems	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	On going	The report is still being drafted.

Description	Type	Year	Status	Justification
Implementing participatory impact adaptation pathways to ensure food security and sustain livelihoods of smallholder farming households in response to climate shocks by capitalizing on gender-specific roles for improved adaptation and risk-coping strategies.	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	Complete	
Providing men and women farmers training courses to enhance their capacities and opportunities to adapt to climate change	Capacity	2014	Complete	
Consultation and active engagement within selected policy campaigns (e.g. Rice-Self-Sufficiency Program in the Philippines; 'One Must Do -- Five Reductions' program in Vietnam)	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	On going	Farming households surveys just been finished. Graduate students have yet to consolidate the results and findings to draw meaningful recommendations.

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Location(s):
Countries: Philippines, Vietnam,

Activity 572-2014

Planning for improved resilience of rice production to cyclones/ typhoons

Status	On going	Milestone	2.1.1 2015
Start date	2014 Jan	End date	2014 Dec

Description: The aggravating trends in frequency and intensity of cyclones/ typhoons in S and SE Asia necessitate the adjustment of rice farming systems such as selection of more resilient cultivars and more suitable crop calendars. The typhoon analysis in 2012 consisted of identifying the location-specific intensities and duration of typhoon events based on local weather records in combination with rainfall and wind speed classes. This will be taken as a basis for defining specific strategies in 2013.

Status: On going. After IRRI has worked on post-hazard mapping of typhoon effects, the activities in 2014 were aimed at developing a typology of typhoon incidents in view of damage patterns on rice production. In the Philippines, the typhoons can be classified along a continuum from 2 extremes using 2 typhoons in 2014 as prototypes (see below), namely the (i) fast-moving/ immediate impact type and the slow-moving/ disrupted development type.

Gender Component: Not defined

Objectives:

1. Improving the location-specific rice cultivars and crop management options taking into account the cyclone/typhoon events in the affected regions

Deliverables:

Description	Type	Year	Status	Justification
Developing regional action plans for improved resilience to typhoon vulnerability in cyclone/ typhoon impacts in S and SE Asia	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	On going	Milestone defined for 2015.

Partners:

1- Manila Observatory:

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Location(s):

Countries: Bangladesh, Philippines,

Activity 575-2014

Finetuning the potential use of a decision support system on mitigation projects rice production systems

Status	On going	Milestone	4.1.2 2015
Start date	2014 Jan	End date	2014 Dec

Description: After integrating the validated simulation models into a decision support system on mitigation projects last year, enhancing the latter is what this activity focuses on. In order to achieve this goal, IRRI in collaboration with CCAFS has strived to establish networks with other institutes involved with modelling of climate change impacts on rice production. However, simulation models are inherently complex in terms of required input parameters and operation, so that their direct use as decision support tools is generally limited. Thus, we will work with simplified input-output tables that derived from modeling results and incorporated into Technical Coefficient Generators. These tools will be continue to be validated this year for more precise climate impact assessments and extreme climatic events, namely drought and salinity stress in S and SE Asia. Moreover, IRRI will continue its active participation in the Agricultural Model Intercomparison and Improvement Project (AgMIP).

Status: On going. The development of mobile phone apps has gained momentum in 2014 due to hiring of a new ICT expert (P. Ficarelli) that was possible with support from the GIZ/ CIM program. The ICT expert works closely with the technical staff specialized on cop management (supervised by R. Buresh) on field testing and improving the beta-version of the CIRCLE (Climate-informed rice crop and low emission) Manager. Moreover, IRRI is expanding the capability of the CIRCLE manager from mere management-based recommendation to a wide range of measures such as variety selection under different types of climatic stresses.

Gender Component: Not defined

Objectives:

1. Providing simple decision support tools for adaptation and mitigation options in rice.

Deliverables:

Description	Type	Year	Status	Justification
User-friendly version of of a decision support system (for mitigation projects)	Other	2014	Complete	
IRRI has compiled a repository of relevant materials for training on climate smart agriculture in rice-based system. This metadata base will be useful for a potential collaborative project on Better Rice Initiative Asia (BRIA) with German Food Partnership. BRIA supports rice sector in different countries in SEA (including Vietnam and Philippines) by providing training to public and private agricultural advisors who will in turn pass on their knowledge to smallholder farmers. Training courses encompass general crop production, business administration and specialist rice production.	Research report (i.e. workshop report, consultant's report, discussion paper, project report, student thesis, etc.)	2014	Complete	

Partners:

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Location(s):

Regions: South Asia (SAs), South East Asia (SEA),

2. Succinct summary of activities and deliverables by Output level.

Output: 1.1.1

Summary: 1) “Lighthouse projects” on adaptation strategies in selected sites in mega deltas of S and SE Asia

Several components of climate smart agriculture have been implemented in 4 provinces of the Mekong Delta (salinity tolerant rice varieties, submergence tolerant rice varieties, alternate wetting and drying); similar lighthouse projects in Bangladesh are on their way to be implemented in 2015.

2) Regional action plans for targeted dissemination of heat-resilient rice varieties in heat-affected areas

After the 2013 work has focused on mapping of heat stress to identify regional hotspots, the work in 2014 focused on detecting long term trends for minimum and maximum temperatures (from 1951 to 2010 relative to the 1951-1980 average) during critical rice growth stages. This historical analysis showed that the proportions of rice area that experienced heat stress was on a low level (< 10%) until the 1980s. Since the early 1990s, however, these proportions showed increasing trends that have been observed for both, Tmax and Tmin. For recent years, more than 40% of the rice area experiences a ‘very hot’ or ‘extremely hot’ year based on the Tmin records. These percentages are in the range of 20% based on Tmax records. We also assessed the influence of changing planting dates, but this shift had effectively no impact on the area proportions with heat stress. Thus, the only future options for rice farmers to cope with heat stress will be very limited unless breeding programs will be able to generate heat-tolerant varieties.

3) Integrating gender-specific roles in farm households into an overall framework for adaptation projects in rice-based production systems.

