



**RESEARCH
PROGRAM ON
Rice**

**Plan of Work and Budget (POWB) for 2018
CGIAR Research Program on rice (RICE)**

Led by IRRI

 AfricaRice		 CIAT International Center for Tropical Agriculture
 cirad	 IRD Institut de recherche pour le développement	 JIRCAS JAPAN

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1. Expected Key Results

1.1 Adjustments/ Changes to Your Theories of Change:

Please provide (in a few bullets) any major modifications to the overall balance of the program and/or Theory of change, and explain why these have occurred at CRP level. If major changes have been made since the CRP proposal was published, please annex a brief updated summary of the CRP.

No changes are expected of RICE's Theory of Change in 2018. However, as evidence emerges, needed changes will be reflected upon throughout the year. A dedicated impact pathway analysis/update workshop will be organized with representatives from eight countries in Asia, with a focus on natural resources management technologies.

1.2 Expected Progress Towards Intermediate Outcomes and SLOs:

*Please provide a short narrative of expected highlights of the CRP expected in 2018: for instance, Key innovations or intermediate outcomes? Cross-cutting areas? Please use bullets where possible. Please complete [Table A: Planned Milestones](#). *Note that these summaries will be shared publicly in any system-level synthesis of plans for publication in 2018.*

FP1 Accelerating impact and equity

- New public and private partnerships for strengthening commercial seed production and seed delivery systems of improved and climate resilient rice varieties.
- At least one million farmers of which at least 50% are women are reached through partnerships and engagement with formal (public and private) and informal seed sector stakeholders
- Publications and policy briefs on youth, varietal identification, stress-tolerant rice varieties, varietal traits, site-specific nutrient management, best-management practices, and social organizations.

FP2 Upgrading rice value chains

- Develop and publish the policy paper "How can West African rice compete in urban markets? A demand perspective for policy makers" in *EuroChoices*, which outlines a regional policy strategy for rice value chain upgrading in West Africa. We expect this policy paper to be adopted by the CARD initiative and implemented in its strategy.
- Strengths, weaknesses, opportunities and threats that faced the irrigated rice value chain identified for strategic decisions making and action planning for sustainable rice enterprises development in Nigeria.
- Optimization of the Solar Bubble Dryer and the GrainSafe storage drying will continue for improved resource use efficiency of both technologies and they will both be commercialized in 2018.

FP3 Sustainable farming systems

- Integrated crop management options including decision support tools (Rice Crop Manager; Rice Doctor, Rice Knowledge Bank) will be regularly updated for the stakeholders who have already adopted their use and will be disseminated in new areas (Philippines, India, Bangladesh).
- Long-term field experiments are maintained and data are mined for insights into carbon storage and other sustainability parameters.

- Integrated crop management options including decision support tools (e.g. RiceAdvice; WeedManager) and machineries are adopted by development partners and disseminated in Burkina Faso, Ghana, Mali, Nigeria, Senegal, and Tanzania.

FP4 Global Rice Array

This flagship project focuses on upstream research and its outputs get translated into outcomes and impacts mostly through released varieties by FP5. As intermediate contributions, the following can be listed:

- New high-quality *de novo* reference genomes have been assembled for IR 8 (indica), N 22 (*circum-Aus*), Azucena (tropical japonica).
- Global phenotyping facilities and network up and running in at least 60% of the target sites
- In-depth genotyping of antenna panel (rice germplasm)

FP5 New rice varieties

- Initiation of new genomic selection-based breeding approaches for development of new rice varieties in intensive systems. A set of lines with higher experimental breeding values shall be screened across different locations to estimate their breeding values across breeding zones in Asia and Africa.
- The modification of the breeding program for intensive systems shall include development of varietal product profiles, introduction of rapid-generation advancement methods for segregating populations, modernization of breeding operations: seed sorting, planting, harvesting, threshing, grading and packaging in linkage with Excellence in breeding (EiB) platform.
- Evaluation of introgressed lines with major QTLs for tolerance to submergence, stagnant flooding, drought, blast, bacterial blight in mega deltas, rainfed lowland in Asia as well as for iron toxicity, low soil fertility in Africa.

1.3 Obtaining Evidence on Relevant Outcomes and Impacts

Please provide a short narrative for any outcome case studies, impact assessment or adoption studies planned in 2018 that are expected to provide evidence on key links between relevant research outputs, outcomes and long-term impacts. This may include relevant planned studies by others, e.g. SPIA or external partners. Please complete. Please complete Table B: Planned Studies for Relevant Outcomes and Impacts.

Adoption studies:

- Varietal identification through DNA fingerprinting and implications for adoption estimates, varietal monitoring and dissemination
- Role of social organizations in adoption of modern rice varieties
- Understanding gendered adoption, social norms and perceptions on Rice Crop Manager (RCM) in the Philippines.
- Understanding how men and women in households make decisions to adopt new stress-tolerant varieties in Madagascar
- Incidence, intensity of adoption of Stress Tolerant Rice Varieties (STRV) and of Best Management Practices (BMP)
- Area-based monitoring survey in Asian and African countries

Impact assessment studies

- Impact assessment of ARICA and other stress-tolerant varieties; certified seeds and agro-advisory services (RCM, RiceAdvice, etc...)

- Evaluation of natural resource management practices (i.e integrated weed management).
- IFAD has commissioned an impact assessment study for three outputs of the Consortium for Unfavorable Rice Environments (CURE): site-specific nutrient management in the Philippines, community-based seed banks in Nepal, and stress-tolerant varieties in the Mekong Delta in Vietnam. This impact assessment will be done by Virginia Tech and CIAT.
- SDC will commission an impact study as part of the project Closing Rice Yield Gaps with Reduced Environmental Footprint (CORIGAP), which focuses on improving crop management practices. It will be done in four countries using household surveys (baseline and year 4 or 5 of project interventions) and most significant change methodology.

Outcome case studies and impact stories

- Rural youth involvement in rice value chain and their career preferences, risk profiling of farmers and insurance intake, nursery entrepreneurs in Odisha and Bihar.
- Report highlighting impact stories from key interventions areas in Asia
- Relationship between gender differences and rice production/use of innovations in at least one of the following countries in Latin America: Colombia, Peru, Bolivia or Ecuador will be generated.
- Studies in Eastern India and Bangladesh to provide evidence on the gendered short term outcomes related to the use of stress tolerant rice varieties.
- Gender studies on identification of suitable business models in rice value chain implemented in West and East Africa

1.4 Plans by flagship project

Please summarize the plans for each flagship in 2018, including any plans for new directions or partnerships, and identifying any areas of work that are being discontinued. If major changes have been made to a flagship since the CRP proposal was published, please annex a brief summary of the current flagship program with the updated theory of change.

FP1 Accelerating impact and equity

- Database from area-based household surveys initiated in Asia, Africa and Latin America for tracking RICE progress indicators. RICE progress indicators estimated from area and hub-based surveys in Asia and Africa
- Establishment of a formal Economic Rice Observatory to provide policy briefs to the FLAR member countries in Latin America. Newly established policy in the Philippines providing support for weather-based crop insurance program.
- RCT experiment on SSNM to examine its impacts on input use, productivity, reinforcement behavior, dissemination pathway and other outcomes. Adoption and impacts studies on stress-tolerant varieties and DNA fingerprinting for variety identification
- Case studies on rural youth involvement in rice value chain: entrepreneurship capacity and employment opportunities. Gender-youth business models in rice value chain reinforced through better understanding of changing roles on decision making of women and youth in rice farming. Evidence-based information generated for improving the efficiency of rice value chain through experimental and ex-post impact assessment of rice technologies (GEM, ASI, Smart-valley, improved rice varieties and RiceAdvice). Understanding gendered adoption, social norms and perceptions on Rice Crop Manager in the Philippines.
- Application of the rice monitoring system for national food security program in Cambodia, supporting Thailand disaster relief program for rice farmers, crop insurance implementation in Tamil Nadu, India, Cambodia and Mekong River Delta, Vietnam, and development of remote sensing based rice monitoring system for Bihar, India

- Digital soil mapping in collaboration with Cranfield University, UK to undertake the spatial analysis of impact of droughts and floods on the global rice market.

