ANNEX 6 - ACHIEVEMENT OF PLANNED MILESTONES IN 2018

CRP	FP	OUTCOMES 2022	SUMMARY NARRATIVE ON PROGRESS AGAINST EACH FP OUTCOME THIS YEAR	MILESTONE	2018 MILESTONE STATUS	PREDOMINANT REASON FOR STATUS	EVIDENCE/EVIDENCE LINK 1	EVIDENCE LINK 2
A4NH	F1	F1 Outcome: Partners and other CRPs incorporate nutrition, health and gender in agri-food value chains and food systems programs	FP1 finalised the methodology and analysis of the dietary gap analysis in four key countries and presented these in stakeholder workshops in 4 countries and on international conferences: ANH-Academy Week and Tropentag2018. Based on the identification of Key Research Areas in food system research in Ethiopia and Vietnam, a MSc Grant Call was opened and 6 students in each country received a grant of 4.500 USD to do research linked to one of the components of the food system. A workshop was organised to train the students and their supervisors on food system and healthy diet analysis based on state of the art conceptual frameworks and indicators.	2018 - Validated metrics and tools for assessing diet quality and characterizing food systems applied by 10 research organizations (partner and external organizations) across the 4 focus countries	Extended	Research/science	Extended to 2019 because milestone was not achieved in all 4 focus countries. In 2018, methods and tools for diagnosis of dietary gaps were developed. Diagnosis and foresight applied in several institutes/universities in Ethiopia, Nigeria, and Vietnam, and started in Bangladesh. Papers characterizing national food systems in Vietnam, Bangladesh, and Nigeria are in progress; will be finalised in 2019, plus a paper on dietary gap analysis.Dissemination and training efforts: ANH Academy, WUR course on food systems, Tropentag, Toulouse School of Economics Evidence: Food Systems Paper and activities in Ethiopia	Food Systems Paper
A4NH	F1	F1 Outcome: Partners, including value chain actors, use evidence from impact evaluations when making operational and investment decisions	The 2017 milestone towards this outcome related to Ethiopia and Vietnam, which has continued to grow in 2018. In Ethiopia, partners are using the evidence on food system analysis and the food system framework to (1) develop methodology to collect conusmer intelligence on dairy informal markets (Euromonitor) and (2) to develop together with IFPRI and WUR a design of a video behaviour intervention with NEED, a local private company. With Euromonitor International: working on a pilot in Ethiopia, to co-develop and test a methodology for the rigorous and systematically generated consumer and market data that reflect the realities of the poor accessing their foods from informal markets. In Vietnam, with the Choices Programme: working with this multi-stakeholder platform together with the Vietnam NIN, CIAT, and private businesses to co-design and evaluate the implementation of a front-of-packaging labelling.	2018 - At least 2 partners, including value chain actors, participate in the identification and design of at least 2 gender-sensitive interventions aligned with findings from CoA1 to improve diets in Bangladesh and Nigeria	Complete		Partner – PARTEX, a Bangladesh conglomerate that works on seed development within agriculture, is working with flagship researchers on designing interventions to expand mung bean production and availability. Partner – Federal University of Technology in Akure, Nigeria, works with flagship researchers on delivering ready-to-cook green leafy vegetables to the consumers using cool boxes on bikes and push carts. This way the vegetables could stay fresh and could be sold at convenient locations close to work places.	https://www.wur.nl/en/newsarticle/Veg-on-wheels-ready-to-cook-vegetables-for-Nigerian-consumers.htm

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A4NH	F1	F1 Outcome: Public-private partnerships formed to promote implementation of A4NH strategies for agri-food value chain/food system innovations	A first draft roadmap strategy to involve private sector in food system innovations was developed, based on experience bringing in private sector and also based on the discussions on private sector involvement in food systems during the ANH Academy learning lab session in Ghana in 2018. In addition, a paper on what food system innovations entail is being developed and will be finalised in 2019 as an IFPRI discussion paper and a peer-reviewed scientific paper. Although first initiatives and discussions with private sector started, in 2018 we aligned with one private sector (Unilever) on sustainable nutrition in Vietnam.	2018 - Systematic approach to be used to engage private sector stakeholders in FSHD focus countries	Extended	Research/science	Published paper on food system innovations: following an expert meeting in July 2018, a paper was drafted to guide conceptual thinking about food system innovations and will be published in early 2019, hence the extension of this milestone. Panel during the ANH Academy in Ghana: delivered a panel session in Ghana on how to implement Public Private Partnerships within food systems. The panel aimed to increase awareness and build private sector engagement skills amongst researchers. Panellists included representatives from business organisations from East and West Africa (i.e. SME's), donors (Dutch Ministry of Foreign Affairs), knowledge institutions (HarvestPlus), and development agencies (GAIN). Strategic Roadmap: development of discussion paper on how to reach out to private sector to partner for research for nutrition, including lessons learnt and best practices on the implementation of public private partnerships in development and expected at the end of 2018.	

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A4NH	F1	F1 Outcome: Key partners, stakeholders, and institutions (including national and local policy makers, private sector, consumer organizations, and other CRPs) are effectively implementing the evidence and lessons learned at scale in their food system related strategies and policy agenda	Presentation of dietary gap analysis and foresight work (Nigeria) reached at least 8 different government bodies. Through 3 national stakeholder workshops, results of the analysis of Platforms for Healthy Diets were validated in 3 of the 4 key countries (Ethiopia/Nigeria/Bangladesh) and key partners, stakeholders and institutions were made aware of the importance of the existing platforms for raising awareness on healthy diets. The Bene et al paper (World Development) on food system narratives and discourses was actively disseminated and highly valued by stakeholders worldwide. The policy baseline studies in Bangladesh and Vietnam were presented during stakeholder workshops contributing to the awareness of stakeholders on barriers of existing policies to enhance Flagship 1.	2018 - 8 stakeholders in relevant policy processes across the 4 focus countries are made aware of A4NH evidence on dietary trends.	Extended	Research/science	Extended to 2019 because policy baseline in NIgeria has to be finalised and has to be started in Ethiopia. The validation of platforms for health and nutrition needs to be finalised in Ethiopia, as well, along with presentation of dietary gaps in Ethiopia, Vietnam and Bangladesh. Progress in 2018 included: In Nigeria a stakeholder workshop was carried out to present the dietary gap analysis and first foresight analysis. The workshop was attended by representatives of at least 8 different government bodies. Dietary gap analysis data were presented at global forums (Tropentag, Africa Nutritional Epidemiology Conference, Agriculture, Nutrition and Health Academy) also attended by policymakers from our key countries.	
A4NH	F1	F1 Outcome: Key partners, stakeholders, and institutions (including national and local policy makers, private sector, consumer organizations, and other CRPs) are effectively implementing the evidence and lessons learned at scale in their food system related strategies and policy agenda	Presentation of dietary gap analysis and foresight work (Nigeria) reached at least 8 different government bodies. Through 3 national stakeholder workshops, results of the analysis of Platforms for Healthy Diets were validated in 3 of the 4 key countries (Ethiopia/Nigeria/Bangladesh) and key partners, stakeholders and institutions were made aware of the importance of the existing platforms for raising awareness on healthy diets. The Bene et al paper (World Development) on food system narratives and discourses was actively disseminated and highly valued by stakeholders worldwide. The policy baseline studies in Bangladesh and Vietnam were presented during stakeholder workshops contributing to the awareness of stakeholders on barriers of existing policies to enhance Flagship 1.	2018 - Food system policies and narratives/discourses thoroughly analyzed in at least 2 focus countries, contributing to an improved understanding of the current research agenda on food systems	Extended	Research/science	Food system narratives/discourses thoroughly analysed at global level – submitted and published in peer-reviewed journal. Results are being actively disseminated. In Vietnam, policy baseline completed – report available and peer-reviewed-paper submitted. Restitution workshop to present finding to key-actors scheduled. In Bangladesh, policy baseline completed and final report in progress.	https://doi.org/10.1016/j.worlddev.2018.08.011

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A4NH	F1	F1 Outcome: Key partners, stakeholders, and institutions (including national and local policy makers, private sector, consumer organizations, and other CRPs) are effectively implementing the evidence and lessons learned at scale in their food system related strategies and policy agenda	Presentation of dietary gap analysis and foresight work (Nigeria) reached at least 8 different government bodies. Through 3 national stakeholder workshops, results of the analysis of Platforms for Healthy Diets were validated in 3 of the 4 key countries (Ethiopia/Nigeria/Bangladesh) and key partners, stakeholders and institutions were made aware of the importance of the existing platforms for raising awareness on healthy diets. The Bene et al paper (World Development) on food system narratives and discourses was actively disseminated and highly valued by stakeholders worldwide. The policy baseline studies in Bangladesh and Vietnam were presented during stakeholder workshops contributing to the awareness of stakeholders on barriers of existing policies to enhance Flagship 1.	2018 - Strategy to strengthen and develop effective healthy diets platform developed for at least 2 countries	Extended	Research/science	Report on identifying platforms for healthier diets for Bangladesh and Nigeria finalized (but not yet published online); Research in Ethiopia and Vietnam ongoing and expected to be finalized at the end of 2018.	
A4NH	F2	F2 Outcome: High-yielding micronutrient enhanced varieties developed and released in priority countries	In 2018, iron-biofortified pearl millet was released in Niger and zinc-biofortified maize was released in three more countries in Latin America. In all, 28 new biofortified crop varieties were released, bringing the cumulative number of releases through HarvestPlus efforts to 208 varieties of 11 crops, across 30 countries (with 31 additional countries in testing phase). When orange-fleshed sweetpotato varieties released through the International Potato Center (CIP) are included, this figure increases to more than 300 varieties of biofortified crops.	2018 - Recommendations of molecular marker external review implemented	Complete		Since the review, a molecular marker meeting was held in February 2018 at CIAT. Summary notes from that meeting list several areas for implementation and other actions. A selection of outcomes from those recommendations are listed below: Across institutions/breeding programs: Integrated approach in United States (US) maize Nested Association Mapping (NAM) panel (mostly temperate materials) at US universities identified 12 genes that explain >80% of natural variation for carotenoid levels in maize grain (Diepenbrock study) Across methods/approaches: nicotianamine synthase (NAS) identified as key zinc regulating gene in both conventional and transgenic rice studies Across crops/species: Several important QTLs and zinc regulating genes (e.g. NAS, YSL16) identified in both rice and wheat Collaboration with the Excellence in Breeding (EIB) Platform: EIB can help genotyping all relevant	https://www.dropbox.com/s/sjn2xi86jcbpxmc/Abstracts%20for%20Erick.docx?dl=0

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							HarvestPlus elite lines (e.g., zinc, vitamin A).	
A4NH	F2	F2 Outcome: Biofortification mainstreamed into CGIAR and NARS breeding efforts	Mainstreaming strategies were developed for biofortified zinc wheat and zinc rice by HarvestPlus, CIMMYT, IRRI. These strategies will be adopted by CGIAR centers and National Agricultural Research Systems (NARS) in efforts to initiate mainstreaming of these crop varieties in their breeding programs.	2018 - 3 crop breeding programs establish/review mainstreaming targets and plans for each target crop/agroecology	Extended	They are in progress. Not all four have been finalized.	1 is complete (CIMMYT zinc wheat). 3 in progress (CIAT iron beans, ICRISAT iron pearl millet, IRRI zinc rice). Report for zinc wheat can be made available upon request.	
A4NH	F2	F2 Outcome: Biofortification mainstreamed into CGIAR and NARS breeding efforts	Mainstreaming strategies were developed for biofortified zinc wheat and zinc rice by HarvestPlus, CIMMYT, IRRI. These strategies will be adopted by CGIAR centers and National Agricultural Research Systems (NARS) in efforts to initiate mainstreaming of these crop varieties in their breeding programs.	2018 - 2.5% annual increase in mainstreaming as a percentage of total CGIAR Center efforts for target crop/agroecology	Extended	Internal resources	Data on mainstreaming efforts by CGIAR Center has not been updated since 2016.	
A4NH	F2	F2 Outcome: High-yielding micronutrient enhanced varieties delivered at scale in priority countries	4.5 million farming households were reached with biofortified planting material in 10 target countries in 2018, bringing the total number of farming households growing and consuming biofortified crops globally to 7.6 million. The goal is to reach 20 million households by 2020.	2018 - 7.5 million households in HarvestPlus priority countries growing and consuming biofortified crops	Complete		Based on the HarvestPlus global households reached projection model described here and here .	https://www.dropbox.com/s/mpzhh5qrcc43e6m/2018_GHRPM_Methodology.docx?dl=0