The participatory rural appraisal (e.g. focus group discussions, household surveys) of 120 rice farming households in two flood-prone villages in Central Luzon, Philippines continued in 2014. The study aimed at understanding how decisions as regards the choice of adaptation and risk-coping strategies were influenced by gender roles. At the household level, we saw a dearth of adaptation options available to the farmers. Majority of the respondents engaged in resowing. As crop insurance was seldom practiced, about one-third of the respondents acquired informal loans and sought financial support from relatives and friends. Selling off rice stockpile originally meant for household consumption was a common practice. All these measures taken to cope with the calamity at hand were usually transitory and driven by a lack of alternatives. Average livelihood diversification index which measures the household’s relative concentration of income sources was extremely low at 0.27. In fact, roughly one-third of the households derived their incomes solely from rice farming.

No significant gender-specific strategies, however, have been observed. This could mean that these households follow the unitary model in decision making (i.e. consultation exists between husband and wife).

In Wet Season 2014, IRRI distributed through the Municipal Agriculture Office some submergence tolerant variety seeds to selected men and women farmers for demonstration trials. A scoping meeting was also organized between farmers and local government unit (LGU) agencies in which the various credit opportunities which farmers can apply for were presented. IRRI served as the liaison in these two minor activities.

4) Implementing participatory impact adaptation pathways to ensure food security and sustain livelihoods of smallholder farming households in response to climate shocks by capitalizing on gender-specific roles for improved adaptation and risk-coping strategies

Participatory Varietal Selection (PVS) has been conducted since 2012-2014 (under CLUES = Climate Change Affecting Land Use in the Mekong Delta: Adaptation of Rice-based Cropping Systems). In the last three years, researcher- and farmer-managed trials as well as sensory evaluation were organized in 4 different provinces/ rice ecologies/ stress prone environments in the Mekong Delta. PVS approach was conducted to elicit gender-differentiated perspectives on desired rice traits. Findings showed that although men and women had similar preferences for specific agronomic traits, gender differences based on gender roles in the food chain (rice production and post-harvest) continued to exist. For instance,

Men and women's preferences for varieties are based on their roles and needs in rice production and post-harvest activities.
(i) As unpaid family workers, they prefer a variety which can recover from heavy floods to reduce their time and drudgery in gap filling and avoid health problems.
(ii) As hired laborers, they prefer a variety of moderate height to ease harvesting, particularly during floods.
(iii) Women as consumers have motivations for adopting stress tolerant varieties.
(iv) As mothers, women want a variety which cooks quickly, has good aroma and good eating quality (fluffy, cooked rice stays soft)

Preferred varieties selected through PVS were not always acceptable in terms of quality traits and did not perform better under farmers' conditions and level of management. Thus, it is important to do PVS which includes the three major components (RMTs. FMTs and sensory evaluation) to ensure high adoption.

5) Providing men and women farmers training courses to enhance their capacities and opportunities to adapt to climate change

In the Philippines, the National Irrigation Administration has contacted IRRI thrice in 2014 to receive

additional information and seminars on AWD to be able to implement and upscale AWD in other regions. In particular, men and women farmers as well as field technicians of were taught how to manage their water and fertilizer resources in light of the “imminent” ENSO episode.

IRRI also organized a scoping meeting between LGU agencies and farmers to identify institutional support enabling farmers to design and implement viable adaptation projects that could enhance the capacity of men and women farmers to cope with climate change and/ or climate extremes. The Municipal Social Work and Development agency assured to assist women farmers who desired to embark on innovative ventures but otherwise lacked financial capital and necessary resources.

6) Consultation and active engagement within selected policy campaigns (e.g. Rice-Self-Sufficiency Program in the Philippines; 'One Must Do -- Five Reductions' program in Vietnam)

This activity focused on assessing the potential of outscaling AWD through large scale field models (comprising of about 100 ha). In this model, resource management decisions were standardized across all fields which may lead in principle to much faster implementation of the One Must Do-Five Reductions campaign in South Vietnam.

Output: 1.2.1

Summary: Note: We are still awaiting inputs from Michael Dingkuhn for Theme 1 commissioned Activity 571-2014.

Output: 2.1.1

Summary: Developing regional action plans for improved resilience to typhoon vulnerability in cyclone/ typhoon impacts in S and SE Asia.

The typology of typhoons in the Philippines comprises a continuum between these 2 prototypes:

1) Typhoon ‘Glenda’: Lasted for 1 day; 35 m/sec max wind speed; impact: Lodging (due to wind impact)
2) Typhoon ‘Ruby’: Lasted for 5 days; 15 m/sec max wind speed; impact: disrupted plant development (due to low solar radiation)
The actual magnitude of yield damage will depend on the typhoon characteristics as well the the plant stage when the incidence occurred. Young plants are less susceptible to wind impact as compared to disrupted solar radiation whereas the opposite is true for older plants. In the next step, IRRI can now develop an algorithm that quantifies yield losses as a function of both, typhoon characteristics and plant stage and define necessary traits to be incorporated into breeding strategies for climate-resilient rice varieties.

Output: 3.3.1

Summary: 1) Country-specific action plans for CDM (or CDM-like) projects in different rice growing regions to improve smallholders' livelihoods

Activity plans for CDM did not materialize because of lack of interest from stakeholders as a result of the collapse of the carbon market. In general terms, the situation of the carbon market is very volatile which could go into both directions – upward and downward price developments. Thus, we will closely observe the situation before and after the forthcoming COP in Paris (Dec. 2015) that is expected to provide principle decisions on the future carbon market.

2) Implementing pilot projects for improved female engagement into mitigation projects (such as AWD) in rice-based production systems

In 2013, we reported the limited participation of women farmers in AWD implementation in the Philippines. The initial plan was to encourage women farmers in monitoring and collecting water level data (as a field scout) throughout the crop growth stage in compliance with the AWD water management practice but this has had limited success. In 2014, IRRI-CCAFS produced a video documentary on AWD success stories which is still in progress. The video showed how a few women farmers contribute to promoting social learning on AWD within their limited capacities and circumstances. It is rather important to mention that field operations are men's turf and that women's involvement in rice production goes only as far as purchasing inputs and doing post-harvest tasks. In relation to this, a study on 'Knowing who are the women in mitigation: some observations on why women do participation in mitigation projects in rice-based farming households in the Philippines while others do not' is ongoing.