FP2 Upgrading rice value chains

- A study will be conducted to analyze the effects of parboiling system on grain quality and market value capture by women small-scale processors in Cote d'Ivoire. Needs assessment of parboiling and post-harvest technology will be conducted in Tanzania.
- Diagnosing the irrigated rice value chain in Nigeria for strategic decision making and action planning for sustainable rice enterprises development in Nigeria.
- Global impact and adoption of technologies in rice breeding: 3 papers; Defining rice quality from consumers to genetics: publish review paper in *Trends in Food Science and Technology*; Determinants of consumer preferences for rice attributes: Evidence from South and Southeast Asia: submit research paper; Eliciting multi-trait cost functions in plant breeding through competitive tenders: submit research paper; Farmers' preferences for varietal trait improvements in Bangladesh, eastern India and Philippines: 3 papers; Farmers' and exporters' preferences for sustainable rice contracts in Vietnam.
- Consolidate and document curriculum for BSC studies in Agricultural Engineering in Cambodia; Consolidate and document curriculum for vocational training of Agricultural Machinery Mechanics in Cambodia.
- Conduct pilot test of combination of improved threshing, paddy cleaning, mini GEM system and milling system, and evaluate their effects on post-harvest losses and value addition in West Africa; Analyze the cost-benefit of using husk gasifier stoves as for cooking processes in Africa; Out-scaled best gasifier cook stoves in households in Cote d'Ivoire and Nigeria and test its effect on household savings, and workplace and environmental pollution. Comparison of postharvest losses from different harvesting business models in Bangladesh
- Further promotion of sustainable rice straw management and rice straw business models in Vietnam and Cambodia and formulation of policy recommendations; Exploring future markets and developing upgrading strategies for rice straw value chains in Vietnam, Cambodia and Philippines; Relationship between rolling phenomenon in traditional rice product, "Kuay chap" and their starch gelatinization will be elucidated. Detailed conditions to prepare "pop-rice" with Thai and Japanese varieties will be elucidated; Nutritional value of "pop-rice" as whole grain product, will be elucidated in terms of protein, vitamins and physiological functionality (i.e. IP6 or oryzanol).

FP3 Sustainable farming systems

- Options for reducing risks caused by climate risks identified (CoA3.1)
- Baseline input use efficiencies quantified, and constraints and opportunities identified (CoA3.2)
- Description of farming systems (CoA3.3)
- Characterization of baseline on-farm diets (CoA3.3)
- Based on the results from above bullet points and previous studies, new sustainable intensification and diversification options will be developed and tested in CoA 3.2 and 3.3.
- Integrated crop management options including decision support tools, which were already validated in farmers' fields, will be disseminated together with scaling partners (CoA 3.2).
- Prototype labor-saving technologies will be developed and tested (CoA 3.2).
- Sustainable Rice Platform (SRP) will release an updated version of the Standard and Performance Indicators (CoA3.2).
- Sustainable intensification options will be tested in long-term experiments (CoA3.2).

- A workshop will be held at IRRI HQ to strengthen collaboration among participating centers for designing sustainable farming systems and developing new innovations in Asia and Africa (all CoAs).

FP4 Global Rice Array

- Action sites for Global Rice Array selected and established in Southeast Asia, South Asia, China, Latin America, and Africa in the beginning of 2018. We anticipate that local resources will be available at some sites that are either self-supported or supported by grants to contribute to the Global Rice Array. Currently, at least 4 action sites in India are participating with sites supported by the Indian government through ICAR. Guangdong Province in China is interested in joining with support from the Provincial Government. Additional provinces such as Yunnan and Guangxi are expected to join later in 2018.
- Drone-based HTP phenotyping will be implemented in selected action sites. High resolution images with octocopter drone platform implemented. Fixed wing drone platform implemented in at least two trial sites.
- At disease monitoring action sites, we will focus on blast, bacterial blight, bacterial leaf streak, and virus diseases such as *Hoja blanca*. We will use the 3K genome data for mining new alleles for resistance genes. At CIAT new alleles will be mined for virus (RHBV), striga. Also phenotyping of new blast isolates to characterize rice germplasm under greenhouse conditions. A destructive method for HTP phenotyping tools based on image analysis to evaluate foliar diseases will be developed.
- Association analysis of new traits and genotypes will improve GWAS and mapping methods. Using this method, we will work on the identification of RHBV genes, C translocation and yield stability genes.
- We will sequence the Antennae Array which is designed to be a small population to be grown by partners at most action sites. The population is a panel of 70 lines nominated by all partner centers. They consist of traditional and modern varieties carrying diverse traits.

FP5 New rice varieties

- A subset of the 3 K panel shall be used to identify donors, QTLs and genes for anaerobic germination, stagnant flooding, drought, sheath blight, brown plant hopper and blast.
- Identification of donors for high nutrient efficiency and Fe toxicity tolerance.
- Development of methods to assign lineage groups along the genome and identification of QTLs for root cone angle and nutrient use efficiency.
- Screen a set of the GRiSP rice panel to identify QTLs for tolerance to seedling stage salinity and promising lines for symbiotic microbes and undertake genetic characterization of elite breeding lines to identify QTLs/genes for blast and agronomic traits.
- Development of SNP markers for number of important genes and deployment of disease resistance and quality genes in improved background at IRRI, SNP markers for Pup 1 at JIRCAS, genomic prediction approaches for abiotic stresses, optimization of genetic gain and protoplast callus transformation at CIRAD, development DNA fingerprinting of elite lines at AfricaRice and identification of genes for agronomic traits and protocols and tools for genome editing at CIAT.
- Modification of breeding strategy to include genomic selection, RGA based population advancement, automation of breeding steps and standardization of screening protocols for both intensive and marginal environments.
- Development and evaluation of high yielding and climate resilient lines for intensive system, rainfed lowland, mega deltas and uplands for release of breeding lines as varieties.
- Improve the understanding of milling quality traits, cooking quality traits, identification of QTLs for low chalkiness and development of high Zn rice lines and diagnostic markers for high Zinc.

- Development of C4 rice lines with 20% higher photosynthetic activity and improved understanding of C4 anatomy pathway.

1.5. Cross Cutting Dimensions

1.5.1 Gender, Youth and Capacity Development

Please briefly summarize the main areas of work in 2018 relevant to cross-cutting dimension.

Gender research in FP1 (supporting the whole RICE CRP) will focus on areas ranging from understanding what influences capacity to innovate in several contexts and the short term outcomes of using some innovations, particularly stress tolerant rice varieties in South Asia. The research will also provide insights into understanding opportunities to close the gender gap in women's access to knowledge and how that influences their nutrition seeking behavior for livelihoods in South Asia and use of nutrient management innovations in South East Asia. Understanding the aspirations of youth in South East Asia (Vietnam and Philippines) and how that influences their migration and farming occupational choices will be an important contribution.

An activity that cuts across different FPs involves elaborating the profitability and employment opportunities of business models that work for women and youth in Nigeria and East Africa. This activity includes FP1 on facilitating innovations processes and FP2 on different upgrading strategies. Tangible technologies will be delivered through FP2 (post-harvest technologies); FP3 (mechanization) and FP5 (seed production). Other cross-cutting propositions include: (1) Assessing acceptability of modern mechanical equipment for rice farming in Madagascar and Cote d'Ivoire through choice experiment approaches (with FP3) and (2) Decision making process by men and women to adopt new stress-tolerant rice varieties in Madagascar and Ethiopia (with FP5). Capacity of NARS partners will be enhanced on advance impact assessment methodology and institutional arrangements. Other value chain actors will be trained on rice business management and entrepreneurship in Cote d'Ivoire, Benin and Nigeria through the rice business school of AfricaRice.

FP2 will specifically mainstream gender in market analysis through the development of gender-sensitive product profiles and will engage youth through capacity building: Finalizing 13 gender-sensitive product profiles spanning 2 seasons and 5 regions (eastern India, Bangladesh, Philippines); Gendered decision-making on future rice breeding products in Bangladesh, eastern India and Philippines; Farmers' preferences for varietal trait improvements in Bangladesh, eastern India and Philippines. In order to attract more youth in rice research and business, MSc and PhD students will be trained on rice value chain analysis for development of competitive markets in Cote d'Ivoire, Nigeria, Tanzania and Madagascar. NARS and value chain actors in Cote d'Ivoire, Nigeria, Tanzania and Madagascar will be also trained in value chain analysis. All students and trainees in Cambodia are young people; the activities therefore directly contribute to capacity development for youth.

FP3 will conduct case studies to test the framework for gender equitable sustainable intensification. Integrated crop management options - including decision support tools – will be tested and disseminated with special attention to women and youth participation. Prototype machinery options (seeder, motorized weeder) to increase women's labor productivity will be tested in Madagascar. Also in Madagascar, surveys on labor, pest and crop management, and diversified rice-based cropping systems will be designed and conducted in a participatory manner including a gender approach to provide insights into social equity considerations. Youth in Senegal will be trained in the use of a cropping pattern analysis tool.

FP4 and 5 shall organize workshop-cum-training programs for youth and men-women scientists to elaborate the product profile development, use of elite lines in crossing programs, new breeding

strategy based on combining marker assisted selection with genomic selection, single seed descent (SSD) method of rapid generation advancement (RGA) to hasten breeding cycles, automation of breeding operations, standardization of evaluation protocols and effective data management using B4R, new and robotized phenotyping tools (e.g., drones), data management and evaluation procedures. FP5 shall train young scientists through internships, BSc and MSc, Ph.D. as well as Post-doctoral research. In 2018, at least 10 MSc, 5 Ph.D. students and 10 Internships at IRRI, and 5 MSc, 2 Ph.D. and 5 internships each at AfricaRice, CIAT, JIRCAS are to be trained out of which 50% shall be women.