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A4NH	F2	F2 Outcome: Evidence on nutritional efficacy and impact informs value chain actors, as well as national and international investors	Learnings shared with partners (ranging from World Bank and Inter-American Development Bank HQs in DC to local civil society organizations in rural Nigeria) in various fora and format to enable development of equitable and cost-effective deliverable plans.	2018 - Partner and implementing organizations use lessons learned about factors (e.g., gender, equity) facilitating and hindering adoption and consumption of biofortified crops to develop equitable and cost-effect delivery plans	Complete		Examples of achievement in 2018 are below: We continue to share the AJFAND special issue with various partners (e.g. GAIN) to help with implementation of biofortification in various countries. CGIAR Biofortification Strategy developed based on lessons learned from target countries.	https://www.cgiar.org/wp/wp-content/uploads/2018/09/SMB10-BP1b-%E2%80%93-Biofortification-Strategy.pdf
A4NH	F2	F2 Outcome: Biofortification supported by global institutions and incorporated into plans and policies by stakeholders	Burundi and China included biofortification in their national strategies; African Union (AU) endorsed the recommendation on biofortification; World Food Programme (WFP) has incorporated biofortified crops in programmes in various countries in Africa and Latin America and the Caribbean; Inter-American Development Bank (IADB) included biofortification in loans to Haiti; information on World Bank loans pending.	2018 - Biofortification included in 3 national/regional policies and 3 country grants/loans from IFIs	Complete		Multi-Sectoral Nutrition Action Plan 2018-2025 by ADB African Union Executive Council PAN African Parliament Resolution on Nutrition and Food Systems in Africa 10th Africa Task Force on Food and Nutrition Development Meeting IFAD - Developing Nutrition-Sensitive Value Chains in Indonesia brochure IFAD - Developing Nutrition-Sensitive Value Chains in Nigeria brochure	Multi-Sectoral Nutrition Action Plan 2018-2025 by ADB
A4NH	F3	F3 Outcome: Key food safety evidence users (donors, academics, INGOs, national policymakers, civil society, and industry) are aware of and use evidence in the support, formulation and/or implementation of pro-poor and risk-based food safety approaches	Our food safety evidence is being used by governmental agencies and donors that due to space limitations we cannot list. We described several recent cases in OICR2730 A4NH research informs the design of a $13 million investment in improving food safety; in OICR2780 East African Community (EAC) uses aflatoxin technical papers to prepare aflatoxin policy briefs that are endorsed by the Council of Ministers; and in OICR2782 Aflasafe products to reduce aflatoxin crop contamination are now registered in eight countries.	2018 - East African Community supports standardized and harmonized policies and regulations for aflatoxins following policy support process	Complete		The East African Community officially launched nine policy briefs on topics related to crop contamination with aflatoxins and its control. The policy briefs contain key recommendations on strategic policy action and interventions required to mitigate impacts and effects of aflatoxin along the food and feed value chains.	https://www.eac.int/press-releases/141-agriculture-food-security/1185-eac-policy-briefs-on-aflatoxin-prevention-and-control-launched-in-nairobi

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A4NH	F3	F3 Outcome: Key food safety evidence users (donors, academics, INGOs, national policymakers, civil society, and industry) are aware of and use evidence in the support, formulation and/or implementation of pro-poor and risk-based food safety approaches	In 2018, the Feed the Future initiative announced a new Innovation Lab on Food Safety, informed by a white paper on food safety research gaps which we wrote for them. Our evidence is being used at national level as we engage stakeholders through platforms and processes we support in several countries: Vietnam, Cambodia, Bangladesh, India, Kenya, Tanzania, and Ethiopia.	2018 - Through PACA, 3 countries include Aflasafe as a component for aflatoxin mitigation in National Agriculture Investment Plan	Complete		Six countries where the Partnership for Aflatoxin Control in Africa (PACA) works - Malawi, Nigeria, Tanzania, Senegal, Gambia and Uganda - prioritized aflatoxin mitigation strategies , including use of Aflasafe as a mitigation tool, developed stakeholder-aligned aflatoxin control action plans, and mainstreamed them into National Agriculture and Food Security Investment Plans.	https://au.int/en/pressreleases/20180425/food-safety-coordination-and-tracking-agenda-side-meeting-14th-caadp
A4NH	F3	F3 Outcome: Key food safety evidence users (donors, academics, INGOs, national policymakers, civil society, and industry) are aware of and use evidence in the support, formulation and/or implementation of pro-poor and risk-based food safety approaches	In 2018, the Feed the Future initiative announced a new Innovation Lab on Food Safety, informed by a white paper on food safety research gaps which we wrote for them. Our evidence is being used at national level as we engage stakeholders through platforms and processes we support in several countries: Vietnam, Cambodia, Bangladesh, India, Kenya, Tanzania, and Ethiopia.	2018 - Policy stakeholders endorse or commit to approaches that draw on A4NH evidence on food safety in informal markets to consider improvements to specific value chain(s)	Complete		Major stakeholders commissioned ILRI to develop key papers: US Agency for International Development (white paper on food safety); Bill and Melinda Gates Foundation/UK Department for International Development (food safety investment report), Agriculture Nutrition and Health Academy (food safety metrics); and Chatham House (animal source foods in the first 1,000 days).	https://www.agrilinks.org/sites/default/files/resource/files/whitepaperfoodsafetyftf-branding_06052017_formatted.pdf
A4NH	F3	F3 Outcome: Biocontrol and GAP delivered at scale in key countries along with understanding of their impact and appropriate use	Aflasafe products are now registered in eight nations in Africa. Use of aflatoxin management strategies are part of the National Agricultural Investment Plans of six nations. Commercialization activities have commenced in most of those nations. The process is accompanied with intensive awareness and sensitization campaigns to understand what aflatoxins are, the contamination process, and effective mitigation strategies centered on use of Aflasafe. During both the testing phase and commercial usage of Aflasafe, use of Aflasafe products along with good agronomic practices resulted in most crops containing little to no aflatoxin content. Due to space limitations, we are unable to provide further details.	2018 - At least 40 farm-based organizations obtain 5% premium or more from sale of Aflasafe maize and groundnut due to market linkages created by innovation platforms	Complete		Recent evaluation: average smallholder income from maize increased by $318 (16% per farmer); consumption of Aflasafe-treated maize increased an average of 20g/day. Groundnut and maize farmers in Nigeria produced crops which contained less than 4 ppb total aflatoxins and could be sold in stringent European markets. More evidence here and here .	https://agresults.org/news-and-blog/10-blog/129-assessing-the-impact-of-prize-competitions-to-increase-adoption-of-aflasafe

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A4NH	F4	F4 Outcome: Development program implementers and investors (governments, NGOs, UN institutions) use evidence, tools and methods to design and implement cost-effective nutrition-sensitive agricultural programs at scale	(1) The Alive & Thrive (AT) initiative is using the 2018 review on nutrition sensitive agriculture (NSA) to inform their NSA work in the second generation of the initiative. An AT staff member cites what A4NH evidence has been used and how in AT in Ethiopia. (2) The World Food Programme (WFP) is using the nutrition-sensitive guidance developed under our partnership to design more nutrition-sensitive programs and proposals. (3) Findings from a study in Malawi are being used to inform a World Bank investment in Malawi to support the government in improving and scaling-up the model.	2018 - At least 3 implementing organizations use evidence generated in Phase 1 of A4NH in programming of nutrition- and gender-sensitive agriculture programs	Complete		(1) Link to email from AT staff (2) Most recent proposal from WFP Sri Lanka on a school meals program (citing A4NH evidence in the design) and (3) A4NH findings were cited in investment report but it is not publicly available.	https://www.dropbox.com/s/puwppuhi1291pxk/FW A4NH 2018 Reporting step 1 - please send your input by Jan. 31.msg?dl=0
A4NH	F4	F4 Outcome: National policymakers and shapers, and stakeholders from different sectors, civil society and industry use evidence to design effective nutrition-sensitive policies, and ensure quality implementation	Structured, step-wise priority-setting process adopted for regional initiative (Transform Nutrition West Africa) during its inception phase. The process was applied to inform priorities for the intiatives' focus in the implementation phase in the West Africa region and four focal countries (Nigeria, Burkina Faso, Ghana, and Senegal). Gender focus was not relevant to the application of the process in this case.	2018 - Gender-sensitive diagnostic and priority-setting tools developed and applied in 3 focal countries	Complete		The Transform Nutrition West Africa inception phase adopted the "5PD Process" to search for data, information, and research on the Problems (prevalence and drivers), Policies, Programs, People (stakeholders and organisations) and their Priorities related to/involved in these targets in the West African region. The process is detailed in the Inception Report and also presented at a regional consultation where nutrition stakeholders identified top priorities through a prioritization process detailed on page 36 of the inception report.	https://www.dropbox.com/s/c3i58m8q7cu0ub2/OPP1170621_Inception_report.pdf?dl=0

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A4NH	F4	F4 Outcome: Stakeholders from different sectors, governments, UN institutions, civil society and industry, including CGIAR and other CRPs, have improved capacity to generate and use evidence to improve nutrition-sensitive agricultural programming, nutrition-sensitive policymaking and implementation.	Five major regional capacity building events mainly reaching people across Sub-Saharan Africa, but also in Asia and beyond, were completed in 2018, which cannot be explained in much detail here due to the word limits. (1) Joint event with Scaling up Nutrition (SUN) Secretariat and others at the FAO-IFPRI event in Bangkok.(2) Pre-conference symposium at Africa Nutrition Epidemiology Conference. (3) With African Nutrition Leadership Programme (ANLP), workshop on "Leading Change in Nutrition". (4) Contributed to ANLP 2018. (5) Learning Lab a tANH Academy on "Collaborate: A Team Player Game to Tackle Food System Challenges" with London School of Hygiene and Tropical Medicine.	2018 - FP4 researchers with key partners from SUN, CAADP and others host at least one regional learning event involving participants from at least four focal countries and other CGIAR/CRP researchers	Complete		(1) Event at FAO-IFPRI (2) ANEC (3) ANLP here and here (4) ANLP here and (5) Learning Lab at ANH2018	https://www.dropbox.com/s/uj6r8hcpv24he0i/SUN-CAADP Focal Point retreat Agenda - 20181118.pdf?dl=0
A4NH	F5	F5 Outcome: Agricultural practices modified to reduce health risks	Rice farming is likely to expand in West Africa to improve food security and changing diets and increasing demand for animal source foods will alter agricultural systems, leading to increased risk of agriculture associated diseases. In Accra, we held an intersectoral workshop to discuss the expected impact on infectious disease of changing diets and agricultural change in West Africa. Rice and malaria emerged as a clear focus, confirming our own prioritisation of this topic. We carried out an updated review of studies comparing malaria in African villages with and without rice; this indicated that the recent suppression of malaria by vector control has altered the situation, so that residual transmission tends to be higher in rice villages. With AfricaRice, we've designed an overall joint strategy to assess the effect of rice intensification techniques on vector breeding in ricefields. In 2019, a new Wellcome-funded study, based in AfricaRice, will start to study whether some modification of AWD (alternate wet-dry) irrigation can reduce not only methane emissions but also mosquito breeding. As part of this, we are exploring opportunities for additional fieldwork in Tanzania.	2018 - Workshop convening senior national and sub-regional experts from the health, agriculture and environmental communities to discuss research priorities, including gender and equity issues.	Complete		June 2018 workshop report in Accra after the Agriculture Nutrition Health Academy week: involved 33 people from 30 institutions across West Africa. Four case studies were presented: (i) rice and infectious disease, (ii) zoonotic diseases, (iii) agrochemicals, agriculture and health and (iv) urban agricultural systems and disease. Gender issues within the topic of agricultural landscape change were discussed in the Accra workshop, but more in the context of community responses to environmental change, on which we are planning some follow-up qualitative work. We are also planning a desk study, comparing equity concepts and methods of measurement in the agricultural vs health domains.	http://researchonline.lshtm.ac.uk/4652183/

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A4NH	F5	F5 Outcome: Agricultural and public health policymakers and implementers deliver coordinated and effective solutions to cysticercosis and other zoonotic threats	One promising solution for controlling cysticercosis is a semi-commercialized pen-side diagnostic assay. A series of studies in 2018 found it not to be effective. Proof of concept with a different partner will be begin in 2019. Progress related to other zoonotic threats: (i) research on brucellosis contributed to the ongoing development of a national brucellosis policy, in Kenya and Tanzania; key A4NH researchers participate in the national policy review committees; and (ii) research showed the environmental limits of Rift Valley fever (RVF), which guided refinement of RVF decision support tools governments can use for interventions.	2018 - Stakeholders (farmers and field veterinarians) have access to a validated and semi-commercialized pen-side diagnostic assay for cysticercosis	Extended	1. Research/science	The pen-side test that was available was piloted in 2018, but poor results were produced. We will commence new work on proof of concept with a different partner in 2019.	
A4NH	F5	F5 Outcome: Public and private sector policymakers implement measures to reduce human and animal health risks from antimicrobial resistance and other interactions	Greater attention to antimicrobial resistance (AMR) is accelerating progress. In 2018, with partners, we progressed in establishing the CGIAR AMR Hub, which was officially launched in February 2019, and developing a CGIAR AMR strategy. Vietnam and Kenya started implementation of their national action plans, which includes measures to reduce AMR; A4NH researchers contribute to implementation discussions. A high level meeting was held in Jaipur (India) to facilitate regional research – policy dialogue. With CRP on Livestock, workshop in Ugandareviewed methodologies for measuring antimicrobial use, explored whether it may be possible to generate comparable data through unifying methods.	2018 - Decision makers in Kenya, Uganda, and Vietnam engaged in discussion of research results on antimicrobial use patterns in livestock agricultural systems and the impact on resistance	Complete		Workshop in Uganda: had participants from all the target countries. It reviewed methodologies for measuring antimicrobial use, explored whether it may be possible to generate comparable data through unifying methods and develop a common understanding on what resolution for measurements in the livestock sector is needed and feasible given variability in livestock production systems. Methods from eight studies in Asia (Vietnam, Cambodia, Thailand) and Africa (Ethiopia, Uganda, Tanzania, Malawi) by veterinary and public health institutions were compared. Consensus was reached on how they should be improved in order to help design surveillance systems for national action plans. Workshops held in Kenya led to the development of surveillance plans -- a link for a draft surveillance plan for the agriculture sector is provided.	http://researchonline.lshtm.ac.uk/4650711/