In Vietnam where the rural social structure in terms of women involvement in rice farming is rather different from that of Philippines is an interesting story. An ongoing research is exploring whether there would be any differences in level of women's engagement subject to the AWD implementation scheme (large scale field model vs individual plots). The household surveys were already finished.

3) Assessment report of the socioeconomic impact of integrating women into natural resource management on food security and livelihood across different irrigation systems

This activity bore strong resemblance to one of the activities under Theme 1 which talked about the implementation of participatory impact adaptation pathways to ensure food security and sustain livelihoods of smallholder farming households by capitalizing on gender roles. The difference would be that this Theme 3 activity was meant to focus on potential AWD areas. However, the realization of limited participation of women in field operations had somewhat brought the study to a temporary halt. In 2014, a scholar of CLIFF (The Climate Food and Farming) came to the Philippines to start working on the socioeconomic field of mitigation research. One aspect of the joint research with IRRI-CCAFS activity was to assess the degree of women farmers' integration into natural resource management (measured by their decision making power within the household).

4) Implementing pilot projects on the use of innovative approaches and instrumentation for recording emission rates as a means to ease future MRV requirements

The principal focus of this activity in terms of MRV development is on the fine-tuning of various approaches for recording emission rates over 24-h cycles. In 2013, we investigated the uncertainties implied in manual sampling taken only once or twice a day. The results clearly showed the temporal variability is superseded by spatial variability which impedes a clear-cut definition of diurnal patterns (under research project ICON = Introducing non-flooded crops in rice-dominated landscapes: Impact on CarbOn, Nitrogen and water budgets). However, we said that the results may be affected by the specific conditions during the dry season as well as the relatively poor time resolution of approx. 4-h intervals.

Meanwhile, in 2014, the newly developed LI-7700 open-path methane analyzer was used to measure methane (CH4) fluxes from irrigated rice fields using the eddy covariance technique. The method has been successfully used to characterize the diurnal and seasonal variations of CH4 emissions over the whole cropping seasons. Clear diurnal cycles of CH4 fluxes were observed when the data were partitioned into different growth stages (pre-planting, vegetative, reproductive, ripening, and fallow). The diurnal patterns were influenced by temperature (air, floodwater, and soil), surface energy flux (net radiation, soil heat flux, sensible heat flux, and latent heat flux), and ecosystem CO2 exchange (photosynthesis and respiration). The seasonal variations in daily CH4 emissions were primarily controlled by water management and the growth of the rice plants. This study has shown that intermittent irrigation during the vegetative stage was an effective water management strategy to mitigate or to lower the seasonal CH4 emissions and made the irrigated rice fields a sink for carbon.

Moreover, a related activity on the comparative analyses of the manual chamber and eddy covariance methods for measuring CH4 fluxes were done during the dry season of 2014 in the IRRI rice fields.Two methods of gas analyses were used with the manual chamber method (MC): (i) semi-automated photo-acoustic spectroscopy (PAS) and (ii)gas chromatography.Diurnal cycles of CH4 fluxes were compared at different rice growth stages using the 2 manual chamber methods and the eddy covariance system (EC). The amplitude of the EC measurements was higher as compared to the more stable MC records. These differences were visible at all growth stages.

The use of PAS gas monitor – INNOVA1412i has been modified to enhance the instrument's performance to justify its suitability as an alternative to other methods. The results of the modifications showed that there is a clear indication that the semi-automated PAS monitor used with a dew point generator could give reliable estimates of CH4 emissions and is a suitable alternative to manual gas sampling and GC analysis.

5) Facilitating a CDM methodology for preventing straw burning: responding to UNFCCC reviews

This activity had to cope with a major infrastructural problem due to the destruction of measurement equipment (smoke collector) by Typhoon Glenda in August 2015. Thus, the deliverable will be delayed. Starting in the latter part of 2014, the re-construction and improvement of the smoke collection set-up has been underway.

However, before the equipment was damaged, results from the experiment showed that CH4 emission and emission factor were directly proportional to increasing moisture content. Total carbon lost due to burning apparently showed decreasing value. N2O emission, its emission factor and total nitrogen lost from burning were not dependent on moisture content. The study confirmed that moisture content level was a critical factor in controlling the carbon partitioning in rice straw burning emissions.

6) Improving the mechanistic understanding of mitigation effects in rice-based systems in terms of element cycles and ecosystem functions: continued field experiments and model application

The long-term goal of the IRRI-CCAFS activities on process understanding is to establish a Knowledge Hub on GHG Mitigation in Rice Production Systems. The required increase in rice production must be achieved with less water, less labor, and less land in more efficient, environment-friendly production systems that are resilient to climate change and contribute less to greenhouse gas emissions.An important component of this work is the development and use of performance indicators that provide quantifiable targets through which management practices can be identified to optimize among multiple goals of high productivity, high profitability, and sustainability while meeting the standards of environmental quality. An extensive field experiment on a total of 12-ha is designed as a long-term, production-scale experimental system in which modern technologies are dynamically explored and adapted to the needs for different intensification and diversification options (Ecological Intensification Platform).

Three eddy covariance flux towers were installed to directly measure fluxes and budgets of CO2, CH4, energy, heat, and evapotranspiration within the different cropping systems.The eddy covariance technique with LI-7700 open-path CH4 analyzer has the advantage of obtaining continuous measurement of CH4 flux integrated over larger areas (at least 4 ha) with no alteration of the ecosystem microclimatology. It also allows simultaneous measurements of surface energy flux and ecosystem CO2 exchange, which most chamber-based measurements cannot do. The information generated by this technique is essential to improve our mechanistic understanding of the different factors affecting net methane emissions from rice-based ecosystems. Additionally, this kind of dataset is most valuable for the modeling community to improve the global CH4 flux estimates from rice paddies, which have been extrapolated almost exclusively from closed-chamber measurements.