1.5.2 Open Data and Intellectual Assets

Please highlight any specific plans you have to move forward in these areas in 2018.

- Integration of RICE/IRRI farm household survey database in interoperability system (<http://ricestat.irri.org/fhsd/index>)
- RICE/AfricaRice farm and household surveys data to be shared through data platform (<http://data.africarice.org/RiceStatistics>)
- RICE/CIAT farm and household survey data to be shared through the Latin American Fund for Irrigated Rice (FLAR) website (<http://ciat.cgiar.org/global-partnerships/flar/>).
- In order to further increase the visibility of RICE household survey data, other open access database platforms such as Harvard Dataverse, World Bank will be explored.
- RiceAtlas, a global spatial database on rice calendar and production published in Nature Scientific data and available online in 2017 (<https://www.nature.com/articles/sdata201774>), is a collaborative work involving IRRI, AfricaRice, IFPRI, Italian National Research Council, UC Davis (US), and University of Twente (Netherlands). The Latin America data is being updated in collaboration with CIAT and data for other countries are being improved. The revised dataset will be made publicly available. This open source global dataset has already been used as input in several modeling studies and publications.
- For the international Global Yield Gap Atlas (<http://www.yieldgap.org/>), RICE will provide new country-level information on rice for Egypt, Ivory Coast, Madagascar, Rwanda, and Senegal.
- Inclusion of long-term experimental data in the Global Long Term Experiment Network being developed in collaboration with Rothamsted Center.
- Rice weed inventory and characteristics will be added to the database of the Weed Identification and Knowledge in the (WIKWIO) (<http://portal.wikwio.org/>).
- New reference genomes will be made available. Data produced from phenotyping of the global rice array panels will be made available together with their associated genomics data – detailed mechanics are to be worked out in 2018.

In the (pre-)breeding domain, developed donors, QTLs, genes and gene-based markers for different traits are shared openly after publication in journals with all participating institutes as well as NARS institutions working on rice. Developed breeding lines are shared freely with public sector organization for evaluation and release. Data generated through multi-environment trials and INGER will be published on the web site. All reports and analyzed data for multilocation evaluation are also published openly. The RICE centers shall use existing SMTA and customized MTA for germplasm exchange. Issues such as using gene constructs licensed from other organizations (Public and Private sector for example by CIAT) have freedom to carry testing/proof of concept but no freedom to distribute to other collaborators need to be addressed. For C4 rice at IRRI, based on the IP agreement within the C4 consortium, listed genes shall be shared after due approval by the consortium. For genome editing including CRISPR/CAS 9 – Broad Institute is the patent holder of the

CRISPR CAS technology for Eukaryotes. For public sector/our research, this technology has been obtained through MTA.

2. Planning for Effectiveness and Efficiency

2.1 CRP Staffing in 2018:

Please briefly summarize any staffing issues or constraints relevant to CRP capacity.

The year 2017 was marked by considerable turnover of CGIAR center staff, which is expected to continue a bit into 2018. At management level, overall leadership of FP1 changed from dr Mohanty to dr. Pede. Senior staff will play an important mentoring role in 2018 to bring new staff up to speed.

2.2 Financial Plan for 2018, including use of W1/2

Briefly highlight any important issues regarding the financial plan and highlight any particularly interesting plans for the use of W1/2 in 2018. Please complete Table E: planned budget, and please complete Table F: Main Areas of W1/2 Expenditure.

Compared with 2017, the approved W1,2 budget has decreased with 0.39 M\$ from 16.14 to 15.75 M\$. However, the actually received W1,2 funds in 2017 were only around 14.8 M\$, which was 1.35 M\$ less than approved and spent. For the fourth year in row, the RICE CGIAR Centers had to draw down on their financial reserves by spending approved W1,2 budgets. Hence, in 2018, W1,2 expenditures will initially be estimated at around 90% of approved budget until more certainty develops about the realization of the CGIAR 'stretch funds'.

The estimated income from W3 and bilateral sources has increased with 7.5 M\$ from 2017 to 2018, bringing total RICE budget up to 79 M\$ (from 72 M\$ in 2017). The relative contribution of W1,2 funds decreased from 22% in 2017 to 20% in 2017. The increase in W3 plus bilateral funding was most pronounced in FP5 with about 8.5 M\$. On the other hand, total W3 plus bilateral funding in FP1 decreased with 3.2 M\$.

Though the relative share of W1,2 funding has decreased, it still provides the backbone of RICE and catalyzes impact through strategic investments along the whole impact pathway, from upstream research to downstream development of business models and multistakeholder partnerships for innovation and scaling out. W1,2 investments cover both the research and product development component of the impact pathway as well as the strengthening of the enabling environment (as per Theory of Change), eg through capacity development and partnership building. The long-term nature of W1,2 funding provides the continuity to the program, and guarantees not only short-term impacts (as derived from most bilateral projects) but also long-term impacts on 5-10 year time scales. Most W1,2 funds are used to support key RICE and flagship project staff, key ME&L activities across all projects and funding sources, gender analyses and gender mainstreaming, capacity development and partnership building for scaling out and achieving impact at scale, and new initiatives (such as farm diversification, value-chain analyses).

2.3 Collaboration and Integration

2.3.1 New Key External Partnerships

Please highlight any interesting new partnerships planned for 2018, including their added value in achieving expected results.

- Partnership with GREAT (Gender-Responsive Researchers Equipped for Agricultural Transformation) to design, conduct and deliver innovations that integrate gender (<https://www.greatagriculture.org/>).
- Collaboration with the Technical Centre for Agricultural and Rural Cooperation (CTA) in implementing the project “Promoting Youth Entrepreneurship and Job Creation in West Africa’s Rice Value Chain”
- Collaboration with FAO on new rice statistics survey methods and on institutional arrangement for rice agri-food transformation in Africa
- Partnership with private companies (i.e Advanced Chemical Industries Ltd (ACI), Metal Private Ltd) in Bangladesh to join efforts in bringing sustainability in the seed sector with respect to climate resilient rice.
- Partnership with Virginia Tech on the impact evaluation of RICE technologies for unfavorable environments.
- Collaboration with University of Gothenberg to analyze the behavioral dynamics with respect cognitive ability and its impact on insurance intake.
- Collaboration with University of Alberta to study the impact of infrastructure development (rural roads) on gender in agriculture decision making
- Collaboration with University of Illinois, and University of Saskatchewan for impact assessment of rice technologies in Africa.
- Continued partnership with Philippine government agencies, namely, Philippine Rice Research Institute, Bureau of Plant Industry, Department of Agriculture (DA)-Central and Regional Field Offices through three projects funded by the DA (PRIME, RCM-SMS, Specialty Rice). The roles of local partners are crucial in data collection, providing local knowledge and context, and, in the case of PRIME, transfer of know-how for institutionalization of activities related to pest surveillance, risk mapping, and pre-season and in-season crop management recommendations to avoid pest outbreaks.
- The gender research team will be partnering with Access Livelihoods India, an established social enterprise to develop a strategy and test it for promoting women’s enterprise and entrepreneurship development in Odisha, an Eastern Indian state. The team will also be partnering with the Center for Research on Innovation and Science Policy to develop practical strategies for enhancing innovation capacity of women farmers, with a particular focus on making knowledge and advisory services more accessible to them to bridge the gender gap.
- The Partnership with GREAT (Gender-responsive Researchers Equipped for Agricultural Transformation) of Cornell and Makerere Universities will be important in shaping the design, conduct and delivery of innovations that integrate gender through the collaborative work in Madagascar.
- Collaboration with the remote-sensing and crop insurance team from International Food Policy Research Institute (IFPRI) lead by Liangzhi You and Philippines Weather Index-Based Insurance (WIBI) project team from Philippine Rice Research Institute (PhilRice) and United Nations Development Programme (UNDP) to pilot remote-sensing and crop mode supported weather-based rice crop insurance program in selected rice cultivation area in the Philippines deploying randomized control trials to elicit information from farmers and other value-chain actors, including study on gender-differentiated perception and understanding option to support youth involvement in strengthening resiliency of rice farming in the face of unfavorable impact of climate and trend in agricultural sector.
- New partnership will be develop to support work on crop insurance, development of new algorithm for historical yield data generation and integrating remote sensing based information into RCM with the following institutions: University of Maryland, USA, University of Valencia, Spain; Cranfield University, UK; Asian Disaster ADPC Preparedness Center; 6th Grain, USA; SwissRe; SCOR.