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A4NH	F5	F5 Outcome: Public and private sector policymakers implement measures to reduce human and animal health risks from antimicrobial resistance and other interactions	Greater attention to antimicrobial resistance (AMR) is accelerating progress. In 2018, with partners, we progressed in establishing the CGIAR AMR Hub, which was officially launched in February 2019, and developing a CGIAR AMR strategy. Vietnam and Kenya started implementation of their national action plans, which includes measures to reduce AMR; A4NH researchers contribute to implementation discussions. A high level meeting was held in Jaipur (India) to facilitate regional research – policy dialogue. With CRP on Livestock, workshop in Ugandareviewed methodologies for measuring antimicrobial use, explored whether it may be possible to generate comparable data through unifying methods.	2018 - CGIAR AMR platform compiling agricultural-associated AMR research data established, maintained, and used by internal and external stakeholders	Extended	Partnership	Significant planning and partnership building took place during 2018. The CGIAR AMR Hub was officially launched February 2019 and the associated website went live. Research outputs are presented as 'research highlights' on the website illustrating how the CGIAR AMR strategy is implemented and will become a go-to source for AMR information.	https://amr.cgiar.org/
A4NH	F5	F5 Outcome: Agricultural research and funding institutions initiate collaboration with public health counterparts to solve complex intersectoral problems	Workshops, in addition to several meetings and interactions, were held in 2018 to engage both agriculture and public health in A4NH research. One event was held around the 2018 World Water Week in Stockholm, co-organized with the CRP on Water, Land and Ecosystems (WLE), Deltares, and The Bridge Collaborative. These meetings support resource mobilization efforts across the flagship. For example, at least two major proposals were prepared for the Wellcome Trust, which were awarded in late 2018/early 2019. The annual ANH Academy Week conference also offers a platform for sharing research and building partnerships across agriculture and health.	2018 - At least 10 research organizations representing natural and social scientists from health and agriculture participate in theme-based workshops which recognize gender and equity issues, and build on partnerships identified in 2015 A4NH regional consultations	Complete		2018 World Water Week event in Stockholm brought together experts to present recent interdisciplinary research on the water-food-nutrition-disease nexus and examined a case study: management of malaria and its relationship to crop production and irrigation. WWW participants are almost entirely environmental scientists and practitioners, and this interaction with health issues, provided by LSHTM, Peru and the Bridge Collaborative, was new. This meeting has led to work interdisciplinary research proposals, one successful. The ANH Academy Week conference in Accra in June 2018 is an annual event, and A4NH and LSHTM lead its organization. Sessions cover all flagship areas of A4NH, including an FP5 relevant session and keynote, and an entire session and learning lab was devoted to gender research in agriculture and health. In 2018, there were 343 participants from 138 agriculture and health institutions in 49 countries, mostly LMICs.	http://researchonline.lshtm.ac.uk/4652184/

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BigData	F1	M1 Outcome: 1.1. A demand-driven analytics environment is available.	Module 1 engages with several partners to help CGIAR handle sensitive data, collaborate on data annotation standards, and easily aggregate and analyze large amounts of data. Modules 1 and 2 worked with Accenture to identify and overcome system-wide and center-specific gaps relating to the effective, secure, and ethical use of big data in agriculture. The value of best practices and FAIR for CGIAR and other stakeholders will be demonstrated from use cases based on GARDIAN data search, translate, and analysis, and case studies for data aggregation. Data science workshops in 2018 and 2019 backstop CGIAR researchers and enhance their capacity.	2018 - 1.1.1. Prototype data analytics environment developed and tested.	Extended	Research/science	This is a relatively new and challenging area of work, requiring collaboration and new approaches. The projects related to this milestone were conceived in 2018 as long-term work with partners to fully leverage their comparative advantages, as well as the comparative advantages of the Platform and CGIAR to achieve Platform goals.	
BigData	F1	M1 Outcome: 1.1. A demand-driven analytics environment is available.	Module 1 engages with several partners to help CGIAR handle sensitive data, collaborate on data annotation standards, and easily aggregate and analyze large amounts of data. Modules 1 and 2 worked with Accenture to identify and overcome system-wide and center-specific gaps relating to the effective, secure, and ethical use of big data in agriculture. The value of best practices and FAIR for CGIAR and other stakeholders will be demonstrated from use cases based on GARDIAN data search, translate, and analysis, and case studies for data aggregation. Data science workshops in 2018 and 2019 backstop CGIAR researchers and enhance their capacity.	2018 - 1.1.2. Seamless integration with 2-3 key analytical or mapping tools enabled.	Complete		Strong progress has been made on exciting analytics approaches and capacity with the University of Florida (**available here**) and UC Davis (**available here**). This work will continue through 2019.	

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BigData	F1	M1 Outcome: 1.1. A demand-driven analytics environment is available.	Under Module 1 the Platform helps CGIAR researchers and centers handle sensitive data, collaborate on data annotation standards, and easily aggregate and analyze large amounts of data. In 2018 we completed an assessment of data strategy across CGIAR and identified system-wide and center-specific gaps relating to the effective, secure, and ethical use of big data in agriculture and actions to covercome them. The Platform aims to demonstrate the value of best practices and making data FAIR (Findable, Accesible, Interiperable, Reusable) for CGIAR and other stakeholders through providing data search, translation, aggregation, and analysis, via the pan-CGIAR data discovery tool GARDIAN. Data science workshops delivered in 2018 engaged CGIAR researchers on identifying critical use-cases and user feedback on GARDIAN, building specific data annoation and analytics capacity. The value of best practices andn making CGIAR data Findable, Accessible, Interoperable, and Reusable (FAIR) for CGIAR and other stakeholders will be demonstrated from use cases based on GARDIAN data search, translate, and analysis, and case studies for data aggregation, specifically related to using CGIAR data appearing in open data repositories for 1) crop modeling and 2) generating a dataset on crop areas in sub-Saharan africa that draws on open data from multiple Centers.	2018 - 1.1.3. At least two case studies using the analytical environment developed and presented.	Extended	Research/science	CGIAR's data assets can provide great value through easier aggregation, querying, and analysis, e.g., across location, time, and datatype. Work towards this was conceived as longer-term, to continue beyond 2018, and includes design/implementation of GARDIAN data annotations for (1) R-based analysis pipelines, (2) decision support, and (3) aggregated high-value data products.	

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BigData	F1	M1 Outcome: 1.2. CGIAR resources are discoverable and reused.	GARDIAN improvements to better showcase CGIAR research include: improved search, filtering, and linking of related publications and datasets; a pilot to query and explore a semantically-enabled data pool; machine-readable licenses; and visualization of crop production data. The number of CGIAR publications and datasets discoverable via GARDIAN almost doubled in 2018. An overview of CGIAR licensing for GARDIAN data was undertaken and reported back to centers, and an algorithm to identify Personally-Identifiable Information (PII) was developed and tested with data from Bioversity International and ICRISAT. Centers were supported in improving resource discoverability and data annotations via funds, tools and services, and capacity development.	2018 - 1.2.1. New interface and functionalities added to GARDIAN (Global Agricultural Research Data Innovation Acceleration Network), including tools and services to accommodate data privacy, ethics, and licensing issues.	Complete		Querying **GARDIAN** and browsing through data and publications results will demonstrate achievement of this milestone.	http://gardian.bigdata.cgiar.org/
BigData	F1	M1 Outcome: 1.2. CGIAR resources are discoverable and reused.	GARDIAN improvements to better showcase CGIAR research include: improved search, filtering, and linking of related publications and datasets; a pilot to query and explore a semantically-enabled data pool; machine-readable licenses; and visualization of crop production data. The number of CGIAR publications and datasets discoverable via GARDIAN almost doubled in 2018. An overview of CGIAR licensing for GARDIAN data was undertaken and reported back to centers, and an algorithm to identify Personally-Identifiable Information (PII) was developed and tested with data from Bioversity International and ICRISAT. Centers were supported in improving resource discoverability and data annotations via funds, tools and services, and capacity development.	2018 - 1.2.2. At least 50 datasets in institutional repository quality-checked, and both data and metadata annotated with ontology and/or AGROVOC/GACS terms.	Complete		Improved annotations for publications and datasets archived in center repositories, with increased use of semantic standards enhancing discovery and data exploration via **GARDIAN**	http://gardian.bigdata.cgiar.org/

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BigData	F1	M1 Outcome: 1.2. CGIAR resources are discoverable and reused.	GARDIAN improvements to better showcase CGIAR research include: improved search, filtering, and linking of related publications and datasets; a pilot to query and explore a semantically-enabled data pool; machine-readable licenses; and visualization of crop production data. The number of CGIAR publications and datasets discoverable via GARDIAN almost doubled in 2018. An overview of CGIAR licensing for GARDIAN data was undertaken and reported back to centers, and an algorithm to identify Personally-Identifiable Information (PII) was developed and tested with data from Bioversity International and ICRISAT. Centers were supported in improving resource discoverability and data annotations via funds, tools and services, and capacity development.	2018 - 1.2.4. Data mining and machine learning methodologies tested for improving data quality or searchability.	Complete		This milestone demonstrates the value of semantically enriched data assets provided by centers through a GARDIAN pilot showing semantically-enabled querying, exploration, aggregation, and visualization of datasets (**available here**).	-

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BigData	F1	M1 Outcome: 1.3. Standards and semantics are utilized to enable FAIR (Findable, Accessible, Interoperable and Reusable) agricultural data.	This outcome focuses on promoting and supporting semantic and other standards across CGIAR to enhance CGIAR's FAIR data assets and effectively position CGIAR as a leader in the digital agriculture arena. Notable milestones in 2018 include: Release of the CG Core Metadata Schema v. 2.0 draft; completion of the Agronomy Ontology; user-testing of the ontology-powered Agronomy Field Information Management System (AgroFIMS) prototype producing agronomy field books for digital data collection with semantic, standards-compliant metadata and data (standardized column headings within datasets etc.). This work, and development of a draft Socioeconomic Ontology (SociO), relies heavily on partnerships.	2018 - 1.3.1. CG Core Metadata Schema v.2.0 finalized and implemented, and/or mapped across Center publications and data repositories.	Complete		The CG Core Metadata Schema v.2.0 that enables common repository-level annotation and discovery of CGIAR resources was upgraded and finalized by the cross-Center Metadata Working Group, supported by Module 1. The schema was ratified as final and acceptable in December 2018 (available here) to be implemented by centers in 2019.	https://github.com/AgriculturalSemantics/cg-core
BigData	F1	M1 Outcome: 1.3. Standards and semantics are utilized to enable FAIR (Findable, Accessible, Interoperable and Reusable) agricultural data.	This outcome focuses on promoting and supporting semantic and other standards across CGIAR to enhance CGIAR's FAIR data assets and effectively position CGIAR as a leader in the digital agriculture arena. Notable milestones in 2018 include: Release of the CG Core Metadata Schema v. 2.0 draft; completion of the Agronomy Ontology; user-testing of the ontology-powered Agronomy Field Information Management System (AgroFIMS) prototype producing agronomy field books for digital data collection with semantic, standards-compliant metadata and data (standardized column headings within datasets etc.). This work, and development of a draft Socioeconomic Ontology (SociO), relies heavily on partnerships.	2018 - 1.3.2. Agronomy Ontology completed and prototype field book tested for data collection based on semantic standards.	Complete		**The Agronomy Ontology**, developed under Module 1, is the semantic standard for agronomic data, harmonizing data and enabling digital data collection via AgroFIMS. AgrO is now largely stable; at the first user workshop in 2018 users reported ease of use, with no major changes to the ontology requested.	https://github.com/AgriculturalSemantics/agro

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BigData	F1	M1 Outcome: 1.3. Standards and semantics are utilized to enable FAIR (Findable, Accessible, Interoperable and Reusable) agricultural data.	This outcome focuses on promoting and supporting semantic and other standards across CGIAR to enhance CGIAR's FAIR data assets and effectively position CGIAR as a leader in the digital agriculture arena. Notable milestones in 2018 include: Release of the CG Core Metadata Schema v. 2.0 draft; completion of the Agronomy Ontology; user-testing of the ontology-powered Agronomy Field Information Management System (AgroFIMS) prototype producing agronomy field books for digital data collection with semantic, standards-compliant metadata and data (standardized column headings within datasets etc.). This work, and development of a draft Socioeconomic Ontology (SociO), relies heavily on partnerships.	2018 - 1.3.4. Draft for key classes and sub-classes for socioeconomic ontology developed.	Complete		Draft classes and sub-classes for SociO were developed in 2018 to capture concepts represented by **100 questions identified as common across CGIAR surveys**. This effort has been led by the Socioeconomic Development Community of Practice (SeD CoP), spearheaded by CIMMYT, IFPRI, ILRI, and others, under Modules 1 and 2.	https://www.dropbox.com/s/rga7sghtcv67am2/100Q_v1.pdf?dl=0

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BigData	F1	M1 Outcome: 1.4. Enhance capacity, catalyze culture change to further CGIAR OA/OD compliance and public goods mandate.	2018 activities towards this outcome were focused on developing training materials and guides on achieving and managing FAIR data, including licensing, privacy/ ethics, and best practices in data management. Module 1 and 2 worked together to make available a course and online seminar on the General Data Protection Regulation (https://bigdata-cgiar.course.tc/catalog/course/gdpr-for-international-development). Support was provided to centers for data sprints to promote the upload of well-annotated datasets to repositories, and for 3 workshops on ways to improve the FAIRness of CGIAR data assets.	2018 - 1.4.1. Materials and webinars developed and/or shared with appropriate CGIAR communities on licensing resources, data privacy and ethics, and data management and standards for maximizing FAIRness (Findability, Accessibility, Interoperability and Reuse) of CGIAR resources.	Complete		**Guidance** and a **course** on addressing privacy and ethics in CGIAR datasets were developed in consultation with centers. Webinars and a presentations/discussions at the CGIAR data management and information specialist meeting in Kenya (referenced above) also helped build capacity on best practices in FAIR data management.	https://bigdata.cgiar.org/responsible-data-guidelines/