7) Developing 'Low Emissions Manager' as add-on to the mobile phone App 'Rice Crop Manager'

As a means to streamline crop management decisions on adaptation and mitigation options in Vietnamese rice production, a new decision tool called CIRCLE (Climate-Informed Rice Crop and Low Emission) Manager has been incorporated into new modules on adjusted rice management practices.

In 2014, a beta version of computer- and smartphone-based CIRCLE Manager for the Mekong Delta has been produced. CIRCLE Manager has the capability to estimate the greenhouse gas footprint of different management practices based on IPCC published guidelines for estimating methane and

nitrous oxide emissions. The CIRCLE Manager is integrated into Rice Crop Manager Manager (RCM_CIRCLE). It is accessible by first accessing RCM at http://webapps.irri.org/vn/rcm, and then by selecting the Mekong Delta, answering the RCM questions, obtaining a RCM recommendation, and finally selecting an option to obtain a CIRCLE Manager calculation for estimated greenhouse gas emissions from the field.There is the capability to archive in a database all the information provided to each user through the CIRCLE Manager output. The testing of the CIRCLE has started in October 2014 and continued until February 2015.

This activity aims to influence national partners on the use of information and communications technology (ICT) as a tool for enhancing and accelerating extension services.

8) Mapping of climatic suitability for AWD

The methodology finalized and tested in a case study on climatic suitability of AWD for the “Philippines”. A publication has been drafted.

Output: 4.1.2

Summary: 1) Mobile phone application comprising user-friendly version of a decision support system for mitigation/adaptation in South and North Vietnam

The methodology of the new decision tool, CIRCLE (Climate-informed rice crop and low emission) Manager has been finalized and beta version has gone through assessment since October 2014 with various stakeholders (e.g. farmers, staff and managers of the Department of Agriculture and Rural Development in Mekong Delta.
At the same time, the IRRI modelling group has investigated salinity effects on rice production. Salinity problems are expected to increase with climate change particularly for deltaic regions such the Ganges and the Mekong, so that future decision tools will have to include this feature. The ORYZA v3 crop model has been expanded to account for salinity effects and possible adaptation strategies in rice production. Model application was based on four different approaches:
• Greenhouse experiments encompassing a gradient of salinity levels
• Controlled plot experiments with increased salinity levels vis-à-vis non-saline plots
• In situ experiments in salinity-affected coastlines in the Philippines and Bangladesh
• Simulations with the aim of reducing salinity effect on rice productivity as a function of crop management
This new capacity of the validated model will allow site-specific recommendations of potential irrigation management strategies in different situations and regions. Apart from integration into mobile phone apps, this new model capability can also applied in view of desirable traits for tolerant and adapted varieties as part of IRRI’s new breeding strategy based on region-specific germplasm developments.

2) Publications ('primers') on climate-proofing of rice production to climate change impacts targeting decision makers in local and provincial government agencies

IRRI has compiled a repository of relevant materials for training on climate smart agriculture in rice-based system. This metadata base will be useful for a potential collaborative project on Better Rice Initiative Asia (BRIA) with German Food Partnership. BRIA supports rice sector in different countries in SEA (including Vietnam and Philippines) by providing training to public and private agricultural advisors who will in turn pass on their knowledge to smallholder farmers. Training courses encompass general crop production, business administration and specialist rice production.

3. Communications.

Media Campaigns:

IRRI has co-organized media training-workshops with CCAFS-SEA in the Philippines and Vietnam. IRRI scientists and communication specialists have provided technical expertise and documentation support for the activities, which produced a number of media articles and established a network of media contacts.

Articles published in the Philippines:

1. 19 Aug 2014: IRRI expands tech that cuts farmer's water expense, greenhouse gas emission
http://www.mb.com.ph/irri-expands-tech-that-cuts-farmers-water-expense-greenhouse-gas-emission/

Articles published in Vietnam:

1. 22 Nov 2014: Xâydng "Làngngphóthông minh vibinikhíhu"
http://dantri.com.vn/moi-truong/xay-dung-lang-ung-pho-thong-minh-voi-bien-doi-khi-hau-998437.htm
2. 18 Nov 2014: ngdngkhoahcvàocôngcucchngbinikhíhuvì an ninhnôngnghipvàlngthctiVit Nam
http://www.dmc.gov.vn/tabid/91/language/vi-VN/item/1848/Default.aspx

Blogs:

Below is a list of news developed in-house and from other media online sources:

1. 25 Sep 2014: New rice helps Mekong farmers battle worsening floods, salt intrusion
http://www.trust.org/item/20140925100008-8j4uh/
2. 27 Nov 2014: Brainstorming with the media on climate change in Vietnam
http://ciat.cgiar.org/news-2-2/brainstorming-with-the-media-on-climate-change-in-vietnam
3. 07 Nov 2014: Crop diversification strategies for Cambodia, Laos and Vietnam
http://ccafs.cgiar.org/blog/crop-diversification-strategies-cambodia-laos-and-vietnam#.VNxrNfmUco5
4. 24 Sep 2014: Elite rice to combat flooding in Vietnam's Mekong Delta
http://ccafs.cgiar.org/blog/elite-rice-combat-flooding-vietnam%E2%80%99s-mekong-delta#.VNxrYPmUco5
http://www.merid.org/en/Content/News_Services/Food_Security_and_AgBiotech_News/Articles/2014/Sep/24/rice.aspx
5. 24 Jun 2014: New irrigation technique can ease drought effects for rice farmers
http://ccafs.cgiar.org/blog/new-irrigation-technique-can-ease-drought-effects-rice-farmers#.VNxrzvmUco5
6. Communicating climate change with greater impact: Next steps for Southeast Asia
13 June 2014: http://ccafs.cgiar.org/blog/communicating-climate-change-greater-impact-next-steps-southeast-asia#.VNxr4PmUco5
04 June 2014: http://irri-news.blogspot.com/2014/06/vietnam-ccafs-sea-holds-workshop-on.html
11 June 2014: http://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=12403
http://iasvn.org/en/tin-tuc/CCAFS-SEA-and-Partners-Discuss-Effective-Communication-on-Climate-