- Partnership with the Ministry of Agriculture and Rural Development (MARD) and Loc Troi in Vietnam, and the Sustainable Rice Platform (SRP) for the implementation of policies that encourage the adoption of sustainable rice standards in the Mekong River Delta, Vietnam.
- Expanded partnership (public, private, civil society, NGO, academic, farmer groups, etc) of the Sustainable Rice Platform.
- Establishment of the Direct Seeded Rice Consortium, a multi-stakeholder (public-private) consortium to develop a comprehensive, science-based, agronomic package adapted for direct seeded rice production in Asia, making direct seeded rice accessible and widely available to rice farmers, thereby enhancing the economic and ecological sustainability of rice production in Asia.
- Partnership with Rothamsted and other public sector agricultural research organizations on global agricultural long-term experiments.
- CIAT will collaborate with EMBRAPA to study the upland environments in Brazil and determine the specificities for breeding (TPE) using modelling approaches (Oryza model)
- CIAT will work closely with national partners (FEDEARROZ and FLAR), universities (Universidad Javeriana, University of Tokyo, University of Texas) to Set up a low-cost fixed station platform that monitors crop growth, soil status (Ph, humidity), nitrous oxide and methane emissions, and weather (rain, wind speed, solar radiation, temperature, humidity).
- IRRI will develop new collaborations in India with the Indian Council of Agricultural Research, as well as with several State Agricultural universities (SAUs) through the new IRRI South Asia Regional Center, Varanasi, to increase genetic gain, grain yield and reduce rice yield losses due to abiotic stresses in eastern and north eastern India.
- IRRI shall extend its South Asia strategy to develop new collaborations with State Governments in eastern, north eastern and southern India as well as in Nepal and Bangladesh.
- To expand C4 mutant screening capacity, IRRI has initiated collaboration with CAAS, China to formulate a joint laboratory in the Biotechnology Research Institute, Beijing that will become operational later in 2018 and funded by CAAS China.
- JIRCAS will develop strong collaboration with FOFIFA and LRI/University of Antananarivo in Madagascar on nutrient management and breeding of nutrient efficient varieties.
- CIRAD and EMBRAPA will work together on dissection of genetic bases of female outcrossing ability and female hybrid seed production ability
- CIRAD-CIAT-FLAR will collaborate on inventory of elites lines for major irrigated rice breeding programs in Latin America.

2.3.2 New Contribution to and from Platforms

Please describe expected services, collaborative research or studies, materials that would be required from each of the CGIAR Platforms (Big Data, Excellence in Breeding, Genebank, and Gender) to support the implementation of the CRPP's POWB for 2018, and an indication of the source of the budget where possible (e.g. CRP, Platform, Joint, other). Please complete Table G: New Internal (CGIAR) Collaborations among Programs and between the Program and Platforms.

- RICE will collaborate with the Gender Platform to implement an assessment of women-led informal seed systems to understand how they contribute to women's engagement and empowerment and, how they enhance women's access to good quality and affordable seed at the right time.
- FP2 of RICE will contribute insights from the product profiles and variety replacement programs to the Excellence in Breeding Platform. FP4 will collaborate in the development of the phenotyping module, of tools to combine phenotypic and genotypic data in Galaxy, of BrAPI for B4R/GOBII/G4R/SNPSeek/Galaxy interoperability, and to enhance capacity for fine mapping. FP5 will collaborate on automation and standardization of breeding procedures, including data

capturing, standardized evaluation system, automation of breeding operations, statistical design use in breeding evaluations and data analysis.

- FP4 (CoA 4.5) will engage with the Big Data Platform on data storage and retrieval platforms. RICE FP4 will collaborate on the development of a grant proposal to develop Drone Image databases. FP5 shall collaborate on genotypic data storage and effective analysis and use of the data.
- FP5 shall effectively collaborate with the Genebank Platform on increased use of genetic diversity in breeding.

2.3.3 New Cross-CRP Interactions

Please describe what is expected to be done through new collaborations with other CRPs and any relevant outputs, outcomes and progress towards impact, focusing on results that could not have been produced without such alliances and including the “give and take values” for the CRP. Please complete Table G: New Internal (CGIAR) Collaborations among Programs and between Programs and Platforms.

A4NH:

- The London School of Hygiene & Tropical Medicine, IITA, and AfricaRice will jointly assess effect of rice cultivation on populations of mosquito larvae with special focus on water management. This activity will be mainly supported by A4NH.
- RICE FP5 will collaborate in the development of healthy and nutrient-dense rice varieties.

CCAFS

- A joint proposal will be developed together with CCAFS under the title “Climate-Smart Agriculture for Transforming the Rice Sector in the Vietnamese Mekong Delta”.
- FP2 will align the policy work on sustainable and climate-smart rice value chain upgrading with CCAFS.
- FP5 will in developing, evaluating, and disseminating climate-smart rice varieties and farming systems and contributing to better climate mitigation and adaptation.

FISH (WorldFish):

- FP3 and WorldFish will execute a joint rice-fish project in Myanmar.

FTA (ICRAF)

- FP3 and ICRAF will organize a joint session on rice agroforestry at the International Rice Conference in October 2018 for identifying key areas for potential collaboration.
- AfricaRice and ICRAF identified common interesting areas for R&D in Ivory Coast in 2017, and at least one joint proposal will be developed in 2018.

Livestock (ILRI):

- As part its sustainable rice straw management activities, FP2 will closely cooperate with ILRI/Livestock in Vietnam on the identification of rice straw markets for animal fodder and on processing technologies for better digestibility.
- Contribution for sustainable rice production (reduced GHGE and pollution), value adding options for farmers, cattle owners and machinery service providers.

MAIZE, WHEAT:

- Continuation of collaboration on cereal systems in South Asia through the CSISA project.

PIM (IFPRI):

- A new proposal will be developed together with PIM under the title “Achieving income and dietary diversification goals through sustainable intensification in Asia”. Studies conducted under the Global Future and Strategic Foresight will lead to peer-reviewed publications involving RICE and PIM. The RICE CRP will also contribute to at least 2 peer-reviewed publications in a special issue of *Global Food Security*.

RTB:

- IITA and AfricaRice have initiated a collaboration to map rice-based farming systems in Rwanda and DR Congo. The objective is to explore the potential for RTB crops-rice integration in smallholder farming systems in the African Great Lakes Region. This study will continue in 2018. At least one new project proposal will be jointly developed and submitted.
- CIAT will work closely with RTB to adapt cassava and rice phenotypic tools for both crops and to upgrade the HTP capacities for both CRPs. The CRPs will jointly improve computational efficiency of the image analysis pipeline, and will support the joint implementation of the fixed platform at two different sites.
- Joint research on rice-potato-based sustainable intensification systems has started in India (West Bengal). The collaboration with RICE will allow testing the sustainability of the different approaches based on the combination of adapted rice and potato varieties and innovative management practices. Scoping workshop on rice-potato/sweet potato systems in South, South-East and East Asia is foreseen to identify opportunities and develop concept notes for fund raising in collaboration with NARS of target countries.

2.3.4 Expected Efforts on Country Collaboration

Please describe expected efforts related to the CGIAR country collaboration initiative in 2018, and in which countries? What are the priority themes for collaboration and how will this work be funded?

In 2017, the System Management Board assigned leadership of the CGIAR Country Collaboration initiative to the CGIAR Centers. A workgroup was convened to provide guidance and proposed modalities of engagement of CRPs. RICE looks forward to leadership and such guidance from this workgroup and from the System Management Office so it can plan its efforts in 2018 accordingly. Meanwhile, RICE continues to collaborate with CRPs/CGIAR centers (especially MAIZE, WHEAT, CCAFS, A4N&H, FISH) in various countries by sharing experimental sites, staff and offices. Highlights are:

- Vietnam: participation in a workshop/meeting with Worldbank and CGIAR centers (organized by CCAFS); sharing of staff and offices and various administrative arrangements (CCAFS, CIP, ICRAF).
- India, Bangladesh: sharing of experimental sites, staff, office space with MAIZE and WHEAT (through CSISA project)
- Myanmar: sharing of experimental sites, staff, office space (FISH, IWMI, WorldFish)

- Latin America and Caribbean: joint activities, sharing of experimental sites, staff, office, equipment etc. with CCAFS; joint partnering with FLAR on climate-smart technologies.
- Philippines, Colombia, Benin: sharing of office space on the RICE center campuses with other CGIAR Centers.

2.4 Monitoring, Evaluation, and Learning

Please highlight any areas of interest for evaluation, review or learning event planned in 2018, and complete Table H: Planned Monitoring, Evaluation, and Learning Exercises.