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BigData	F1	M1 Outcome: 1.4. Enhance capacity, catalyze culture change to further CGIAR OA/OD compliance and public goods mandate.	2018 activities towards this outcome were focused on developing training materials and guides on achieving and managing FAIR data, including licensing, privacy/ ethics, and best practices in data management. Module 1 and 2 worked together to make available a course and online seminar on the General Data Protection Regulation (https://bigdata-cgiar.course.tc/catalog/course/gdpr-for-international-development). Support was provided to centers for data sprints to promote the upload of well-annotated datasets to repositories, and for 3 workshops on ways to improve the FAIRness of CGIAR data assets.	2018 - 1.4.3. At least two workshops/trainings for data/ information/ ontology managers and researchers held on ways to render datasets FAIR.	Complete		Several in-person and virtual presentations were organized through Platform-supported CoPs and working groups to enhance CGIAR data management and FAIRness of research outputs, including on: ontologies and vocabularies for data annotation; several tools to ease metadata entry and compliance; licensing; and best practices in addressing privacy and ethics	https://sites.google.com/a/cgxchange.org/oad-support-pack/2018-events/2018-oawg-dmtf-annual-meeting
BigData	F2	M2 Outcome: 2.1. CGIAR is more broadly engaged in BIG DATA community.	The Platform developed several shared services (clean historical weather data, secure transfer of large datasets, gridded global population data, and commercial satellite imagery access), started development of critical datasets (croplands, elevation) and launched a learning portal to host webinars and short online courses specifically for CGIAR. In addition, the Platform produced another edition of the Annual Big Data in Agriculture Convention.	2018 - 2.1.1. Communities of Practice around topics of geospatial data, socioeconomic data, ontologies, data-driven agronomy, livestock data for development and crop modelling, produce outputs addressing key constraints of the sector and establish CoP networks.	Complete		Six CoPs were fully operational during 2018. Each CoP has held webinars, online virtual discussions, and contributed to review and synthesis papers provided in the publications annex. They also have websites with dynamic content available **here**.	https://bigdata.cgiar.org/convene/

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BigData	F2	M2 Outcome: 2.1. CGIAR is more broadly engaged in BIG DATA community.	The Platform developed several shared services (clean historical weather data, secure transfer of large datasets, gridded global population data, and commercial satellite imagery access), started development of critical datasets (croplands, elevation) and launched a learning portal to host webinars and short online courses specifically for CGIAR. In addition, the Platform produced another edition of the Annual Big Data in Agriculture Convention.	2018 - 2.1.2. Hold high-level Annual Big Data in Agriculture Convention, with wide participation of CGIAR and non-CGIAR actors, establishment of collaborative agreements.	Complete		The Convention was held in October 2018 in Nairobi, co-hosted by ILRI and ICRAF. Over 400 people were in attendance and 2,500 people participated virtually (of which 35% were female). Full documentation is available **here**	https://bigdata.cgiar.org/nairobi-2018/
BigData	F2	M2 Outcome: 2.2. CGIAR increases its capacity to work on priority topics more quickly, more effectively and at greater scale	The Platform developed several shared services (clean historical weather data, secure transfer of large datasets, gridded global population data, and commercial satellite imagery access), started development of critical datasets (croplands, elevation) and launched a learning portal to host webinars and short online courses specifically for CGIAR.	2018 - 2.2.1. Identify high priority, high impact new data products and develop methodological plan to produce them, with initial implementation.	Complete		All centers were given access to key enabling datasets and analytics environments as Shared Services, including Digital Globe's GBDX Platform and Satellite Imagery Archive, TWC Global Historical Weather Dataset, aWhere Weather Dataset, and LandScan Gridded Population Dataset through the Center Focal Points and CoP on Geospatial Data. Agreements with the providers are archived at the Platform SharePoint and available upon request.	
BigData	F2	M2 Outcome: 2.3. CGIAR develops as a learning organization.	The Platform conducted a pan-CGIAR assessment of the state of digital strategy in the organization addressing the role of leadership, data, partnerships, infrastructure, and skills building in building a more effective, cohesive digital vision for the System. This culminated in special sessions at the Convention, where four Directors General of centers underscored the importance of building new digital strategies for the organization. This spurred requests directly from centers to look more closely at these elements of digital strategies at the center level.	2018 - 2.3.1. Map out CGIAR needs for common big data related computing and storage infrastructure.	Extended	4. Internal resources	Platform personnel and consultants conducted a pan-CGIAR assessment of these needs and gaps in developing digital strategy for the organization, and began information infrastructure mapping at centers. This is a complex issue which continues to be evaluated in 2019 with an expanding partnership with GLOBUS.	

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BigData	F2	M2 Outcome: 2.3. CGIAR develops as a learning organization.	The Platform conducted a pan-CGIAR assessment of the state of digital strategy in the organization addressing the role of leadership, data, partnerships, infrastructure, and skills building in building a more effective, cohesive digital vision for the System. This culminated in special sessions at the Convention, where four Directors General of centers underscored the importance of building new digital strategies for the organization. This spurred requests directly from centers to look more closely at these elements of digital strategies at the center level.	2018 - 2.3.3 Develop capacity building activities linked to centers' needs.	Complete		s per capacity building section, numerous training sessions held on distinct digital topics. Some of the webinars and online courses are documented **here**.	https://bigdata-cgiar.course.tc/catalog/course/cgiar-platform-for-big-data
BigData	F2	M2 Outcome: 2.3. CGIAR develops as a learning organization.	The Platform conducted a pan-CGIAR assessment of the state of digital strategy in the organization addressing the role of leadership, data, partnerships, infrastructure, and skills building in building a more effective, cohesive digital vision for the System. This culminated in special sessions at the Convention, where four Directors General of centers underscored the importance of building new digital strategies for the organization. This spurred requests directly from centers to look more closely at these elements of digital strategies at the center level.	2018 - 2.3.4 Build the capacity of CGIAR to meet the data needs of the agriculture development sector.	Complete		Significant capacity building efforts have been made through each of the CoPs to CGIAR institutions, and through shared service agreements centers. CRPs have access to more tools and data resources. The Platform used the food system framework as a way to develop the agenda of the **Annual Big Data in Agriculture** Convention, interviewing some 60 different food system participants in East Africa.	https://bigdata.cgiar.org/nairobi-2018/
BigData	F3	M3 Outcome: 3.1 CGIAR shows how data-driven approaches yield results in poverty reduction, enhanced nutrition or environmental benefits.	Under this module, the Platform has sourced 24 high-quality innovations to date (two cohorts of 12 finalists), over two years and awarded 10 startup grants and three scale-up grants. For those that got to scale-up stage, they had quantified evidence and credible plans for scale-up that were evaluated by scaling experts.	2018 - 3.1.1. New Pilot Inspire projects around BIG DATA related innovations.	Complete		Five new pilot grants were awarded in 2018 and are documented **here**.	https://bigdata.cgiar.org/inspire/inspire-challenge-2018/

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BigData	F3	M3 Outcome: 3.1 CGIAR shows how data-driven approaches yield results in poverty reduction, enhanced nutrition or environmental benefits.	Under this module, the Platform has sourced 24 high-quality innovations to date (two cohorts of 12 finalists), over two years and awarded 10 startup grants and three scale-up grants. For those that got to scale-up stage, they had quantified evidence and credible plans for scale-up that were evaluated by scaling experts.	2018 - 3.1.2. Scale-up one successful pilot Inspire project (from winners 2017) around BIG DATA related innovations.	Complete		Three scale-out grants were awarded in October during the **Annual Big Data in Agriculture Convention.**	https://bigdata.cgiar.org/inspire/inspire-challenge-2018/
BigData	F3	M3 Outcome: 3.1 CGIAR shows how data-driven approaches yield results in poverty reduction, enhanced nutrition or environmental benefits.	Under this module, the Platform has sourced 24 high-quality innovations to date (two cohorts of 12 finalists), over two years (2017 and 2018) and awarded 10 startup grants and three scale-up grants. For those that got to scale-up stage, they had quantified evidence and credible plans for scale-up that were evaluated by scaling experts.	2018 - 3.1.3. Synthesis of Inspire project successes and failures, policy documents, best-practice guidance.	Complete		A **learning document** was produced and published reflecting on the innovation process around the 2017 Inspire grants.	https://bigdata.cgiar.org/wp-content/uploads/2018/08/The-2017-CGIAR-Inspire-Challenge-3.pdf
CCAFS	F1	FP1 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	Activities undertaken on development and dissemination of training materials on resilience building in several countries of Southeast Asia, supporting National Adaptation Plans and Nationally-Determined Contributions (NDCs); training materials and regional workshops on NDCs in West and East Africa; training the African Group of Negotiators on gender mainstreaming in United Nations Framework Convention on Climate Change negotiations, in West Africa; climate-smart agriculture planning and investment in coastal Asia; long-term capacity development of the Senate of Cambodia on climate change and national commitments; training material developed and used for scenario-based strategic planning in several Central American countries. All this helps empower partners to mainstream issues around climate change, national commitments and gender into national decision-making processes.	2018 - Training materials are developed and workshops held to strengthen national/state capacities for scenario-based strategic planning, as well as targeted materials for other partner organisations (e.g. NGOs) developed (linked to CoA 1.2)	Complete		(1) NDC trainings; (2) NDC materials; (3) Scenarios material, Central America; (4) Cambodia; and (5) Southeast Asian Parliamentary staff conducts climate change-related studies	https://hdl.handle.net/10568/100095

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CCAFS	F1	FP1 Outcome: # of organisations and institutions in selected countries/states adapting plans and directing investment to optimise consumption of diverse nutrient-rich foods, with all plans and investments examined for their gender implications	Activities towards this outcome include participatory scenarios-based policy guidance work in all CCAFS target regions that has resulted in eight major policy outcomes. This work is being developed through a greater emphasis on food systems and food and nutrition security, as well as using foresight as a mechanism for inclusion of gender and youth issues and stakeholders, in Bangladesh and Ethiopia. The IMPACT model extended and applied to address livestock, fish and nutrition. Such tools have an important role to play in bridging the science-policy divide and in helping to evaluate the possible effects of different actions on different stakeholders.	2018 - State of the art multi-level scenarios methodology is tested by downscaling scenarios to national/state levels and including food and nutrition security modelling outputs; tools are developed for different audiences	Complete		(1) IMPACT livestock data, code; (2) Human health and nutrition and red meat; (3) Food security and climate change policy; (4) Can Ethiopia feed itself by 2050?; and (5) Keeping human diets within environmental limits	http://dx.doi.org/10.17632/kmcfws92mf.2
CCAFS	F1	FP1 Outcome: # of organisations and institutions in selected countries/states adapting plans and directing investment to optimise consumption of diverse nutrient-rich foods, with all plans and investments examined for their gender implications	Activities towards this outcome include participatory scenarios-based policy guidance work in all CCAFS target regions that has resulted in eight major policy outcomes. This work is being developed through a greater emphasis on food systems and food and nutrition security, as well as using foresight as a mechanism for inclusion of gender and youth issues and stakeholders, in Bangladesh and Ethiopia. The IMPACT model extended and applied to address livestock, fish and nutrition. Such tools have an important role to play in bridging the science-policy divide and in helping to evaluate the possible effects of different actions on different stakeholders.	2018 - Combined climate and food and nutrition security scenarios are developed and being used for multilevel policy development in selected countries/states, with the process started in one country to effect relevant policy change that takes into account gender dimensions with appropriate MEL systems on policy effectiveness in place	Complete		Evidence of the milestone process for Bangladesh	https://www.dropbox.com/s/z1ixi1gf63je9bq/A4NH_Dhaka_Moghayer_v2%20JV.pptx?dl=0

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CCAFS	F1	FP1 Outcome: # of countries/states where CCAFS priority setting used to target and implement interventions to improve food and nutrition security under a changing climate	CCAFS made priority-setting contributions in more than six countries. Models were applied to help develop the strategic vision document for Bhutan's agricultural sector and investment plans for states in Nepal and India. World Bank-led climate-smart investment plans developed for Mali and Cote d'Ivoire with CGIAR science input. CCAFS contributed to Colombia's Green Growth Policy, and supported the Central American Agricultural Council's (CAC) Executive Secretariat in guiding implementation of their CSA Strategy; the Colombian Agriculture Institute (ICA), FAO and the Economic Commission for Latin American and the Caribbean aligned their medium-term plans to support its implementation. Household gender methodology was implemented in one country and is being expanded to more countries, working with IFAD to test a framework evaluating gender and nutrition issues in agricultural transformation.	2018 - Global and regional models are applied in two particular countries facilitating cross-level analyses and used to analyse relationships with other sectors; this includes integrating other datasets from household or other levels; joint cross-CRP analysis on specific agri-food systems topics are initiated	Complete		(1) Bhutan; (2) India; (3) India; and (5) India	https://cgiar-my.sharepoint.com/:b:/g/personal/h_pathak_cgiar_org/EWyTVT7I8G1MkHLmk0nig8MBD0xhCW33zL7PB1vX_ckb3Q?e=n991Pp
CCAFS	F1	FP1 Outcome: # of countries/states where CCAFS priority setting used to target and implement interventions to improve food and nutrition security under a changing climate	CCAFS made priority-setting contributions in more than six countries. Models were applied to help develop the strategic vision document for Bhutan's agricultural sector and investment plans for states in Nepal and India. World Bank-led climate-smart investment plans developed for Mali and Cote d'Ivoire with CGIAR science input. CCAFS contributed to Colombia's Green Growth Policy, and supported the Central American Agricultural Council's (CAC) Executive Secretariat in guiding implementation of their CSA Strategy; the Colombian Agriculture Institute (ICA), FAO and the Economic Commission for Latin American and the Caribbean aligned their medium-term plans to support its implementation. Household gender methodology was implemented in one country and is being expanded to more countries, working with IFAD to test a framework evaluating gender and nutrition issues in agricultural transformation.	2018 - Country level recommendations for policy alternatives are being developed that identify robust climate smart strategies, while taking priority setting and trade-off analyses into account	Complete		(1) Description of prioritized technologies, institutional framework, and impact on green growth indicators at the national level; (2)Technical and policy recommendations to the Green Growth Mission in Colombia; (3) Climate change and nutrition in the Philippines; and (4) Agriculture and climate change in the Philippines	https://goo.gl/sjFstu