Change-2508.html

7. 05 Nov 2014: New CCAC Agriculture Effort Tackles Climate Change, Supports Rice Production

http://rice-climatechange-research.blogspot.com/2014/11/new-ccac-agriculture-effort-tackles.html
http://ccafs.cgiar.org/news/media-centre/press-releases/new-climate-and-clean-air-coalition-agriculture-effort-tackles#.VNy2D_mUco5
http://futureag.info/news/new-climate-and-clean-air-coalition-agriculture-effort-tackles-climate-change-supports-rice-production/

8. 27 Nov 2014: IRRI and CCAFS discuss better collaboration of climate-change-related research activities
http://rice-climatechange-research.blogspot.com/2014/11/irri-and-ccafs-discuss-better.html

9. CCAFS-SEA kicks off first media workshop on how to report about climate change with impact
http://irri-news.blogspot.com/2014/08/ccafs-sea-kicks-off-first-media.html

10. 19 Aug 2014: IRRI and CCAFS regional program office/ Southeast Asia organize training on greenhouse gas emission measurements
http://irri-news.blogspot.com/2014/01/irri-and-ccafs-regional-program-office.html

11. 15 Sep 2014: 'Extreme events from climate change could threaten global rice production, warns IRRI scientist
http://rice-climatechange-research.blogspot.com/2014/09/extreme-events-from-climate-change.html

12. 04 Sep 2014: Rice field emit greenhouse gases say agriculturalists
http://rice-climatechange-research.blogspot.com/2014/09/rice-fields-emit-greenhouse-gases-say.htm l

13. 26 Aug 2014: Bangladesh rice farmers can earn carbon credit, say researchers

http://www.oryza.com/news/rice-news/awd-and-fdp-techniques-can-reduce-ghg-emissions-bangladesh-rice-fields-say

14. 04 Sep 2014: Use less urea for green Bangladesh, say Matia
http://rice-climatechange-research.blogspot.com/2014/09/use-less-urea-for-green-bangladesh-says.html

15. 04 Sep 2014: IRRI and ASIAFLUX hold workshop on how to sustain balance in ecosystem
http://rice-climatechange-research.blogspot.com/2014/09/irri-and-asiaflux-hold-workshop-on-how.html

16. 05 Sep 2014: Partners convene to steer climate change activities to next level

http://rice-climatechange-research.blogspot.com/2014/09/partners-convene-to-steer-climate.html

Websites:

1. Rice Crop Manager (incl. beta-version of CIRCLE manager for Vietnam) http://cropmanager.irri.org/

2. Dec 2014: World resources Institute/ Installment 8 of Creating a Sustainable Food Future
http://www.wri.org/publication/wetting-and-drying-reducing-greenhouse-gas-emissions-and-saving-water-rice-production

Social Media Campaigns:

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Articles published in Vietnam:

1. 22 Nov 2014: Xâydng "Làngngphóthông minh vibinikhíhu"
http://dantri.com.vn/moi-truong/xay-dung-lang-ung-pho-thong-minh-voi-bien-doi-khi-hau-998437.htm
2. 18 Nov 2014: ngdngkhoahcvàocôngcucchngbinikhíhuvì an ninhnôngnghipvàlngthctiVit Nam
http://www.dmc.gov.vn/tabid/91/language/vi-VN/item/1848/Default.aspx

Newsletters:

None

Events:

1. 18-23 Aug 2014: Asiaflux 2014: Proceedings, photos, video
2. 07 Oct 2014: Launching of program to reduce methane emission from rice production

http://rice-climatechange-research.blogspot.com/2014/10/launching-of-program-to-reduce-methane.html

3. 19-22 Oct 2014: Workshop on "CCAFS Regional Impact Pathways and Theory of Change" in Bangkok, Thailand
4. 31 Oct 2014: Climate and Clean Air Coalition Inception Planning Workshop: Report
5. 17 Dec 2014: Launch of WRI report on AWD World Bank and the World Resources Institute hosted a discussion based on the WRI report. R. Wassmann gave a presentation via tele-conference
http://www.wri.org/events/2014/12/reducing-ghg-emissions-and-saving-water-rice-production

Videos and other Multimedia:

1. Climate proofing rice in Vietnam
https://www.youtube.com/watch?v=okW0tDZlmFM&list=UU6RPxIIMQ6E4ZjOBPWr3ycg
2. IRRI and Vietnam partnership to boost country's rice sector
https://www.youtube.com/watch?v=QrNE4fJrYtM#t=13

Other Communications and Outreach:

1. 29-30 May 2014: Workshop on "Collective Engagement and Communication Plan for CCAFS - SEA" in Hanoi, Vietnam

2. 14-15 Aug 2014: Workshop on "Reporting Climate Change, Agriculture & Food Security: Challenges & Opportunities for the Philippine Media" in Laguna, Philippines
3. 17-18 November 2014: Workshop on "Mobilizing Science for Climate Change, Agriculture & Food Security: Engaging the Media in Vietnam" in Hanoi, Vietnam
4. Media Workshop Bulletin
https://www.dropbox.com/s/1dyjwsud5787j1e/Media%20Workshop%20Bulletin.pdf?dl=0

4. Case studies.

Case Study #1

Title: Methane and nitrous oxide emissions from rice straw burning: determining the effect of moisture content through laboratory experiments

Author: R. Romasanta, R. Wassmann, B.O. Sander, Y. Gaihre

Type: Breakthrough science;

Project Description:

Burning of rice straw in the field is the most common practice of residue management all over Asia due to its low-cost and –labour input. But burning of straw has a range of negative implications. The smoke that covers swaths of rice producing regions after harvest is bad for human health and is a source of greenhouse gases(GHGs) and black carbon. However, data on emission factors from straw burning – although being the prevalent practice -- is scarce. Thus, we established this series of experiments to fill this important research gap.