- The annual RICE Monitoring, Evaluation, Learning, Impact Assessment, Gender (MELIAG) meeting will be organized on Sept 3-6, 2018. A dedicated impact pathways and learning workshop will be held under FP3 with participants from eight countries in the CORIGAP project (Asia).
- There will be a joint initiative among the RICE centers to harmonize RICE progress indicators and methodologies for computing these indicators. Lessons learnt from previous household surveys will help in designing the new rounds of area-based surveys in 2018. A RICE report highlighting trends and changes on progress indicators will be developed and made available online at www.grisp.net.
- In Asia, IRRI will conduct the area-based household survey in seven countries: India, Philippines, Bangladesh, Vietnam, Myanmar, Indonesia, Cambodia. Given the budget constraint, a light survey questionnaire focusing on key indicators will be considered. For monitoring and evaluation of rice technologies in Africa, panel surveys will be conducted in Nigeria, Benin and Cote d'Ivoire. Trainings on new methods of rice statistics survey will be organized in Madagascar. Pilot surveys and stakeholder workshops on new methods for rice statistics survey will be organized in Ghana, Madagascar and Ethiopia. The AfricaRice Management Information System (MIS) for ME&L (<http://www.mlaxmel.com/>) and the website for rice Statistics (<http://data.africarice.org/RiceStatistics>) will be further improved. The IRRI farm household survey database (<http://ricestat.irri.org/fhsd/php/panel>) will be integrated in interoperability system, wherein info-graphics will be made available on key indicators from surveys conducted in Asia and Africa. Household surveys data collected in Latin America are being considered for open access through Harvard Dataverse and some of these databases will be submitted for peer review journals that specialize in publishing databases (e.g. Data in Brief, Scientific Data). The data collected throughout the joint monitoring and evaluation initiative between Latin American Fund for Irrigated Rice (FLAR) and CIAT is going to be displayed on FLAR website providing descriptive analysis and wider access to the information collected in the region (<http://ciat.cgiar.org/global-partnerships/flar/>).
- CIAT will present and discuss the analysis of the monitoring and evaluation initiative between FLAR and CIAT during the XIII International Rice Conference for Latin America and the Caribbean.

3. CRP Management

3.1 Management of Risks to your CRP

Highlight any particular risks (if any) that you foresee coming up in 2018 and any mitigation measures planned. Please refer to [CGIAR Risk Management Guidelines](#)

The top risk is the dramatically increased uncertainty in funding that took place in 2017 and that is expected to reverberate throughout the CRP portfolio in 2018. Also, for the fourth year in a row, actually received W1,2 funds were below approved funds and the RICE CGIAR Centers drew down on their financial reserves. This can not happen again in 2018, so RICE will conservatively spend its W1,2 funds and initially target 90% of approved budget. The introduction of the term 'stretch funds' in the overall CGIAR funding scheme has raised additional uncertainties as it is not clear how this fund will be managed.

Because of budget uncertainty and repeated reduction in W1,2 funding in 2018 a number of W1,2-funded activities were reduced in scope, and this will continue in 2018. The number of action sites in FP2 and FP3 has been decreased:

- In CoA 2.2 and 2.4 activities in Bangladesh have been reduced
- In FP3, the original eight action sites in the 2018 milestone "Baseline input use efficiencies quantified, and constraints and opportunities identified" will be reduced to six action sites; the original six action sites in the 2018 milestone "Options for farm diversification developed and tested" will become four action sites; the original four action sites in the 2018 milestone "Baseline on-farm diets characterized" will be three sites.

As detailed in RICE's risk management strategy (chapter 1.0.15 of the RICE proposal), most risks identified in the CGIAR risk management guidelines are handled at center level by the CGIAR centers. Specific management and governance risks pertaining to RICE are managed as per RICE strategy.

In terms of risk on delivery of outcomes, RICE has expanded its network of national downstream partner collaboration and will continue to do so in 2018. Similarly, the risk of insufficient connection to frontier (upstream) research technologies is addressed by strengthened partnerships with advanced research institutes (see section 2.3.1 for examples). A specific risk identified in FP4 and FP5 are the increasingly stringent rules that limit international germplasm exchange. The RICE CGIAR Centers address this by pro-actively engaging with governments and the relevant international bodies to facilitate such exchange for research and development purposes.

Finally, risks exist to in-country operations by upcoming general or presidential national elections in some of RICE's target countries: Nigeria, Senegal, Madagascar, Bangladesh, Cambodia, and Thailand. In other countries, ongoing political unrest may affect potential impacts of RICE investments. RICE centers have put measures in place to ensure safety of its personnel.

3.2 CRP management and Governance

Please briefly describe any important changes in governance or management expected in 2018, if any.

No changes.

Table A: Planned Milestones

Please include the planned milestones mapped to FP, sub-IDO and 2022 outcomes. Please indicate how W1/2 funding will be used vis-à-vis W3/bilateral.

FP	Mapped and contributing to Sub-IDO	2022 CRP outcomes (from proposal)	Milestone*	Budget		Assessment of risk to achievement** (L/M/H)	Means of verification
				W1/2	W3/bilateral		
1.1	Increased capacity for innovation in partner research organizations	Foresight analyses and priority setting used by RICE and partner scientists to develop and target technology options	Application of the rice monitoring system for national food security program in Cambodia, supporting Thailand disaster relief program for rice farmers, crop insurance implementation in Tamil Nadu, India, Cambodia and Mekong River Delta, Vietnam, and development of remote sensing based rice monitoring system for Bihar, India	630,499	1,288,638	L, support from national partners	Reports, publications
1.2	Improved capacity of women and young people to participate in decision-making	Improved role in decision making by women and youth in rice value chains as evidenced by empowerment measures at key action sites	Gender-youth business models in rice value chain reinforced through better understanding of changing roles on decision making of women and youth in rice farming	723,398	1,406,452	M, Dependence on support from national partners and governments	Reports, publications
1.3	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	Well-functioning multistakeholder platforms for innovation at six action sites (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	Establishment of a formal Economic Rice Observatory to provide policy briefs to the FLAR member countries	161,547	3,139,732	L, support from national partners	Policy briefs
	Enhanced individual capacity in partner research organizations through training and exchange	New cadre of young, well-trained scientists - 30% women - engaged in rice research	250-300 scholars (30% women) enrolled in advanced degree training (bachelors, masters, PhD)	53,849	1,046,577	L	Training centers statistics, NARES training programs, University enrollment.
1.4	Increased capacity of beneficiaries to adopt research outputs	Effective public and private delivery systems for seeds of improved rice varieties in six countries (Bangladesh,	Sufficient commercial seed produced by the seed system to provide seeds for at least 5 million farmers, of which at least 50% are women, at the key action sites	170,959	1,302,865	L	Bilateral project reports, RICE Indicators, seed sale reports, public provisioning of seeds

		India, Nepal; Nigeria, Senegal, Tanzania)					
1.5	Increased capacity of beneficiaries to adopt research outputs	Impacts and adoption of RICE technologies assessed	Adoption and impact studies on NRM technologies and/or varieties - rolling plan based on progress of technologies along the impact pathway	838,484	4,836,946	L	Data, reports and publications; budget expenditures
1.6	Increased capacity for innovation in partner research organizations	Functional and effective results-based management system for RICE and its partners	Annual updates of progress and performance indicators; reflective learning workshops; commissioned reviews and evaluations (rolling plan)	1,062,817	252,456	L	Workshop reports; strategy papers; regular skype meetings with core team
2.1	Diversified enterprise opportunities	Diversified enterprise opportunities through upgraded value chains at six action sites (Indonesia, Myanmar, Vietnam; Cote d'Ivoire, Nigeria, Tanzania)	Upgrading strategies developed with partners for increasing value capture by actors in three action sites	667,957	196,446	L	Reports, case study documentation, significant change stories, RICE indicators
2.2	Improved access to financial and other services	Income by value-chain actors increased by 10% at six action sites through improved access to financial and other services (Indonesia, Myanmar, Vietnam; Cote d'Ivoire, Nigeria, Tanzania)	Rice market value captured by women scale-processors increased thanks to the improved parboiling system introduced for rice products diversification in Cote d'Ivoire. Opportunities for youth engagement in agribusiness services provision identified along the rice value chain in Côte d'Ivoire.	211,317	1,003,629	L, collaboration with local partners	Reports, case study documentation, significant change stories, RICE indicators
2.3	Reduced pre- and postharvest losses	Income by value-chain actors increased by 15% through adoption of at least one of the postharvest or value addition practices or technologies at six action sites (Bangladesh, Cambodia, Indonesia; Benin, Cote d'Ivoire, Nigeria)	At least two loss reduction or value addition options identified and piloted	434,631	432,898	L	Reports, case study documentation, significant change stories, RICE indicators
2.4	Increased	Functional value	Prototype improved	277,438	803,531	L	Existence of

	value capture by producers	chains for improved processing and novel products from rice at six action sites (Bangladesh, Cambodia, Indonesia; Benin, Cote d'Ivoire, Nigeria)	processing and novel products developed and tested at six action sites				new products and processing technologies, Reports, case study documentation, significant change stories, RICE indicators
3.1	Enhanced capacity to deal with climate risks and extremes	Results of completed farming systems analyses used to focus development activities on key opportunities for adapting to climate risks at eight action sites (Nigeria, Senegal, Tanzania, Madagascar, Vietnam, Indonesia, Bangladesh, Myanmar)	Options for reducing risks caused by climate risks identified at six action sites (Senegal, Madagascar, Vietnam, Indonesia, Myanmar)	577,524	1,378,003	L (General or presidential elections will occur in Senegal, and Madagascar, and might affect activities in those countries.)	Reports, case study documentation
3.2	Closed yield gaps through improved agronomic and animal husbandry practices	Improved management practices that reduce yield gap by 10-15% developed and disseminated at eight action sites (Nigeria, Senegal, Tanzania, Madagascar, Vietnam, Indonesia, Bangladesh, Myanmar)	Integrated management options identified for reducing yield gaps at six action sites (Nigeria, Senegal, Madagascar, Bangladesh, Myanmar, Indonesia)	405,360	3,098,001	L (General or presidential elections will occur in Senegal, and Madagascar, and might affect activities in those countries.)	Reports, case study documentation
	More efficient use of inputs	Improved management practices that increase input use efficiency by 5% developed and disseminated at eight action sites (Nigeria, Senegal, Tanzania, Madagascar, Vietnam, Indonesia, Bangladesh, Myanmar)	Baseline input use efficiencies quantified, and constraints and opportunities identified at six action sites (Nigeria, Senegal, Madagascar, Vietnam, Indonesia, Myanmar)	405,360	3,098,001	L (General or presidential elections will occur in Nigeria, Senegal, and Madagascar, and might affect activities in those countries.)	Reports, case study documentation, RICE indicators