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CCAFS	F1	FP1 Outcome: # of national/state organisations and institutions adapting their plans and directing investment to increase women's access to, and control over, productive assets and resources	Strong engagement to position gender and climate-smart agriculture in two national (Guatemala, Honduras) and one regional (CAC) agendas in Central America. Support to the African Group of Negotiators in making submissions to the United Nations Framework Convention on Climate Change (UNFCCC) on gender. South Africa's Department of Agriculture supporting creation of community seedbanks, promoting the role of women in their governance. Gender mainstreaming in climate change policy work in Uganda and Ethiopia. Innovative gaming work undertaken with UNFCCC Conference of the Parties (COP) participants and youth. Understanding current constraints to gender inclusion in policy formulation and implementation is a key contribution to achieving the outcome.	2018 - Gender and social inclusion focused components in CSA priority setting developed and tested; improved modules related to gender and sex-disaggregated output data from the integrated assessment models developed and tested	Complete		(1) Green Growth Policy, Colombia; (2) Kenya, AGN; (3) Social inclusion in Honduras; (4) Gender inclusion in Latin America related to Climate change and nutritional and food security; (5) Gender mainstreaming and smallholder perceptions in Uganda x 2 (Evidence link 7 and 8); (6) Climate tipping point game at COP and (7) Game prototypes	https://goo.gl/DH12yV
CCAFS	F1	FP1 Outcome: $ USD new investments by state, national, regional and global agencies, informed by CCAFS science and engagement	In FY2018 the portfolio of new agriculture projects at the World Bank was worth US$ 4.1 billion. CGIAR science was used in project design and implementation activities amounting to several hundred million dollars in >20 lower-income countries, and 45% of project budgets are dedicated to activities and actions that are contributing to making project recipients/countries more resilient to a changing climate, while contributing to GHG emissions reductions. A framework for implementing transformational approaches to IFAD's mainstreaming themes (climate and environment, gender, nutrition and youth) was developed, for informing IFAD's future investments in CSA.	2018 - Novel tools employed in comparative analyses of the effectiveness of current and emerging climate-related food and nutrition security policies, and of science-policy exchange processes and other engagement mechanisms that support climate-smart outcomes and gender equity	Complete		(1) New tools and analysis for climate risk assessment in Malawi, Zambia; (2) New climate risk maps and tools, Southeast Asia; (3) Multi-stakeholder platforms in East Africa; (4) Platform synthesis science-policy divide; (5) Platforms and scenarios for transformation in West Africa; and (6) CCAFS' lessons on science-policy divide	https://hdl.handle.net/10568/96184

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CCAFS	F1	FP1 Outcome: $ USD new investments by state, national, regional and global agencies, informed by CCAFS science and engagement	In FY2018 the portfolio of new agriculture projects at the World Bank was worth US$ 4.1 billion. CGIAR science was used in project design and implementation activities amounting to several hundred million dollars in >20 lower-income countries, and 45% of project budgets are dedicated to activities and actions that are contributing to making project recipients/countries more resilient to a changing climate, while contributing to GHG emissions reductions. A framework for implementing transformational approaches to IFAD's mainstreaming themes (climate and environment, gender, nutrition and youth) was developed, for informing IFAD's future investments in CSA.	2018 - 'Good enough' practice guidelines on enabling policy environments with national planners and relevant international and regional organisations on climate change issues across different sectors and scales are developed and disseminated; these organisations make US$ 100 million of new investments on the basis of CCAFS science	Complete		(1) Transformational approaches; (2) CCAFS knowledge and evidence inform World Bank Group investments in agricultural development	https://hdl.handle.net/10568/98265
CCAFS	F2	FP2 Outcome: # policy decisions taken (in part) based on engagement and information dissemination by CCAFS	The outcome target (10) has been large exeeded. A total of 27 policy decisions taken as a result of CCAFS science were reported in 2018, of which 22% are considered Level 2 in maturity and one is Level 3. These include incorporation of CSA concepts into development plans at national level (Kenya Climate Smart Agriculture Implementation Framework and Philippine Medium Term Development Plan), and local levels (e.g. Guinayangan, Quezon Comprehensive Development Plan Municipal Agriculture Office Banner Programs). Level 3 maturity in Root Capital's Expected Impact Rating system, which has been used to review and close 251 loans, including 199 loans totalling US$ 146 million to coffee and cocoa businesses.	2018 - 10 country profiles in Sub-Saharan Africa and South Asia developed; strategic engagement with subnational government; capacity building and training plan co-developed with the Africa Climate Smart Agriculture Alliance; workshops on climate-smart local development planning	Complete		By the end of 2018, CSA Country Profiles have been develop for 21 countries across Sub-Saharan Africa and Asia (Africa: Benin, Côte d'Ivoire, Ethiopia, Kenya, Lesotho, Mozambique, Rwanda, Senegal, Tanzania, The Gambia, Uganda, Zambia and Zimbabwe; Asia: Bangladesh, Bhutan, Kyrgyzstan, Nepal, Pakistan, Sri Lanka, the Philippines, and Vietnam).	https://ccafs.cgiar.org/publications/csa-country-profiles

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CCAFS	F2	FP2 Outcome: # policy decisions taken (in part) based on engagement and information dissemination by CCAFS	The outcome target (10) has been large exeeded. A total of 27 policy decisions taken as a result of CCAFS science were reported in 2018, of which 22% are considered Level 2 in maturity and one is Level 3. These include incorporation of CSA concepts into development plans at national level (Kenya Climate Smart Agriculture Implementation Framework and Philippine Medium Term Development Plan), and local levels (e.g. Guinayangan, Quezon Comprehensive Development Plan Municipal Agriculture Office Banner Programs). Level 3 maturity in Root Capital's Expected Impact Rating system, which has been used to review and close 251 loans, including 199 loans totalling US$ 146 million to coffee and cocoa businesses.	2018 - New CSA knowledge products made available for partners and updated CSA compendiums (approximately 50,000 datapoints)	Complete		The African Compendium Dataset was redone and completed in 2018. It will be made publically available in 2019, following release of first scientific publications. Already, it is being used for development (e.g., in the CSA investment plans). Practical Guide to Climate-Smart Agriculture Technologies in Africa published and (visual) Data leaks booklet related to climate-smart agriculture (CSA) with emphasis on experiences in Eastern and Southern Africa.	https://ccafs.cgiar.org/publications/practical-guide-climate-smart-agriculture-technologies-africa#.XQFwNRZKiUk
CCAFS	F2	FP2 Outcome: 15 development organisations, with the focus on investments for CSA activities, adapting their plans or directing investment to increase women's access to, and control over, productive assets and resources.	The outcome target has been exceeded with 24 organizations reached by CCAFS outputs. The governments of Cote d'Ivoire and Mali who have developed plans to guide investments into CSA, which include gender and youth inclusion concerns. CCAFS has influenced the US$ 2 billion investment by ADB into CSA, the Tanzania CSA Guideline and the Kenya CSA Framework Programme. Additionally, in West Africa development institutions (CORAF/WECARD, ECOWAS, UEMOA) using CCAFS-informed equitable and transformative CSA options to plan initiatives in four countries (Burkina Faso, Ghana, Niger and Senegal) for large investments for 1.5 million farmers that increase women's (at least 30% women) and youth control over productive assets and resources.	2018 - Evidence on the gender and youth related motivations, aspirations, opportunities, challenges, and associated benefits related to specific technologies and practices informing subnational adaptation plans and development initiatives addressing gender equity	Complete		A book "Gender dimensions of climate change research for agriculture: Case studies in Southeast Asia" explores men and women farmers vulnerabilities and coping mechanisms or adaptation measures. Working paper "Understanding socioeconomic aspects influencing CSA adoption" and Analysis of gender disaggregated CSA adoption trends in Tuma-La Dalia in Nicaragua.	https://www.researchgate.net/publication/331728298_Gendered_Perceptions_Impacts_and_Coping_Strategies_in_Response_to_Climate_Change_Evidence_from_Mekong_Delta_Vietnam

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CCAFS	F2	FP2 Outcome: 15 development organisations, with the focus on investments for CSA activities, adapting their plans or directing investment to increase women's access to, and control over, productive assets and resources.	The outcome target has been exceeded with 24 organizations reached by CCAFS outputs. The governments of Cote d'Ivoire and Mali who have developed plans to guide investments into CSA, which include gender and youth inclusion concerns. CCAFS has influenced the US$ 2 billion investment by ADB into CSA, the Tanzania CSA Guideline and the Kenya CSA Framework Programme. Additionally, in West Africa development institutions (CORAF/WECARD, ECOWAS, UEMOA) using CCAFS-informed equitable and transformative CSA options to plan initiatives in four countries (Burkina Faso, Ghana, Niger and Senegal) for large investments for 1.5 million farmers that increase women's (at least 30% women) and youth control over productive assets and resources.	2018 - Socially differentiated financial vehicles and incentive mechanisms identified and tested across three CSVs; checklist on gender aspects for informing policymakers	Complete		Fiancial landscape mapping for Climate-Smart Agriculture made in the Nyando (Kenya) Climate Smart Village; Testing of financial instruments (including voluntary savings groups); Alternative financial delivery channel (VSLA) and financial technology (blockchain) with CARE and SNV in their target sites; Impact investment innovations tested and scaled out through Root Capital (Root Capital's Expected Impact Rating) and others.	https://ccafs.cgiar.org/es/node/56872#.XQGIuRZKiUk
CCAFS	F2	FP2 Outcome: 15 sub-national public/private initiatives providing access to novel financial services and supporting innovative CSA business models	Major achievement on this front in 2018 with 8 initiatives informed by CCAFS outputs. Training materials for both cocoa and coffee climate risk assessment are in use by voluntary certification agencies (Rainforest Alliance) in Ghana and Ivory Coast (cocoa) and Peru (coffee and cocoa), private sector extension teams (Ghana and Ivory Coast, cocoa; Uganda, coffee), other projects (Alliance for Resilient Coffee, Honduras, Guatemala, Uganda). Training materials for Council on Smallholder Agricultural Finance developed in 2018 and piloted connecting CSA practice implementation with producer organization finance in Guatemala (Root Capital). Extension apps used by private sector in Ghana (cocoa) and Uganda (coffee).	2018 - Multi-stakeholder platforms established including representatives from different groups and actors of the value chain and participatory modeling workshops held with decision makers to create investment portfolios	Complete		Multi-stakeholder platforms established across West Africa target countries for CSA planning. For cocoa related work, climate risk assessments and adaptation planning results handed over to multi-stakeholder platforms managed by World Cocoa Foundation, and in Peru with the Chamber of Commerce. Global Coffee Platform, USAID Alliance for Resilient Coffee, the Learning Community for Private Sector Investment in CSA ld webinar series on climate change in the coffee sector (over182 participants). CSA investment plans completed for Ivory Coast and Mali.	https://cgspace.cgiar.org/handle/10568/100159

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CCAFS	F2	FP2 Outcome: 15 sub-national public/private initiatives providing access to novel financial services and supporting innovative CSA business models	Major achievement on this front in 2018 with 8 initiatives informed by CCAFS outputs. . Training materials for both cocoa and coffee climate risk assessment are in use by voluntary certification agencies (Rainforest Alliance) in Ghana and Ivory Coast (cocoa) and Peru (coffee and cocoa), private sector extension teams (Ghana and Ivory Coast, cocoa; Uganda, coffee), other projects (Alliance for Resilient Coffee, Honduras, Guatemala, Uganda). Training materials for Council on Smallholder Agricultural Finance developed in 2018 and piloted connecting CSA practice implementation with producer organization finance in Guatemala (Root Capital). Extension apps used by private sector in Ghana (cocoa) and Uganda (coffee).	2018 - Multi-stakeholder platforms established including representatives from different groups and actors of the value chain and participatory modeling workshops held with decision makers to create investment portfolios	Complete		Workshop held with range of climate finance institutions, and paper on key innovative financing mechanisms to scale up CSA finalized. Workshop held with 12 Council of Smallholder Agricultural Finance members on how to incorporate climate and deforestation risk in loan due diligence processes, and out-scaled significantly by Root Capital (RC). RC screening of 251 loans (coffee and cocoa worth $ 146m). Contribution to Sustainable Agricultural Standard by Rainforest Alliance. Food Systems Finance Advantage event at COP24, public and private industry leaders in the agriculture, forestry and land-use finance space gathered to discuss financial pathways to transform global food systems, the need to make public investment more climate-smart and leverage private capital at scale.	http://blog.rootcapital.org/back-roads-to-boardrooms/support-peruvian-coffee-farmers-on-the-frontlines-of-climate-change
CCAFS	F2	FP2 Outcome: 50 site-specific targeted CSA options (technologies, practices and services) tested and examined for their gender implications	94 CSA practices tested and/or evaluated across the Climate Smart Village (CSV) network: 63 with gender dimensions assessed and 45 with mitigation potential. Numerous publications summarizing results, including analysis of the effect of combinations of practices (portfolios) in South Asia. Gender dimensions of CSA practices assessed through CSV monitoring in nine sites, and for over 30 practices. Significant outscaling achieved for some practices. For example, science-based evidence helped the Indian Government to prioritize crop residues management solutions and establish a large scale investment of INR 1150 crores for in-situ management using the Happy Seeder technology. This scheme targets increased incomes for 2 million farmers.	2018 - Structural and functional farm household and farming systems typologies developed across/within sites for targeting CSA technologies and practices and potential domains for targeting CSA options identified and refined in East Africa and South Asia	Complete		94 CSA practices evaluated across the CSV network: 63 with gender dimensions assessed and 45 with mitigation potential. Household typologies and farm systems modelling results published for South Asia CSV sites. CSA-Dx (derived product from Compendium) implemented at three sites that produce farmer-relevant data including gender and socio-economics of CSA.	https://cgspace.cgiar.org/handle/10568/100237