This study was first implemented in 2012 at IRRI, Philippines. The set-up was fabricated and preliminary data were gathered. In collaboration with IRRI's Postharvest Group, set-up and methodologies were improved based on the 2012 assessment and the next series of experiments was conducted during Wet season 2013. One key aspect was an evaluation of the influence of straw moisture on the GHGs emitted.

Introduction / objectives:

This study aims to provide technical coefficients in the form of emission factors for rice straw burning.

These emission factors are expected to be used for different purposes, e.g. life cycle assessments, comparative analyses of different straw management options and reporting of emissions. The specific objectives of this study are to:
1) measure and quantify the amount of GHG emissions generated by rice straw burning,
2) determine the relationship between straw moisture and GHG emissions, and
3) assess the total carbon and nitrogen lost during burning.

Project Results:

Results from the case study showed that CH4 emission and emission factor are directly proportional with increasing moisture content. Total carbon lost due to burning showed decreasing value. N2O emission, its emission factor and total nitrogen lost from burning are not dependent on moisture content. The study confirmed that moisture content level is a critical factor in controlling the carbon partitioning in rice straw burning emissions.

Partners:

Climate Change Agriculture and Food Security (CCAFS), IRRI Postharvest Division

Links / sources for further information:

For more information about the case study area: http://asiaflux.net/?action=multidatabase_action_main_filedownload&download_flag=1&upload_id=492&metadata_id=4

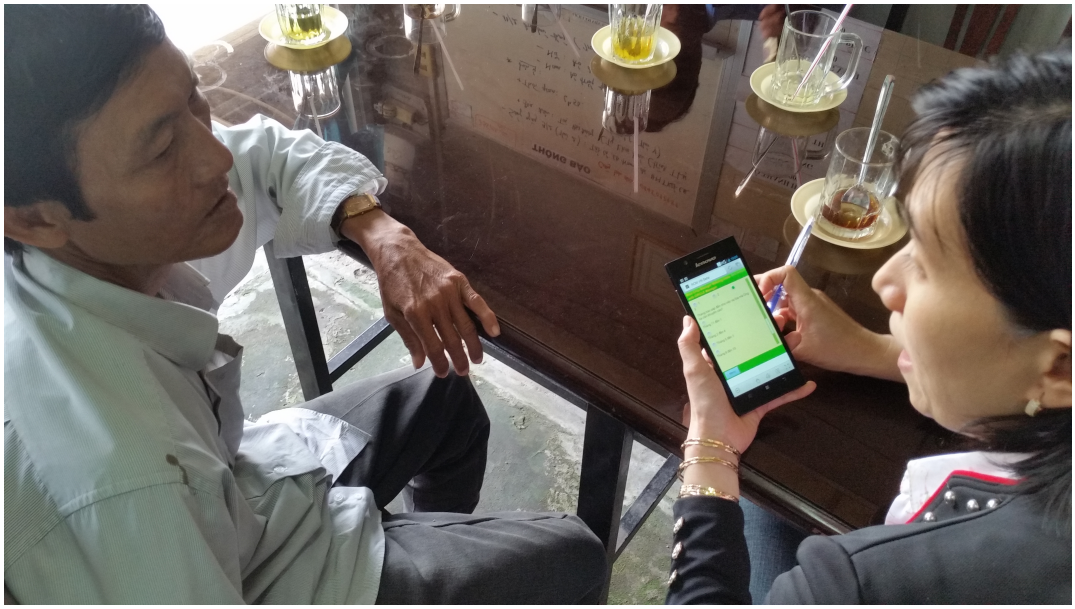
For more information about the SAMPLES project:
http://www.samples.ccafs.cgiar.org/trace-gases.html

Case Study #2

Title: Information and communication technologies for the dissemination of climate smart agriculture to rice farmers

Author: Paolo Ficarelli

Type: Social differentiation and gender; Innovative non-research partnerships; Capacity enhancement;



Project Description:

The case study focuses on the development stage of an IRRI ICT platform for farmer advisory in support to key national campaigns for climate change mitigation to ensure sustainable productivity increases. IRRI, in partnership with national agricultural organizations, has developed a mobile phone-enabled web-application for South and Southeast Asia. The Rice Crop Manager (RCM) provides customized guidelines to farmers on crop management practices best suited for their specific rice-growing conditions.The farmer interface (RCM input) contains a series of questions in the local language. It is designed to obtain information from the farmer, matching the location-specific cropping practices and needs of the farmer. The back end model resides on a cloud-based server, uses the farmer's answers to the questions together with information from databases to calculate a field-specific management decisions.The RCM output provides pre-season recommendations in the form of a printout before planting followed by a SMS service during the growing period until harvest. The project is now adding to the capabilities of the evolving RCMa climate smart component, the so called Climate-Informed Rice Crop Low Emission (CIRCLE). This component can includeclimate-adjusted crop yields and information associated with climate and environmental risks and rice low- emission options. In a successive development stage, such a component could offer agro-met advisory for pest and diseases prevention. Historical climate data on inter-annual variation can offer farmer decision making support for crop management adjustments of the yield potential in the current cropping season while links of the RCM_CIRCLE with seasonal weather forecasting could help farmers to determine optimal time of planting and most suitable crop establishment practices, such as direct seeding or

transplanting for rainfed rice. Water level monitoring and water quality data collected through sensors could also provide further decision making information to farmers and intelligent agriculture.

Introduction / objectives:

1. Integration of GHG footprint calculator in response to different management practices into the RCM ICT platform;
2. Integration into the RCM of farmer practices and farm profiling questions determining suitability for AWD;
3. Development of a specific advisory output on most appropriate AWD protocol for different soil types
4. Development of strategic partnerships for testing, refining, verifying, promoting and disseminating CIRCLE Manager in Mekong Delta and Red River Delta;
5. Leveraging support from government of Vietnam and private sector for endorsement and future development of the RCM_CIRCLE ICT platform and integration into national key delivery programs in rice sector

Project Results:

An assessment during the initial testing period with 60 farmers of different categories, including 15 women showed that a large majority found the RCM_CIRCLE questions easy and interesting. 95.6% agreed that all questions were relevant to their situation. Only a 4.4%that found that the interview questions were not so relevant. 77.8% believed that the RCM_CIRCLE recommendations could have been useful to them to improve their rice field management practices.A22.2% said that recommendations were relevant only to some extent. 71.43% of the womeninterviewed have been found to be fully involved in the management decisions of rice fields. All women thought that all questions posed by the RCM_CIRCLEwere relevant and not difficult to answer. 42.5% of farmers considered the overall experience as rated from one(negative) to five (very positive)was 20% three, 37.5% four and a five.