	Technologies that reduce women's labor and energy expenditure developed and disseminated	Value chain actors including farmers and service providers using new mechanization options designed to increase women's labor productivity at seven action sites (Nigeria, Senegal, Tanzania, Vietnam, Indonesia, Bangladesh, Myanmar)	Prototype labor-saving technologies identified at two action sites (Madagascar, Myanmar)	173,726	1,327,715	L (General election will occur in Madagascar. Instability in Cote d'Ivoire might affect activities.)	Reports, case study documentation
	Reduced net GHG emissions from agriculture, forests and others forms of land use	Improved rice management practices that reduce GHG by 5% disseminated at three action sites (Bangladesh, Philippines, Vietnam)	Improved rice management practices that reduce GHG emissions demonstrated in Vietnam	173,726	1,327,715	L	Reports, case study documentation
3.3	Increased livelihood opportunities	Options to diversify rice farms with other crops, animals, or trees developed and disseminated at six action sites (Cote d'Ivoire, Madagascar, Tanzania, India, Bangladesh, Myanmar) (together with other CRPs)	Options for farm diversification developed and tested at four action sites (Cote d'Ivoire, Madagascar, Bangladesh, Myanmar)	629,477	1,394,238	L (General election will occur in Madagascar. Instability in Cote d'Ivoire might affect activities.)	Reports, case study documentation
	Increased access to diverse nutrient rich food	Diversified on-farm diets sourced through diversified farming systems at four action sites (Cote d'Ivoire, Madagascar, Bangladesh, Myanmar) (together with other CRPs)	Baseline on-farm diets characterized at three action sites (Madagascar, Bangladesh, Myanmar)	209,826	464,746	L (General election will occur in Madagascar.)	Reports, case study documentation
4.1	Enhanced capacity to deal with climate risks and extremes	Predicted global rice production risks used to guide development and targeting of	Global array refined based on preliminary results to capture major TPEs (target populations of environments of breeding programs) and	594,025	354,855	L	Defined array and reference panels; first panels grown at platform sites

		climate change-adapted technologies at least for the most vulnerable rice agroecosystems	major climate trend scenarios				
4.2	Enhanced genetic gain	A functional global phenotyping network composed to 30% by non-CRP partners (including self-sponsored), and genetic donors (>10) and ideotypes (2-4) adopted by breeding programs to develop climate-smart rice varieties	(i) Phenotyping facilities and network up and running in at least 60% of the target sites, (ii) new HTP platforms established at Mbé (HTP field-based), CIAT PALMIRA, and IRRI, (iii) Efficient reporting (data acquisition, quality control, annual reports, etc.) mechanisms/tools are in place	914,999	2,560,492	L	Existence of phenotyping platforms, phenotype-genotype protocols available, reports
4.3	Enhanced capacity to deal with climate risks and extremes	Characterized pathogens populations and diversity used to predict varietal deployment for at least 3 major rice diseases	Spatial distribution of pests and diseases and deployment of available isolines completed in at least 60% of the target sites	939,078	1,352,610	L	Existence of trials, reports, management options communicated in various (E) outlets
4.4	Enhanced genetic gain	At least 5 major QTLs/genes that are stable across environment and management, for all four mega rice environments, are integrated in the respective varietal development pipelines	Value added to candidate genes from Global Phenotyping Network GWAS through post-GWAS analyses with data curated.	382,970	949,939	L	Publications, reports, open access data bases (eg SNP Seek)
4.5	Increased conservation and use of genetic resources	A functional rice data hub providing open access phenotypic and genotypic information and data analysis tools to global users	(1) Data analysis tools: a) GWAS pipeline - a data analysis tool available to users through IRRI Galaxy. (b) Genotype imputation tools available through IRRI Galaxy environment). (c) haplotype clustering and visualization tools. (2) Datasets: (a) imputed data for most used genomic datasets (e.g. 3K, HDRA (b) haplotype database for all/major rice genes based on 3K	286,133	2,262,288	L	Tools available for partners, Reports, research projects at partner research organizations

			and HDRA data.				
5.1	Increased conservation and use of genetic resources	Rice diversity in rice gene banks used globally for identification of traits and discovery of new genes	20% of targeted traits/donors/QTLs/genes identification achieved,	529,852	2,347,855	L. Highly unlikely that some of the accessions do not show tolerance to anaerobic germination	Publications, reports
5.2	Increased conservation and use of genetic resources	Novel tools for precision biotech breeding based on genetic diversity shared open access and globally	Models and computational methods to characterize inter(sub) specific mosaic structure of rice genomes and its impact on traits transmission.	809,580	2,922,746	H- reduced funding may effect delivery of output	Tools available through websites
5.3	Enhanced genetic gain	New rice varieties resulting in 1.3 % genetic gain in intensive systems	25-50 New rice varieties for intensive system	843,772	4,822,718	L- NARS support release of new lines	Existence of released new varieties
5.4	Enhanced adaptive capacity to climate risks	Rice varieties with 20, 15, 10% reduction in yield loss caused by factors induced by climate change, in mega deltas, rainfed lowlands, and uplands, respectively	Genes conferring tolerance of submergence, stagnant flooding, salinity, high/low temperatures, iron toxicity, drought, and blast conferred to elite backgrounds; initial elite lines nominated for release	709,392	12,611,288	L- National system support evaluation	Publications, reports
5.5	Increased access to diverse nutrient rich food	High quality and high nutritious rice varieties that are preferred by men and women farmers and consumers	Novel tools and processes to capture specialty traits developed at key action sites to minimize chalk, enhance head rice recovery, capture cooking quality	457,318	4,972,331	M- Effectiveness of QTLs against different backgrounds	Publications, reports
5.6	Increased conservation and use of genetic resources	Prototype C4 rice lines with increased yield potential available	One line with a basic C4 pathway with at least 20% enhanced photosynthetic rate and improved biomass production fed to FP4 for validation of genetic gain from C4	132,754	503,418	H- C4 is a complex trait	Publications, reports

** Milestones include both outputs, output use and outcomes along the impact pathways as appropriate to the scale and maturity of the work. In this table A, please focus as much as possible on significant milestones towards outcomes which can be justified the completion at reporting.*

***Please list the major risks focusing more on technical or geographic considerations that may hinder the expected delivery of results by the CRP.*

Table B: Planned Studies for Relevant Outcomes and Impacts

Please complete the following table to share any outcome case studies, impact assessment or adoption studies planned. Please indicate relevant sub-IDOs, and provide links to long-term expected outcomes and impacts, if appropriate. Mention any cross-cutting dimensions explicitly, if any.