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CCAFS	F2	FP2 Outcome: 50 site-specific targeted CSA options (technologies, practices and services) tested and examined for their gender implications	94 CSA practices tested and/or evaluated across the Climate Smart Village (CSV) network: 63 with gender dimensions assessed and 45 with mitigation potential. Numerous publications summarizing results, including analysis of the effect of combinations of practices (portfolios) in South Asia. Gender dimensions of CSA practices assessed through CSV monitoring in nine sites, and for over 30 practices. Significant outscaling achieved for some practices. For example, science-based evidence helped the Indian Government to prioritize crop residues management solutions and establish a large scale investment of INR 1150 crores for in-situ management using the Happy Seeder technology. This scheme targets increased incomes for 2 million farmers.	2018 - Participatory ex-ante scenario assessment conducted to understand possible trajectories towards incorporation of CSA practice portfolios within gender differentiated livelihoods; multi-temporal scale prediction of best practices in Latin America	Extended	6. External environment (political, economic, legal, market)	M&E system was implemented in Latin America CSVs. In Cauca CSV, community leaders and local partner are currently making use of that information for their planning and decision-making processes based on key indicators. Capacity building workshop delivered to 15 National Level institutions aiming to strengthen capacities for the formulation and implementation of gender sensitive climate-smart agricultural programs/interventions	https://ccafs.cgiar.org/blog/monitoring-climate-smart-agriculture-practices-geofarmer-guatemala-and-honduras#.XQGXexZKiUk
CCAFS	F2	FP2 Outcome: 6 million farm households receiving incentives (training, financial, programmatic, policy-related) for adopting CSA related practices and technologies that potentially reduce production risks with increased benefits for women	Science-based evidence generated by CCAFS-CIMMYT partners in the Climate Smart Village (CSV) network helped the Indian Government to prioritize crop residues management solutions and establish a large scale investment of INR 1150 crores for in-situ management using the Happy Seeder technology. This scheme targets an increased incomes for over 2 million farmers, improving soil health, reducing water use and carbon footprints on 4 million hectares. In Latin America, climate specific management systems are estimated to be delivering actionable advisories to 500,000 farmers. Through UTZ certification schemes, an estimated 2.3 million farmers are receiving incentives for adoption of CSA practices based on CCAFS science.	2018 - CSA technologies/practices successfully piloted in 1000 out-scale sites in South Asia by two subnational governments and private sector agencies, and three strategic public-private partnerships established in East and West Africa for wide scale adoption by at least 300,000 farmers	Complete		Agreements with three different state actors in India now outscaling the CSV approach, with outscaling program on residue management targeting 2 million farmers. Nepal state government officials present their future plans to invest in large scale Climate-Smart Village programmes at a workshop held in New Delhi. In West Africa, approx. 2.3 million farmers estimated to be receiving incentives for CSA adoption through UTZ certification schemes, in addition to development program EU/IFAD investments.	https://cgspace.cgiar.org/handle/10568/98827

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CCAFS	F2	FP2 Outcome: 6 million farm households receiving incentives (training, financial, programmatic, policy-related) for adopting CSA related practices and technologies that potentially reduce production risks with increased benefits for women	Science-based evidence generated by CCAFS-CIMMYT partners in the Climate Smart Village (CSV) network helped the Indian Government to prioritize crop residues management solutions and establish a large scale investment of INR 1150 crores for in-situ management using the Happy Seeder technology. This scheme targets an increased incomes for over 2 million farmers, improving soil health, reducing water use and carbon footprints on 4 million hectares. In Latin America, climate specific management systems are estimated to be delivering actionable advisories to 500,000 farmers. Through UTZ certification schemes, an estimated 2.3 million farmers are receiving incentives for adoption of CSA practices based on CCAFS science.	2018 - Climate sensitive extension schemes and climate-site-specific advisory systems for farmers tested across CSVs in West and East Africa, South Asia and Latin America	Complete		Training materials for coffee and cocoa in use in multiple countries (Ghana, Peru, Honduras, Guatemala, Uganda), mobile application releases in Uganda in use by 4,000 farmers and three private partners. 500,000 farmers now accessing climate specific advisories in Latin America. Key lessons from Private sector engagement for improving coffee sector climate-smart awareness and decision making. Smartphone application developed to support the roll-out of the Stepwise approach for use by impact partner extension workers (Hanns R. Neumann Stiftung and Olam)	https://ccafs.cgiar.org/publications/manual-cocoa-extension-ghana#.XQGORxZKiUk
CCAFS	F3	FP3 Outcome: # of low emissions plans developed that have significant mitigation potential for 2030, i.e. will contribute to at least 5% GHG emissions reduction or reach at least 10,000 farmers, with all plans examined for their gender implications	In 2018, CCAFS research informed measurement, reporting and verification (MRV), finance and technical options for projects and policies in Vietnam, Colombia, Kenya, India, Thailand, Mexico, Bangladesh, Tanzania, and Indonesia, as well as standards for the private sector (International Fertilizer Association). Government capacities for Tier 2 MRV of livestock were strengthened for 15 to 20 countries to help with Nationally Determined Contribution reporting of Indonesia. Tools and resources (food loss and waste calculator, MRV resource webpage, SECTOR rice greenhouse gas calculator) were developed. Gender research on women in savings and loans organizations for agroforestry supply chains and for women in the informal dairy market was conducted. Food loss and waste action research was delayed. Milestone was met and progress towards outcome targets made in five countries.	2018 - Piloting of economic and social incentives to adopt mitigation practices (livestock, rice, fertilizer, soil management)	Complete		(1) Vietnam paddy rice; (2) Kenya gender x 2 (Evidence link 3 and 4); (3)Kenya livestock improved feed investment case; (4) Vietnam gender: Simelton email, provided under milestone reporting CERES investor guidance; (5) Business case development; and (6) COP23 event on finance	https://ccafs.cgiar.org/no-regret-mitigation-strategies-rice-production

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CCAFS	F3	FP3 Outcome: # of low emissions plans developed that have significant mitigation potential for 2030, i.e. will contribute to at least 5% GHG emissions reduction or reach at least 10,000 farmers, with all plans examined for their gender implications	In 2018, CCAFS research informed measurement, reporting and verification (MRV), finance and technical options for projects and policies in Vietnam, Colombia, Kenya, India, Thailand, Mexico, Bangladesh, Tanzania, and Indonesia, as well as standards for the private sector (International Fertilizer Association). Government capacities for Tier 2 MRV of livestock were strengthened for 15 to 20 countries to help with Nationally Determined Contribution reporting of Indonesia. Tools and resources (food loss and waste calculator, MRV resource webpage, SECTOR rice greenhouse gas calculator) were developed. Gender research on women in savings and loans organizations for agroforestry supply chains and for women in the informal dairy market was conducted. Food loss and waste action research was delayed. Milestone was met and progress towards outcome targets made in five countries.	2018 - Proof of concept of mitigation practices for N management, rice, and livestock provided to focal countries based on field trials and scenarios	Complete		(1) Nitrogen fertilizer minimum requirements; (2) AWD in rice in Vietnam; (3) Livestock x 4 (Evidence link 4 to 7 inclusive); (4) LED practices generally and (5) FLW	https://hdl.handle.net/10568/100664
CCAFS	F3	FP3 Outcome: # of low emissions plans developed that have significant mitigation potential for 2030, i.e. will contribute to at least 5% GHG emissions reduction or reach at least 10,000 farmers, with all plans examined for their gender implications	In 2018, CCAFS research informed measurement, reporting and verification (MRV), finance and technical options for projects and policies in Vietnam, Colombia, Kenya, India, Thailand, Mexico, Bangladesh, Tanzania, and Indonesia, as well as standards for the private sector (International Fertilizer Association). Government capacities for Tier 2 MRV of livestock were strengthened for 15 to 20 countries to help with Nationally Determined Contribution reporting of Indonesia. Tools and resources (food loss and waste calculator, MRV resource webpage, SECTOR rice greenhouse gas calculator) were developed. Gender research on women in savings and loans organizations for agroforestry supply chains and for women in the informal dairy market was conducted. Food loss and waste action research was delayed. Milestone was met and progress towards outcome targets made in five countries.	2018 - Improved options for global donors to support LED and agricultural climate readiness, with options examined for gender implications	Complete		(1) East Africa Dairy NAMA (in proposal phase); (2) Hay production; (3) Gender in dairy and low emissions livestock recommendations x 2 (Links 4 and 5); (4) Extension opportunities x 2 (Links 6 and 7); (5) Access to and supply of finance for Kenya dairy productivity; (6) ADB training (CCAFS-wide); (7) MDB guidance on soil organic carbon (SOC) indicators and (8) SOC	https://hdl.handle.net/10568/93176

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CCAFS	F3	FP3 Outcome: # of organisations adapting their plans or directing investment to increase women's participation in decision-making about LED in agriculture	With the Global Research Alliance and US Agency for International Development co-funding, CCAFS awarded a record 33 Climate Food and Farming - Global Research Alliance Development Scholarships (CLIFF-GRADS) fellowships, including 17 women. An additional nine (five women) CLIFF-GRADS recipients received awards in March and conducted research in 2018. In Vietnam, led by the World Agroforestry Center (ICRAF) and CARE, 300 women in two provinces in Village Savings and Loan Organizations received training in agroforestry and in gender dynamics to participate more effectively in the coffee value chain. In Kenya, analysis of women's role in the informal dairy market and dairy household dynamics informed Kenya's Dairy Development Board's gender strategy and the Dairy Nationally Appropriate Mitigation Action (NAMA). Moderate progress toward outcomes, with at least five organizations adapting plans to increase women's participation.	2018 - Comparison of LED-related livelihood options for women and their mitigation co-benefits (e.g. in dairy sector)	Complete		Gender in dairy and low emissions livestock recommendations x 2	https://hdl.handle.net/10568/97553

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CCAFS	F3	FP3 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	International Rice Research Institute (IRRI) supported Alternate Wetting and Drying (AWD) upscaling in Bangladesh and Vietnam. The World Agroforestry Center (ICRAF) supported action research on agroforestry measurement, reporting and verification (MRV) with Colombia and Vietnam, producing a major synthesis of global agroforestry MRV practices, and an outcome on the contribution of agroforestry to the Nationally Determined Contribution for Vietnam. CCAFS' low emission development flagship (FP3) organized an activity-data workshop with ~15 country MRV experts, and representatives from the Global Research Alliance(GRA), the UN Food and Agriculture Organization (FAO), Wageningen University and Research (WUR), and UN Framework Convention on Climate Change (UNFCCC). Two significant MRV projects were launched in China, one to improve national guidance on Tier 2 emissions estimates (with the Chinese Academy of Agricultural Sciences [CAAS] and GRA) and one producing a footprinting tool and analysis for livestock sustainability interventions (CAAS, Chinese Agricultural University, Wageningen University and Research, producers). MRV resources clearinghouse website created with GRA. Capacity for improved policy enhanced in at least ten countries, contributing to good progress on outcome.	2018 - MRV methodology for livestock available to partner countries	Complete		(1) Ruminant MRV in Colombia; (2) Agroforestry MRV global review; (3) MRV resource website; (4) Livestock Tier 2 MRV global review (2017) and (5) Livestock Tier 2 Activity Data workshop July 2019, and presentations Tier 2 MRV findings	https://hdl.handle.net/10568/97097

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CCAFS	F3	FP3 Outcome: # of agricultural development initiatives where CCAFS science is used to target and implement interventions to increase input efficiency	CCAFS' Flagship 3 supported country initiatives in Colombia (mitigation in livestock), Mexico (fertilizer efficiency), Vietnam (agroforestry measurement, reporting and verficiation (MRV), agroforestry mitigation potential, alternative wetting and drying (AWD) scaling and investment), Bangladesh (AWD), China (MRV, greenhouse gas footprint), and Kenya (dairy investment, mitigation scenarios) that inform Nationally Determined Contributions and support monitoring of their progress. Work in Bangladesh with Climate and Clean Air Coalition funding to the International Rice Research Institute has successfully focused on scaling up AWD through grassroots capacity building and the preparation of technical manuals. Analysis of cattle certification for mitigation in Brazil identified key barriers to scaling. Progress in at least six countries is supporting outcome targets.	2018 - Analysis of LED (livestock systems, rice, fertilizer) synergies with food security development and suitability by geographic region, production system and farmer characteristics in 5–8 countries	Complete		Part 1: *AWD analysis in Vietnam, Bangladesh, Thailand, Philippines x 3 *Gender studies from 2018 and prior years x 5	https://ccafs.cgiar.org/ghg-mitigation-rice-information-kiosk
CCAFS	F3	FP3 Outcome: # of agricultural development initiatives where CCAFS science is used to target and implement interventions to increase input efficiency	CCAFS' Flagship 3 supported country initiatives in Colombia (mitigation in livestock), Mexico (fertilizer efficiency), Vietnam (agroforestry measurement, reporting and verficiation (MRV), agroforestry mitigation potential, alternative wetting and drying (AWD) scaling and investment), Bangladesh (AWD), China (MRV, greenhouse gas footprint), and Kenya (dairy investment, mitigation scenarios) that inform Nationally Determined Contributions and support monitoring of their progress. Work in Bangladesh with Climate and Clean Air Coalition funding to the International Rice Research Institute has successfully focused on scaling up AWD through grassroots capacity building and the preparation of technical manuals. Analysis of cattle certification for mitigation in Brazil identified key barriers to scaling. Progress in at least six countries is supporting outcome targets	2018 - Analysis of LED (livestock systems, rice, fertilizer) synergies with food security development and suitability by geographic region, production system and farmer characteristics in 5–8 countries	Complete		Part 2: *Livestock in Kenya x 4 *Livestock in Colombia x 1 *Fertilizer in India (2017)	https://hdl.handle.net/10568/91527