The feedback from 16 staff and 2 managers of the Department of Agriculture and Rural Development (DARD) was also very positive. 78.58% of extension staffs which tried the RCM_CIRCLE for the first timefound the tool and the interview process with farmer satisfactory and 14.28% found it very satisfactory. 78.58% rated the interview process with women as particularly interesting and rewarding. 64.28% extension staffs felt thatthe automated recommendations generated by the RCM_CIRCLE were relevant/useful to farmers while 35.72% extension staffs feel that recommendations to some extent useful to farmer. 92.86% extension staffs found theRCM very practical and useful for extension. Overall experience of staff and managers with the use of RCM_Circle was also very positive.

Partners:

Engaging different actors in innovation processes such as the RCM_CIRCLE ensure user-driven evolution based on continuous learning and selection of improvements. The development of ICT platforms for advisory services to farmers requires different levels of cooperation relationships:
1) National partnerships for endorsement, ownership and integration of ICT to strengthen relevant national agricultural programs

2) Research partnerships for content development and validation
3) Dissemination alliances with organizations with “boots in the fields” already engaged in advising directly farmers on sustainable agricultural practices

The CIRCLE development as a Climate Smart Agriculture component for the RCM platform in Vietnam has established strong research partnershipsfor content development and validation with the Cuu Long Delta Rice Research Institute (CLRRI) for the Mekong River Delta, the CanTho University (CTU) for the Mekong River Delta, with the Soil and Fertilizer Research Institute (SFRI) for the Red River Delta for climate-smart rice production practices and climate change mitigation and regionally with the Regional Integrated Multi-Hazard Early Warning Systems for Africa and Asia (RIMES) for the integration of weather forecasting and early-warning information related to Vietnam.

For testing the use of the RCM_CIRCLE in the field with farmers, strong dissemination alliances have been forged with different organizations in order to reach different farmers categories, especially women. The following organizations have engaged in the process of development and dissemination: Provincial Departments of Agriculture& Rural Development (DARD) units such as the Agriculture Extension Centers managing working with Farmers Clubs and Farmer Associations and Cooperatives, Plant Protections Units working with Large Scale Fields farmers, Women Union working with Women Clubs in agriculture and finally with private sector companies marketing quality rice working with contract farmers and other donor funded projects.

Links / sources for further information:
http://cropmanager.irri.org/

5. Outcomes.

Outcome #1:

Water-saving in rice production (AWD) recognized as high-priority mitigation option by policy makers in Vietnam

What is the outcome of the research (i.e. use of research results by non-research partners)?

The 20-20-20 decree published by the Vietnamese Prime Minister in 2012 (and reported as our CCAFS outcome for 2013) is now moving towards implementation at province scale. However, the vigour of its implementation is apparently hampered by uncertainty on the international commitments that developing countries such as Vietnam will take over in a new UNFCCC convention. Last year, the focus of the policy discussion in Vietnam was more on the national framework for mitigation planning (NAMA vs. INDC).

What outputs produced in the three preceding years resulted in this outcome?

Field experiments alongside with farmer surveys and participatory research have shown the suitability of AWD for many rice farmers in Vietnam Participatory approaches to assess farmers' perception on crop management decisions

What partners helped in producing the outcome?

NARES in Vietnam and the Philippines

Who used the output?

Policy makers in Vietnam in charge of NAMA and INDC

How was the output used?

At this point, only for discussing the possible content of NAMA and INDC

What is the evidence for this outcome? Specifically, what kind of study was conducted to show the connection between the research and the outcome? Who conducted it?

1. The 20-20-20 decree by the Prime Minister representing the pivotal document for mitigation planning (please see attached original memorandum and screenshot of Vietnamese government portal)
2. Several presentations by decision makers on NAMA preparations in Vietnam, e.g. http://nama-database.org/images/a/a6/Vietnam_PresentationMAINVietnam_2012_09.pdf

Outcome #2:

Climate change projects fundamental part of re-structuring of the rice-subsector in Vietnam

What is the outcome of the research (i.e. use of research results by non-research partners)?

The Vietnamese Ministry for Agriculture and Rural Development is now embarking on a re-structuring of its rice-sector based on a paradigm shift from quantity to quality target in rice production. At the same time, MARD recognizes the specific challenges stemming from climate change to achieve these production targets in a sustainable and environmentally friendly manner. Other rice growing countries are following suit in launching similar initiatives. Likewise, several development agencies (e.g. Worldbank, GIZ) have started initiatives to modernize rice production.

What outputs produced in the three preceding years resulted in this outcome?

The IRRI/ CCAFS group participated in one technical mission and high-level meeting with MARD and was one of the main contributors for developing an action plan submitted to MARD; this action plan encompassed climate change research as a major component.

What partners helped in producing the outcome?

NARES in Vietnam and the Philippines

Who used the output?

Policy makers in Vietnam in charge of re-structuring the rice sub-sector

How was the output used?

At this point, only for discussing the planning of the re-structuring

What is the evidence for this outcome? Specifically, what kind of study was conducted to show the connection between the research and the outcome? Who conducted it?