Planned topic of study	Geographic scope	Relevant to Sub-IDO, or SRF target if appropriate	Comments
Randomized Control Trials on ICT advisory applications (SSNM), and testing the role of reinforcement messages.	India	Increased capacity of beneficiaries to adopt research outputs	Treatment has been provided and data collection planned for 2018.
Randomized Control Trial on Site Specific Nutrient Management (SSNM) to examine to the impacts on input use, productivity and other outcomes	Philippines	Increased capacity of beneficiaries to adopt research outputs	This study is part of the CURE project evaluation commissioned by IFAD
Most significant change studies after project intervention for improved crop management practices (FP3)	Myanmar, Indonesia, Thailand, Vietnam	Closed yield gaps through improved agronomic and animal husbandry practices More efficient use of inputs Technologies that reduce women's labor and energy expenditure developed and disseminated	Part of CORIGAP project, funded by SDC
Randomized Control Trial for evaluation of Green Super Rice Varieties	Bangladesh	Increased capacity of beneficiaries to adopt research outputs	Data collection has been completed. Analysis is in progress
The impact assessment of ARICA and other improved rice varieties	Africa	Increased capacity of beneficiaries to adopt research outputs	
Impact assessment of RiceAdvice, ASI and GEM	Nigeria	Increased capacity of beneficiaries to adopt research outputs	
Gendered outcomes on the use of stress tolerant varieties	Odisha and Eastern Uttar Pradesh in India and, Bangladesh	Increased capacity of beneficiaries to adopt research outputs	
Impact assessment of	Benin and Cote d'Ivoire		

certified seed and rice seed value chain analysis			
DNA fingerprinting of dealer seeds for varietal identification and implications for seed delivery systems	India	Increased capacity of beneficiaries to adopt research outputs	This study is initiated as part of the Rice Monitoring Survey (RMS) funded by BMGF
Incidence, intensity of adoption and impacts of STRVs and BMPs	Philippines, Vietnam and Nepal	Increased capacity of beneficiaries to adopt research outputs	This study is part of the CURE project evaluation commissioned by IFAD
Case studies on nursery entrepreneurs in Odisha and Bihar	India	Diversified enterprise opportunities	This outcome case study has been initiated under CSISA project
Case studies on rural youth involvement in rice value chain and their career preferences	India	Improved capacity of women and young people to participate in decision making	This outcome case study has been initiated under RICE CRP
Case study on risk profiling of farmers and insurance intake	India	Increased capacity for innovation in partner organization and in poor and vulnerable communities	This outcome case study has been initiated under an Odisha state program.
Analyzing the role of social organizations into the adoption of modern rice varieties	Ecuador	Increased capacity for innovation in partner organization and in poor and vulnerable communities	
Estimating the economic value of varietal traits attached to producers	Ecuador	Increased capacity of beneficiaries to adopt research outputs	This study will provide insight to rice breeders regarding the importance of different varietal traits for further efforts.
Analyzing the rice sector in the context of Latin America and the Caribbean	17 FLAR country members	Increased capacity of beneficiaries to adopt research outputs	
Impact of AWD on water savings and farm income	Bangladesh		The study is being supported by 3ie (International Initiative for Impact Evaluation)
Impact of short duration flood tolerant rice on cropping system and farm income	Eastern India (West Bengal)		This study is supported by ICAR
Impact of short duration drought tolerant rice	Bangladesh		This is supported by SPIA
Testing extension by	Eastern India (Odisha)		This is supported by ATAI

agro dealers for the adoption of flood-tolerant rice			(Agriculture Technology Adoption Initiative) and Odisha project
Spatial analysis of impact of droughts and floods on the global rice market.	South and South East Asia	Enhanced capacity to deal with climate risks and extremes	In collaboration with Agri-food Policy Platform and PIM.
Individual and combined effect of technologies on the value of local rice	SSA	Reduced pre- and postharvest losses	
Effect of husk for energy technologies on workplace and environmental pollution	Global	Increased value capture by producers (Improved by-product management practices which contribute to reduce GHG emissions)	
Effect of parboiling steaming time and variety on digestive properties of rice	SSA	Improve the diets for poor and vulnerable people	

Table C: Cross-cutting aspects of expected outputs and deliverables.

Please note that Table C is optional in 2018 POWB. Please present expected total overall number of outputs, and % of outputs with principal (scored 2), significant (scored 1), and not targeted (scored 0), for gender, youth and capacity development.

Cross-cutting	Number (%) scored 2 (Principal)	Number (%) scored 1 (significant)	Number (%) scored 0	Total overall number of outputs
Gender	35 (19)	90 (48)	62 (33)	188
Youth	34 (18)	80 (43)	75 (40)	
CapDev	35 (19)	84 (45)	69 (37)	

Table D: CRP Staffing

Please fill in the table for 2018 CRP staffing.

Category	Female (FTE*)	Male (FTE)	Total FTE	% female (FTE)
Program director & flagship leaders	4	12	16	24
Principal Investigators	7	36	44	17
Other Senior Scientists (not PIs)	22	63	86	26
Post-docs / junior scientists	70	74	144	49
Research fellows	124	95	219	56
Other science support staff	80	202	282	28
TOTAL CRP	309	483	792	39

*FTE= Full Time Equivalent

Table E: CRP Planned Budget

Please fill the table based on the planned CRP budget for 2018.

	Planned budget 2018			Comments on major changes
	W1/2	W3/bilateral	Total	
FP1	3,641,554	13,273,667	16,915,221	
FP2	1,591,342	2,436,504	4,027,846	
FP3	2,574,998	12,088,418	14,663,416	
FP4	3,117,205	7,480,183	10,597,387	
FP5	3,482,669	28,180,356	31,663,026	
Strategic Competitive Research grant				
CRP Management & Support Cost	1,341,622			
CRP Total	15,749,389	63,459,128	79,208,517	

Table F: Main Areas of W1/2 Expenditure

Expenditure area *	Estimated percentage of total W1/2 funding in 2018	Space for your comments [please remove notes below]
Planned research: principal or sole funding source	20	<p>Describing the rice production context in Latin America; policy briefs on rice to the FLAR member countries.</p> <p>Generating relevant remote-sensing products to support PCIC and crop insurance stakeholders in the Philippines as part of the implementation of the crop insurance program.</p> <p>Constraints, challenges and opportunities identified in irrigated rice value chain in Nigeria for strategic decisions making and action planning for sustainable rice enterprises development.</p> <p>Three improved post-harvest technologies piloted in Cote d'Ivoire; 30 households benefit from an efficient husk for energy technology in Cote d'Ivoire.</p> <p>Defining rice quality from consumers to genetics</p> <p>Determinants of consumer preferences for rice attributes: Evidence from south and Southeast Asia.</p> <p>Farmers' preferences for varietal trait improvements in Bangladesh, eastern India and Philippines.</p>

		<p>New agricultural treatments introduced and tested in long-term trials in Senegal.</p> <p>Description of farming systems in Cote d'Ivoire, Madagascar, Rwanda, and Senegal.</p> <p>Establishment of the global rice array sites and improving the available facility and infrastructure; upgrading the imaging systems for HTP phenotyping; develop a pipeline for phenotype-genotype analysis leading to the identification of QTLs at multiple array sites; pathogens survey and sampling.</p> <p>Sustainability testing of long term experiments initiated.</p> <p>New options tested in the Philippines for optimizing cropping systems based on modeling in long-term field experiments.</p> <p>Screening a subset of the 3 K panel to identify donors, QTLs and genes for anaerobic germination, drought, sheath blight, brown plant hopper and blast; screening germplasm for identification of donors for high nutrient efficiency and Fe toxicity tolerance, seedling stage salinity and promising lines for symbiotic microbes, QTLs for root cone angle and nutrient use efficiency.</p>
<p>Planned research: Leveraging W3/bilateral funding</p>	<p>20</p>	<p>Study on migration and occupational choices of members left behind</p> <p>Assessing the acceptability of modern mechanical equipment for rice farming in Madagascar and Cote d'Ivoire.</p> <p>Digital technologies and knowledge developed and disseminated for better and informed decision making</p> <p>Identification of new business models in rice value chain: case of Nigeria.</p> <p>Sustainability assessments (LCA) for harvesting and postharvest operations</p> <p>Sustainable rice straw management (Vietnam, Cambodia, Philippines, ..).</p> <p>Development and optimization of postharvest technologies for drying and storage (Solar Bubble Dryer, GrainSafe dryer).</p> <p>New work in Madagascar, leveraging investments by Cirad, JIRCAS: Value chain support services including finance identified; Evaluation of seasonal climate predictions; Evaluation of crop and farm yard manure management for the effective use of nutrient resources in farming systems; Evaluation of effect of</p>

		<p>planting period and nursery management for rice production in the central highland; Description of farming systems; Options for crop diversification tested; Description of use of machineries and prototype machinery options (seeder, motorized weeder) tested; On-farm diets characterized.</p> <p>Development/upgrading of decision support tools</p> <p>Integrated crop management options including decision support tools tested and disseminated</p> <p>SRP standard adopted by partners in Nigeria.</p> <p>Phenotyping of array panels at global rice array sites. Drone image collection at selected sites with adequate infrastructure. Manual for phenotyping produced.</p> <p>Development of SNP markers for important genes and deployment of disease resistance and quality genes in improved background; modification of breeding strategy to include genomic selection, RGA based population advancement, automation of breeding steps and standardization of screening protocols for both intensive and marginal environments; development and evaluation of high yielding and climate resilient lines for intensive system, rainfed lowland, mega deltas and uplands; improve understanding of milling quality traits, cooking quality traits; identification of QTLs for low chalkiness; development of high Zn rice lines and diagnostic markers for high Zinc; development of C4 rice lines with 20% higher photosynthetic activity and improved understanding of C4 anatomy pathway.</p>
Catalyzing new research areas	12	<p>Community Tipping points: the looser Normative Climate enabling rapid and inclusive agricultural development.</p> <p>Role of social organizations in adoption of modern rice varieties.</p> <p>Decision support tool for assessment of basis risks in the implementation of weather-index based crop insurance program in the Philippines.</p> <p>Migration and occupational choices of members left behind: To leave or to stay in farming?: case study in Vietnam.</p> <p>Eliciting multi-trait cost functions in plant breeding through competitive tenders.</p> <p>Initiate agricultural-based nutrition surveys.</p> <p>Development of methods to assign lineage groups along the genome, genomic selection for optimization of genetic gain and protoplast callus transformation;</p>