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CCAFS	F3	FP3 Outcome: # of agricultural development initiatives where CCAFS science is used to target and implement interventions to increase input efficiency	CCAFS' Flagship 3 supported country initiatives in Colombia (mitigation in livestock), Mexico (fertilizer efficiency), Vietnam (agroforestry measurement, reporting and verficiation (MRV), agroforestry mitigation potential, alternative wetting and drying (AWD) scaling and investment), Bangladesh (AWD), China (MRV, greenhouse gas footprint), and Kenya (dairy investment, mitigation scenarios) that inform Nationally Determined Contributions and support monitoring of their progress. Work in Bangladesh with Climate and Clean Air Coalition funding to the International Rice Research Institute has successfully focused on scaling up AWD through grassroots capacity building and the preparation of technical manuals. Analysis of cattle certification for mitigation in Brazil identified key barriers to scaling. Progress in at least six countries is supporting outcome targets	2018 - Analysis of the causes of FLW in priority value chains and related drivers of emissions reductions	Extended		FLW business case analysis: This delay is due to a performance issue involving the former FLW research leader in 2016-2018. WUR has been responsive and appointed a new FLW leader in the last quarter of 2018	https://hdl.handle.net/10568/97688
CCAFS	F4	FP4 Outcome: 8 of million farm households with improved access to capital, with increased benefits for women (millions)	The agCelerant smallholder value-chain platform (ICRISAT, P46) provided over 50,000 farmers with insurance, finance, inputs and advisories. Commitments were secured, in 2018, by Nigeria's Federal Ministry of Agriculture and Rural Development (FMARD) to scale up to 15 million farmers, and by the Islamic Development Bank (IDB) to reach 2 million in the 2019–2024 Regional Rice Value Chain Program (10 countries). International Maize and Wheat Improvement Center (CIMMYT) and IRI (P41) supported an insurance provider serving more than 600,000 farmers in Africa to develop Monitoring and Evaluation (M&E) protocols and to improve design and marketing. FP4 and International Food Policy Research Institute (IFPRI) (P266) initiated an insurance community of practice through webinars and raised visibility through InsuResilience Global Partnership, activities at Microinsurance Conference and COP24.	2018 - National/subnational initiatives incorporate flood insurance products in disaster risk reduction financing solutions in collaboration with insurance industry and governments	Complete		IWMI (P41) piloted flood insurance in 17 villages (1000 households) in Muzaffarpur District, Bihar, India. It has been adopted by Bihar Disaster Management Department and at national level by Ministry of Agriculture - Farmer's Welfare, as evidenced by co-financing; and by a World Bank project proposal for Assam (OCIR2654).	https://ccafs.cgiar.org/news/index-based-flood-insurance-torchbearer-reducing-agrarian-distress-india#.XPkyLS3MxEI

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CCAFS	F4	FP4 Outcome: 8 of million farm households with improved access to capital, with increased benefits for women (millions)	The agCelerant smallholder value-chain platform (ICRISAT, P46) provided over 50,000 farmers with insurance, finance, inputs and advisories. Commitments were secured, in 2018, by Nigeria's Federal Ministry of Agriculture and Rural Development (FMARD) to scale up to 15 million farmers, and by the Islamic Development Bank (IDB) to reach 2 million in the 2019–2024 Regional Rice Value Chain Program (10 countries). International Maize and Wheat Improvement Center (CIMMYT) and IRI (P41) supported an insurance provider serving more than 600,000 farmers in Africa to develop Monitoring and Evaluation (M&E) protocols and to improve design and marketing. FP4 and International Food Policy Research Institute (IFPRI) (P266) initiated an insurance community of practice through webinars and raised visibility through InsuResilience Global Partnership, activities at Microinsurance Conference and COP24.	2018 - Scaling of weather-related agricultural insurance in West Africa	Changed	6. External environment (political, economic, legal, market)	ICRISAT (P46) supported development of agCelerant platform to scale up insurance within a suite of value chain services. Nigeria's Federal Ministry of Agriculture and Rural Development endorsed an insurance roadmap (in 2017), developed with FL4 (P266), CIMMYT (P51), and CCAFS West Africa (P255), but shifted its strategy to partner with agCelerant to scale up insurance (OICR2702).	https://hdl.handle.net/10568/89445
CCAFS	F4	FP4 Outcome: 40 of institutions or major initiatives that use CCAFS research outputs for services that support farm households' management of climatic risks	FP4 engagement and research outputs contributed to significant advances in 2018, by at least 41 institutions, in services or projects that support farm households' management of climatic risks. These included national meteorological services and regional climate centers; government ministries, agencies and departments; farmer and community organizations; development NGOs; private insurance; agribusiness and communication companies; and development donors. (Evidence: P41, P42, P46, P48, P51, P25, P266, P363).	2018 – National meteorological services and regional climate institutions implement new climate information or climate-related early warning products/platforms targeting agricultural decision-makers; NARES and other farmer intermediary organizations implement new participatory and ICT-based communication channels scaled up for rural climate services	Complete		New climate information was achieved in 2017 (2017 OICR on African met institutions), enhanced in 2018 at ICPAC, AGRHYMET, Meteo-Rwanda (P266, P363). Scaling communication was achieved through PICSA adoption in 17 countries (OICR2583), radio programming in Senegal (P46) and Rwanda (OICR2144), ICT-based advisories in India (P259) and Nepal CSVs (OICR181).	https://research.reading.ac.uk/picsa/

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CCAFS	F4	FP4 Outcome: $ USD new investments by state, national, regional and global agencies, informed by CCAFS science and engagement	Engagement of major climate service funders included participation in United States Agency for International Development (USAID) Learning Agenda for Climate Services in Sub-Saharan Africa, which aims to strengthen knowledge and evidence base for investment in agricultural climate services in Africa. Progress was also made in shaping pan-Africa climate research strategy through Climate Research for Development (CR4D) Africa; in discussions with Department for International Development (DFID) on its climate service investment programs in Africa and South Asia; and in project-focused discussions with donors including World Bank, Europen Union (EU), Adaptation Fund, and the International Fund for Agricultural Development (IFAD). Work on ex-ante cost-benefit analysis to inform agricultural climate service investment did not progress sufficiently to contribute significantly to guiding climate service investment.	2018 - Science-policy engagement processes, guidance policy briefs inform new climate service investments in CCAFS regions	Extended	4. Internal resources	Progress was made engaging USAID and DFID on climate service investment strategy and on discussions with World Bank, EU, Adaptation Fund, and IFAD about projects. Through USAID's Learning Agenda for Climate Services in Sub-Saharan Africa, FP4 drafted publications (some to be published in 2019) that aim to inform climate service investment/implementation.	https://www.climatelinks.org/projects/learningagendaonclimateservices
CCAFS	F4	FP4 Outcome: $ USD new investments by state, national, regional and global agencies, informed by CCAFS science and engagement	Engagement of major climate service funders included participation in USAID Learning Agenda for Climate Services in Sub-Saharan Africa, which aims to strengthen knowledge and evidence base for investment in agricultural climate services in Africa. Progress was also made in shaping pan-Africa climate research strategy through Climate Research for Development (CR4D) Africa; in discussions with the Department for International Development (DFID) on its climate service investment programs in Africa and South Asia; and in project-focused discussions with donors including World Bank, the European Union (EU), Adaptation Fund, and the Intrnational Fund for Agricultural Development (IFAD). Work on ex-ante cost-benefit analysis to inform agricultural climate service investment did not progress sufficiently to contribute significantly to guiding climate service investment.	2018 - CCAFS cost-benefit analyses, methods, guidance integrated into African Climate Policy Center (ACPC) guidance to Africa-focused climate service investors	Extended	3. Partnership	Building on FP4 investment in its design/launch, ongoing CCAFS East Africa engagement of the Climate Research for Development Africa initiative, coordinated by ACPC, contributed to its 2018–2022 strategic plan to prioritize and catalyze climate research responsive to development needs across Africa (OICR21). Work on cost-benefit analyses and methods extended into 2019.	https://marlo.cgiar.org/projects/CCAFS/studySummary.do?studyID=21&cycle=Reporting&year=2018

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CCAFS	F4	FP4 Outcome: 20 of development organizations adapting their plans and directing investment to increase women's access to, and control over, productive assets and resources through gender-sensitive climate-based advisories and safety nets	In P42, Bioversity research on gender-differentiated impacts of climate risk on food security informed the design of Guatemala's food security monitoring and early warning system. In P51, as a result of project engagement, a major agricultural insurance provider, which services about 600,000 farmers across Africa, increased their attention to women and other under-served farmer groups in their product design and Monitoring and Evaluation. In P363, the development of rural climate services in Rwanda aims at gender balance in intermediaries trained and farmers engaged, and gives attention to gender in its Monitoring and Evaluation.	2018 - Based on assessment of current FP4 project portfolio and opportunities, an adjusted project portfolio will target research and engagement that will lead to increased efforts, by at least 10 additional development organizations, to increase women's participation in decision-making about climate services and safety nets	Complete		2019 project planning identifies 11 next users that will increase women's participation in decision-making about climate services and safety nets.	https://www.dropbox.com/s/2g0qkx3dmele38j/Next%20users_women_evidence.pdf?dl=0
CCAFS	F4	FP4 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	Advances in policy: 1) shaping the Climate Research for Development Africa 2018–2022 Strategic Plan (OICR21); 2) adoption of Local Technical Agroclimatic Committees approach in Regional Strategy for Disaster Risk Management in Agriculture Sector and Food and Nutrition Security in Latin America and the Caribbean (OICR2571); 3) adoption of community-based food security monitoring and early warning system by Guatemalan Secretariat for Food and Nutrition Security, formalized by National Council for Food and Nutrition Security (OICR151); 4) adoption of CS-MAP climate-risk related maps and adaptation plans by Ministry of Agriculture and Rural Development to adjust rice planting calendar (OICR2600); and 5) progress in developing National Climate Service Frameworks in Rwanda (OICR2098) and Colombia.	2018 - National planners in at least one country supported to incorporate CCAFS-informed climate services, insurance and/or safety nets into CSA/adaptation investment portfolios for international climate finance providers that meet funding requirements	Changed	6. External environment (political, economic, legal, market)	We did not find the opportunities to work with countries on international finance. There was one major effort, but it did not come through. Engagement led to two opportunities that led to national funding.	

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CCAFS	F4	FP4 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	Advances in policy: 1) shaping the Climate Research for Development Africa 2018–2022 Strategic Plan (OICR21); 2) adoption of Local Technical Agroclimatic Committees approach in Regional Strategy for Disaster Risk Management in Agriculture Sector and Food and Nutrition Security in Latin America and the Caribbean (OICR2571); 3) adoption of community-based food security monitoring and early warning system by Guatemalan Secretariat for Food and Nutrition Security, formalized by National Council for Food and Nutrition Security (OICR151); 4) adoption of CS-MAP climate-risk related maps and adaptation plans by Ministry of Agriculture and Rural Development to adjust rice planting calendar (OICR2600); and 5) progress in developing National Climate Service Frameworks in Rwanda (OICR2098) and Colombia.	2018 - Agro-Climatic Risk Management approach and local Agroclimatic Committies formalized in Colombia's agriculture policy	Complete		Prior adoption of the LATC approach by Colombia has been extended regionally (OICR2571).	https://marlo.cgiar.org/projects/CCAFS/studySummary.do?cycle=Reporting&year=2018&studyID=2571

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EiB	0	Creation of clear product profiles, a stage gate process "from breeding cross-to-farm", and appropriate breeding schemes commensurate with level of investment, best practices and tools available results in accelerated breeding cycles and rates of genetic gain per unit time that are 25% greater than current approaches.	Product profile creation is on track to have the complete Product Replacement Targets for the CGIAR + NARS identified by the end of the project. The Stage Gates system leading to a formalized product advancement process is also on track to monitor the progress of germplasm and traits development. Module 1 focuses on increasing variety turnover and less about increasing the rate of genetic gain.	1. Members document current product profiles. 2. Members agree on standardized templates and approaches for defining and further improving product profiles. 3. Member breeding programs establish a format and process for implementing a stage gate system in their breeding program. 4. Review of current approaches to assessing rate of genetic gains within member programs. 5. Benchmark and plan which CGIAR breeding programs have BPAT assessments completed. 6. Center leadership and participating breeding programs sign membership agreement documenting commitment to the EiB modernization process. 7. Pilot NARS identified to become EiB members. 8. NARS linkage coordinator and Product	1. Extended 2. Complete 3. Extended 4. Changed (to Module #2) 5. Extended 6. Complete 7. Extended 8. Extended		Product Profiles & Standardized Template progress has been demonstrated via written reports, the creation of a global map of product profiles and the extensive use of the product replacement tool on the EiB Toolbox by the submission of over 200+ product profiles. Stage Gates progress has been demonstrated by Trip Reports and submitted stage gates for review. Genetic Gain Assessment Management has agreed to move this component to Module 2. Collaboration between BPAT-EiB M1 is documented by common terminology and the use of a common product replacement strategy between the two groups. Follow-up occurs via verbal and written level between EiB M1, BPAT and the evaluated centers. According to EiB management, all centers will participate with EiB. There is a significant variation on how they are using the support. National program participation has been very strong in Module 1 activities. EiB has trained many national programs as they have been included in the CGIAR - EiB Module 1 workshops. National programs have submitted product profiles along with CGIAR programs. The national programs look at product profiles as a way to communicate to the CGIAR centers the needs of the client.	