1. Intensive policy dialogue among IRRI and Vietnamese Ministry of Agriculture (http://irri.org/news/media-releases/vietnam-and-irri-jointly-craft-strategy-to-boost-country-s-rice-industry)
2. Worldbank's initiative to prepare substantial loan for climate change projects/research targeting the Mekong Delta (http://www.worldbank.org/en/news/press-release/2015/02/02/mekong-delta-forum-builds-momentum-for-coordinated-action-to-improve-resilience-to-climate-change-and-enhance-shared-prosperity)
3. IRRI (through GIZ's The Better Rice Initiative for Asia) to develop a training program for extension service incorporating Climate-smart Agriculture. (http://www.rural21.com/english/news/detail/article/german-food-partnership-first-projects-ready-for-launch-0000931/)

7. Outcome indicators.

Outcome Indicator:

One to five flagship technical and/or institutional approaches identified and developed with farmers, key development and funding agencies (national and international), civil society organizations and private sector in three regions, which would directly enhance the adaptive capacity of the farming systems to the climate change conditions

Achievements:

Participatory variety selection trials and sensory evaluation were conducted to encourage farmers' participation in the selection of locally preferred varieties. This process will ensure high adoption of improved varieties.

Evidence:

Truong Thi Ngoc Chi, Tran ThiThuyAnh, Thelma Paris, Le Duy, Dang Tuyet Loan and Nguyen Thi Lang. 2014. Farmers' feedback on rice varieties tested under farmer-managed trials. Omon Rice (in press, Vietnamese). This is under CLUES project funded by ACIAR.

Outcome Indicator:

Breeding strategies of regional and national crop breeding institutions in three target regions are coordinated, informed by CCAFS-led crop modeling approaches that are developed and evaluated for biotic and abiotic constraints for the period 2020 to 2050

Achievements:

1) Improved rice varieties, largely against submergence and salinity, have been released to farmers and breeding centers for seed multiplication.

2) Simulations of heat stress in Asia were done using early, peak and late planting dates in different rice growing seasons to identify opportunities for shifting crop calendars which is one adaptation strategy for ensuring food security.

Evidence:

1) http://ccafs.cgiar.org/blog/elite-rice-combat-flooding-vietnam%E2%80%99s-mekong-delta#.VObUi3yUehX

2) Please see attached image showing proportion of rice areas with high minimum and maximum temperatures relative to the 1951-1980 average during different planting dates in the main rice growing season in Asia, 1951-2010.

Outcome Indicator:

Integrated adaptation strategies for agricultural and food systems inserted into policy and institutional frameworks at regional, national or sub--national level in 2 target regions. Policy makers and key stakeholders use CCAFS research outputs - guidelines, tools and methods-- to support the development of NAPAS, sector specific adaptation plans, or germplasm benefit sharing policies.

Achievements:

1) The 20-20-20 decree by the Prime Minister incorporates yield targets for higher agricultural production under aggravating climate constraints that can be deemed as a call for adaptation.

2) Several rice growing countries such as Vietnam, Cambodia, Thailand and Myanmar are currently discussing with IRRI programs for modernizing their rice sub-sector; while these discussions are most progressed for Vietnam (see above) the interest of the other countries has been expressed during several high-level meetings with the respective ministries over recent months.

Evidence:

1.1) Recent Decision No.1775 of Prime Minister aims at promoting AWD for mitigating GHG emissions (see attached original memorandum and screenshot of Vietnamese government portal)

1.2) Recent MARD Decisions No.543 and No.3119 specify AWD implementation. These MARD Decisions are now being translated into action at provincial level, one example for Quang Nam Prov. in Central Vietnam

Outcome Indicator:

One to five flagship risk management interventions evaluated and demonstrated by farmers and agencies at benchmark locations in three regions

Achievements:

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Evidence:

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Outcome Indicator:

Three food crisis response, post-crisis recovery, and food trade and delivery strategies tested and evaluated with partner crisis response organizations at benchmark locations in three regions

Achievements:

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Evidence:

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Outcome Indicator:

National meteorological services and regional climate centers trained and equipped to produce downscaled seasonal forecast products for rural communities in two countries in each of three regions

Achievements:

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Evidence:

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Outcome Indicator:

Findings and evaluation tools on mitigation and livelihoods benefits of alternative agricultural development pathways used by global agencies and decision-makers in two countries in each of the three regions

Achievements:

B.O. Sander attended a national meeting of Vietnamese climate change scientists developing MRV guidelines for GHG measurements for Vietnam in September 2014. Guidelines developed in SAMPLES will inform the Vietnamese GHG measurement protocol.

Evidence:

Please see attached Report on “Communities of Practice” meeting and workshop on Measuring, Reporting and Verification for Green House Gas Emission in Agriculture held on 18-19 September 2014 in Hue City, Vietnam.

Outcome Indicator:

Decision-makers in three regions better informed re options and policy choices for incentivizing and rewarding smallholders for GHG emission reductions

Achievements:

B.O. Sander published a policy brief on AWD together with Meryl Richards from CCAFS Theme 3.

In Vietnam, AWD became integral part of rice technology campaigns to increase farmers’ incomes (e.g. 1Must Do -- 5 Reductions).

Evidence:

https://cgspace.cgiar.org/bitstream/handle/10568/35402/info-note_CCAFS_AWD_final_A4.pdf

Outcome Indicator:

Project design and monitoring guidelines for smallholder agriculture in developing countries produced and contributing to global standards

Achievements:

Measurement guidelines have been published within SAMPLES project.

Evidence:

See chapter 5 of the book:Introduction to the SAMPLES approach In: Guidelines for EvaluatingImpact of Smallholder Agriculture on Climate Change (Rosenstock, T.S., et al., 2015)

http://www.samples.ccafs.cgiar.org/samples-protocol.html

Outcome Indicator:

Agriculture mainstreamed into the global climate change policies, and major international food security

initiatives fully incorporate climate change concerns

Achievements:
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Evidence:
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Outcome Indicator:

Global database and set of tools for climate-smart agriculture established and used by key international and regional agencies

Achievements:
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Evidence:
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Outcome Indicator:

New knowledge on how alternative policy and program options impact agriculture and food security under climate change incorporated into strategy development by at least 3 national agencies, and 3 key international and regional agencies

Achievements:
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Evidence:
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8. Leveraged funds.

There is no Leverage funds

9. Publications.