		development DNA fingerprinting of elite lines and identification of genes for agronomic traits and protocols and tools for genome editing.
Gender	15	<p>Identification of suitable business models for women and youth in rice value chain: Case of Nigeria and Madagascar</p> <p>Framework for assessing gendered dimensions and outcomes of sustainable intensification and diversification</p> <p>What drives capacity to innovate? Insights from rural men and women in Africa, Asia, and Latin America</p> <p>Gender differences and rice production /use of innovations in Latin America context</p> <p>Effects of parboiling system on grain quality and market value capture by women small-scale processors assessed in Cote d'Ivoire.</p>
Youth	3	<p>Identification of suitable business models for women and youth in Nigeria and Madagascar. Youth and career preference in India.</p> <p>Attracting and incentivizing rural youth in rice value chain. This study is initiated to analyze youth willingness to choose agriculture or related value chain activities as career and to explore what type of policy and institutional supports are needed by youth in order to pursue agricultural career.</p> <p>Where Gender Meets Generation: Occupational Aspirations and Trajectories of Rural Youth across 25 Villages of the Global South.</p> <p>Opportunities for youth engagement in agribusiness services providing along the rice value chain identified in Cote d'Ivoire.</p>
Capacity development	10	<p>Training on impact Assessment methods and new method of rice statistics.</p> <p>Capacity building of rice value chain actors.</p> <p>Training of trainers.</p> <p>University Curriculum for BSC in Agricultural Engineering, RUA, Cambodia.</p> <p>Vocational training curriculum for agricultural machinery mechanics, Don Bosco, Cambodia.</p> <p>Hosting the internship of one Borlaug-Ruan (World Food Prize Youth program) fellow. At least one intern (MSc student) jointly supervised by AfricaRice and WUR for farming systems research. One PhD student will be jointly trained by CIRAD and AfricaRice for</p>

		testing of diversification options. At least one MSc and one PhD student will be jointly trained by JIRCAS and LRI on the nursery fertility management in the central highland of Madagascar.
Start-up or maintenance of partnerships (internal or external)	5	See list under section 2.3.1 New Key external partners
Monitoring, learning and self-evaluation	5	MELIAG workshop Area-based household surveys initiated in Asia, Africa and Latin America for tracking RICE progress indicators; Reports summarizing RICE progress indicators obtained from area-based surveys
Evaluation studies and Impact Assessment studies	10	Economic evaluation of varietal traits. Assessment of parboiling & post-harvest technology needs and requirements in East Africa. Global impact and adoption of novel technologies in rice breeding programs. Varietal identification through DNA fingerprinting and implications for adoption estimates, varietal monitoring and dissemination Role of social organizations in adoption of modern rice varieties Understanding gendered adoption, social norms and perceptions on Rice Crop Manager (RCM) in the Philippines. Understanding how men and women in household make decisions to adopt new stress-tolerant varieties in Madagascar Incidence, intensity of adoption of Stress Tolerant Rice Varieties (STRV) and of Best Management Practices (BMP) Impact assessment of ARICA and other stress-tolerant varieties; certified seeds and agro-advisory services (RCM, RiceAdvice, etc...) Evaluation of natural resource management practices (i.e integrated weed management).
Emergency/contingency		
Other	8	RICE management
TOTAL FUNDING (AMOUNT)	15,750,000 \$	

Table G: New Internal (CGIAR) Collaborations among Programs and between the Program and Platforms

Please list up to five most relevant new collaborations for 2018 with other CRPs and platforms, using the following table.

Name of CRP or Platform	Brief description of collaboration (give and take among CRPs*) and value added**	Relevant FP
A4NH	The London School of Hygiene & Tropical Medicine, IITA, and AfricaRice jointly assess effect of rice cultivation on populations of mosquito larvae with special focus on water management. RICE CRP FP do not have specific output for this topic. However, this information will be useful to show potential risk and developing options for reducing mosquito larvae, when expansion of lowland rice areas is promoted.	FP3
CCAFS	Joint proposal development for Green Climate Fund (GCF). Title: Climate-Smart Agriculture for Transforming the Rice Sector in the Vietnamese Mekong Delta Give = Climate smart resilient rice technologies Take = Prioritization tools	FP1
CCAFS	Align policy research on sustainable and climate-smart rice value chain upgrading (efficiency benefits)	FP2
EiB Platform	Collaboration on the development of the phenotyping module, of tools to combine phenotypic and genotypic data in Galaxy, of BrAPI for B4R/GOBII/G4R/SNPSeek/Galaxy interoperability, and to enhance capacity for fine mapping.	FP4
EiB Platform	Modernization of breeding programs and automation of the breeding operations through development and implementation of standard tools and steps across breeding programs to develop better varieties for dissemination.	FP5
Gender Platform	RICE will collaborate with the Gender Platform to implement an assessment of women-led informal seed systems to understand how they contribute to women's engagement and empowerment and, how they enhance women's access to good quality and affordable seed at the right time.	FP1
Genebank	FP5COA5.1 shall continue to use genetic diversity present in the gene bank in Asia, Africa and Latin America for identification of donors, QTLs, genes and their utilization in the breeding program as well as for C4 rice research	FP5
Livestock	Assessment of rice straw markets, processing options for higher digestibility and life cycle assessments for rice straw as animal fodder. Contribution for sustainable rice production (reduced GHGE and pollution), value adding options for farmers, cattle owners and machinery service providers.	FP2
FISH	FP3 will deliver assessments of the rice part of the rice-fish cropping system and take FISH assessments of the fish part.	FP3
PIM	Joint proposal development for 2018 Global Futures and Strategic Foresight. Title: Achieving income and dietary diversification goals through sustainable intensification in Asia. Give = report and peer-reviewed publication Take = Foresight modeling tools and methods	FP1

RTB	<p>CIAT-RICE will work closely with RTB to adapt cassava and rice phenotypic tools for both crops and to upgrade the HTP capacities for both CRPs. The CRPs will jointly improve computational efficiency of the image analysis pipeline, and will support the joint implementation of the fixed platform at two different sites.</p> <p>IITA and AfricaRice have initiated a collaboration to map rice-based farming systems in Rwanda and DR Congo. The objective is to explore the potential for RTB crops-rice integration in smallholder farming systems in the African Great Lakes Region.</p> <p>Joint research on rice-potato-based sustainable intensification systems has started in India (West Bengal). The collaboration with RICE will allow testing the sustainability of the different approaches base on the combination of adapted rice and potato varieties and innovative management practices.</p>	FP4
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**give = the outputs that the CRP will deliver; take = the outputs that the collaborating CDRP or Platform will offer. **e.g. scientific or efficiency benefits*

Table H: Planned Monitoring, Evaluation, and Learning Exercises

Planned evaluations, impact assessments and other learning exercises for 2018.

Planned studies/learning exercises in 2018	Comments
Annual RICE Monitoring, Evaluation, Learning, Impact Assessment, gender workshop	4 day workshop(whole FP1 and FP2 teams, with all flagship leaders and operationla RICE management team)
Impact pathway and learning workshop, FP3	2 day workshop under the CORIGAP project, with stakeholders from 8 countries.
Randomized Control Trial (RCT) on Site Specific Nutrient Management (SSNM) to examine to the impacts on input use, field/farm productivity and other outcomes	
Randomized Control Trials on ICT advisory applications	
Development of protocol for a sustainable mechanism and process to track and monitor compelling impact stories from key intervention sites	This work was initiated in 2017, and will continue in 2018.
Developing strategies for computing the common CGIAR indicators for RICE	This activity will be implemented following instruction from the MELCOP and SMO
Study in the Philippines to understand gender dynamics in adoption of Rice Crop Manager	
Study in Vietnam to examine the influence of migration on adoption of climate change mitigation technologies.	
Qualitative data collection to understand gendered roles and constraints in the adoption of high-zinc rice in Bangladesh.	
Assessment of women-led seed systems models in Odisha	
Development of youth- and women-led business models pertaining to seed production and marketing in Africa	
Ex-ante analysis of the adoption of soil-acidity tolerant rice varieties in the Colombian Llanos	

Writeshop for comparing M&E indicators across Latin America, Asia and Africa and developing joint annual M&E report	
Impact of RiceAdvice for nutrient management, ASI thresher, GEM parboiler, ARICA and other improved rice varieties	Monitor the progress of outcomes indicators
Panel data collection in Nigeria, Benin, Cote d'Ivoire	Panel data will be collected for impact assessment on Sub-IDOs
Training on new method of rice statistics survey in Madagascar	To improve rice information
Pilot survey and stakeholder workshop on new methods for rice statistics survey in Ghana, Madagascar and Ethiopia	To improve rice information