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EiB	0	Increased rates of genetic gain through use of best practices, optimization of breeding strategy and more effective use of resources (time, finances).	The pipelines presented in breeding programs were discussed and broad definitions agreed during the EiB annual meeting in November 2018. A schema for capturing breeding schemes has been drafted. Increased rates of genetic gain through use of best practices, optimization of breeding strategy and more effective use of resources (time, finances) will follow hiring of the Module 2 leader and completion of the first round of improvement plan submissions.	1. Breeding program optimization specialist hired. 2. Members begin to document trait and core breeding pipelines in Toolbox. Broad recommendations for breeders to consider when making key breeding decisions to be developed and posted to the toolbox and be presented to breeding teams & discussed during regional visits. 3. In collaboration with Modules 3 & 4, use cases of successful/failed implementation of predictive tools providing value towards breeding for product profiles documented. 4. Recommendations for strategic and structural division of resources (and activities) between pre-breeding and core breeding activities will be developed. This will include a clear description of the distinction between these activities. These will be posted to the toolbox, presented to senior management during a specific meeting targeting senior management and also to breeding teams during regional visits.	Extended		The delayed hiring of a Module 2 lead to spend time with breeding programs documenting their breeding pipelines has resulted in an extension of component 2.	

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EiB	0	Efficient and effective application of genomic technology, including better targeted genotypic data in breeding supports larger, more cost-effective programs and is mainstreamed within AFS networks, in order to accelerate the rate of genetic gain delivered in farmers' fields.	Adoption of low-density genotyping platform for FB and Quality Control (QC) is progressing well for various AFS and on track to achieve 2022 outcome. Mid density platform for Genomic Selection (GS) application expected to start in 2019. Logistic support and training for various AFS teams are showing positive results but further engagement is needed to improve data quality and adoption for outsourced services. Joint effort with Module 1 to develop trait stage gate protocols is expected to minimize deployment cost of molecular tools and strengthen collaboration in various crops.	(1) Use cases and implementation guidelines for Marker Assisted Selection (MAS), Genomic Selection (GS) and Quality Control (QC) applications in forward breeding; tissue sampling systems, and Laboratory Information Management System (LIMS) documented in the Toolbox; capacity enhancement through the development of courses and workshops; (2) For developing the optimization tools in Module 1, cost/benefit analyses of Marker Assisted Selection (MAS) and Genomic Selection (GS) workflows are conducted for all EiB-supported breeding teams and documented; (3) Implementation plans developed and executed for all green-light Marker Assisted Selection (MAS) and Genomic Selection (GS) applications; (4) Contracts that provide access to cost-effective genotyping/sequencing services and tissue/seed sampling systems; and (5) Logistics support to effectively utilize genotyping/sequencing services provided to	Extended		(1) Use case documents extended, to be uploaded by individual contributors in 2019. Documents on sampling logistics and job submissions completed (EiB toolbox). MAS / Forward breeding introduction and training to be submitted in 2019; (2) Cost benefit analysis pending, absence of breeding optimization lead. Development of trait stage-gate as additional milestone; (3) Continued to 2019; (4) Low density genotyping contract renewed, with up to 50% cost reduction on jobs with 50+ markers. Mid density service contract pending, expected by mid-2019; and (5) More than 5 (independent and joint) training workshops provides to AFS breeding teams in Asia and Africa.	

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				AFS breeding teams so they are able to avail of low cost genotyping/sequencing options.				

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EiB	0	Lower-cost, better targeted phenotypic data supports larger, more cost-effective programs.	Two engineer specialists were hired; Procedures to identify current status and opportunities to increase plot throughput/ reduce cost through high-throughput phenotyping, mechanization and automation were developed. Year to date 19 stations have been visited. Recommendation and best practices shared to all of them. Those should be incorporated into improvement plans; 1st Qualitative analysis workshop was conducted in one of the regions proposed	1. Process Engineering/Automation/ Mechanization Specialist hired. 2. Identify gaps and address needs and best approaches to increase plot throughput/reduce costs through high-throughput phenotyping, mechanization, automation. 3. Identify existing best practices and equipment in use by various programs. 4. Take stock of current use of laboratories, their capabilities and costs; prioritize needs 5. Community of practice for high-throughput phenotyping and NIRS established.	1.Complete 2. Extended 3. Extended 4.Extended 5. Extended		(1) Two engineers hired; (2) Procedures defined and 19 stations have been visited. Still pending are visits to AfricaRice, ICARDA and some satellite stations. We are on track to finish by July 2019; (3) The list of best practices depends on visits. By July 2019, it would be expected to finish the current status analysis visits. After that, we will complete the list of best practices; (4) The strategy to define the list of labs by conducting regional workshops and surveying attendees. Three priorities regions have been defined: Asia, East + southern Africa, and West Africa. In 2018, we conducted the Asia workshop. In 2019, it is in the work plan to conduct the pending workshops; and (5) The community of practice was dependent on the Toolbox development. It will be implemented in 2019 now that the Toolbox is available on-line	

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EiB	0	Bioinformatics tools that support automation, data integration and decision making are fully integrated for use in AFS breeding networks	Module 5 made significant progress in period 1 regarding interoperability of systems, data analytics and capacity development. In the area of interoperability, a common architecture was defined to align functionality and define data exchanges between various systems being developed for CGIAR breeding programs. As a funded project Breeding Application Programing Interface (BrAPI) made significant advances in stabilizing the API definitions and providing validation to ensure consistent implementation and facilitate development of interoperability. The Enterprise Breeding System project made substantial advancements initiating a software development project to fully integrate several key systems. Substantial progress was made in the area of data analytics with the development and launch of the EiB Galaxy instance.	1. Breeding use cases reprioritized based on landscape analysis: sample tracking for genotyping and field data collection apps	Extended		(1) Prioritization of Breeding Use cases remain as Sample Tracking and Field Data Collection Apps based on the landscape analysis.	
EiB	0	Bioinformatics tools that support automation, data integration and decision making are fully integrated for use in AFS breeding networks	Module 5 made significant progress in period 1 regarding interoperability of systems, data analytics and capacity development. In the area of interoperability, a common architecture was defined to align functionality and define data exchanges between various systems being developed for CGIAR breeding programs. As a funded project Breeding Application Programing Interface (BrAPI) made significant advances in stabilizing the API definitions and providing validation to ensure consistent implementation and facilitate development of interoperability. The Enterprise Breeding System project made substantial advancements initiating a software development project to fully integrate several key systems. Substantial progress was made in the area of data analytics with the development and launch of the EiB Galaxy instance.	2. (i) Core Systems are certified BrAPI v1 compliant; (ii) Workflow implemented for the case studies identified in Year 1; (iii) Implementation of connectivity across the different tools/systems.	Extended		2.(i) BMS, B4R, Cassavabase, and GOBii projects all have some relevant BrAPI calls implemented, and many more implementations are available in other projects in the wider BrAPI community. (ii) The sample tracking use case has been mapped and included in the annual report. (iii) Implementation has been delayed until 2019	http://cbsugobii05.biohpc.cornell.edu:6084/pages/viewpage.action?pageId=9339229

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EiB	0	Bioinformatics tools that support automation, data integration and decision making are fully integrated for use in AFS breeding networks	Module 5 made significant progress in period 1 regarding interoperability of systems, data analytics and capacity development. In the area of interoperability, a common architecture was defined to align functionality and define data exchanges between various systems being developed for CGIAR breeding programs. As a funded project Breeding Application Programing Interface (BrAPI) made significant advances in stabilizing the API definitions and providing validation to ensure consistent implementation and facilitate development of interoperability. The Enterprise Breeding System project made substantial advancements initiating a software development project to fully integrate several key systems. Substantial progress was made in the area of data analytics with the development and launch of the EiB Galaxy instance.	4. (i) Report on the current landscape of databases, bioinformatics capabilities/software, and biometric capabilities/software; (ii) Documented gap analysis for the Year 1-2 case studies; (iii) Existing databases and tools assessed and updated; (iv) Development or acquisition of new database and tools.	Complete		4.(i) The report has been made available to the platform lead and will be made widely available in 2019. (ii) The ability to connect phenotype and genotype remains a significant challenge for CGIAR breeding programs. To address this a working group developed logic for implementation of sample tracking. A document of the sample tracking logic was distributed. (iii) Updates occur through Expert Advisory Group meetings, Community of Practice meetings, and the annual contributors meetings. Links to pages describing each of the primary systems has been loaded to the EiB toolbox. (iv) In the initial stages, module 5 is focused on deployment, adoption, and integration of existing systems that are under active development. Once core breeding functionalities are met module 5 will evaluate the need to develop/acquire new	

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							systems for lower priority functionality.	
EiB	0	Bioinformatics tools that support automation, data integration and decision making are fully integrated for use in AFS breeding networks	Module 5 made significant progress in period 1 regarding interoperability of systems, data analytics and capacity development. In the area of interoperability, a common architecture was defined to align functionality and define data exchanges between various systems being developed for CGIAR breeding programs. As a funded project Breeding Application Programing Interface (BrAPI) made significant advances in stabilizing the API definitions and providing validation to ensure consistent implementation and facilitate development of interoperability. The Enterprise Breeding System project made substantial advancements initiating a software development project to fully integrate several key systems. Substantial progress was made in the area of data analytics with the development and launch of the EiB Galaxy instance.	5. (i) Identify key analyses and data required for selection candidate advancement and parental selection; (ii) Catalogue existing analysis tools and pipelines; (iii) Initiate open-source collaboration on breeding optimization suite.	Complete		5.(i) Appropriate analysis techniques vary depending on experimental designs and the objectives of trials. Rather than listing specific analysis or criteria that may or may not be relevant for a specific use case, module 5 has focus on providing training through 7 sabbaticals and 3 short courses. (ii) The use of various statistical and analytical packages varies widely across the CGIAR. Some key is software and analysis pipelines are listed in the EiB toolbox with links to software descriptions and download pages. A Galaxy Server was set up with most widely used tools (iii) Module 2 is leading this.	http://galaxy-demo.excellenceinbreeding.org

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EiB	0	Bioinformatics tools that support automation, data integration and decision making are fully integrated for use in AFS breeding networks	Module 5 made significant progress in period 1 regarding interoperability of systems, data analytics and capacity development. In the area of interoperability, a common architecture was defined to align functionality and define data exchanges between various systems being developed for CGIAR breeding programs. As a funded project Breeding Application Programing Interface (BrAPI) made significant advances in stabilizing the API definitions and providing validation to ensure consistent implementation and facilitate development of interoperability. The Enterprise Breeding System project made substantial advancements initiating a software development project to fully integrate several key systems. Substantial progress was made in the area of data analytics with the development and launch of the EiB Galaxy instance.	7. (i) CoP for statisticians and bioinformatics leaders; (ii) Annual Bioinformatics and Biometrics "Hackathon"; (iii) Core operational guidelines for bioinformatics and biometrics defined; (iv) Common BrAPI defined; (v) Capacity development strategy for bioinformatics and software adoption developed; (vi) Support capacity building and the evaluation of new bioinformatics and biometrics tools and approaches in collaboration with distinct user groups and use cases prioritized in Modules 2-4; (vii) Execute	Complete		i) The CoPs have been formed and meet regularly via web conference calls. Frequently attended conferences are also used as an opportunity for in person meetings with the last meeting occurring 1/14/19 at Plant and Animal Genome Conference (PAG) in San Diego, CA. (ii) The first biometrics hackathon was held in February 5-8 2018 and hosted at IRRI. The hackathon produced serval tools, many of which are included the EiB Galaxy instance. (iii) Core operational guidelines will be addressed through the formation of working groups tasked with providing recommendations and guidelines. In 2018 working groups centered on sample tracking and UUIDs. Outputs of these working groups are included in the annual report and shared with the CoP. (iv) Completed (v) To build capacity Module 5 supports workshops, hackathons, sabbaticals, and an online seminar series. To date	https://github.com/venice-juanillas/EIB-hackathon

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				training workshops for biometricians in CGIAR target countries to expand the number of resource persons.			there have been 3 workshops, 3 hackathons, 7 sabbaticals (sabbatical reports can be found in appendix 5.4), and a monthly seminar series currently hosted by the GOBii project. (vi) Working groups have been formed with the CoPs to address these needs. In 2018 working groups centered on sample tracking and universallt uique identifier (UUIDs). In addition a galaxy platform was developed to share bioinformatics and biometrics tools.	
EiB	0	Best practice information made available to EiB members in V1.2 of the Toolbox and a Beta version of course building tool available for testing in V1.2 of the Toolbox.	1. To initiate the structured sharing of best practice information an online content management site and system was been developed within the EiB portal. This site or "toolbox" is structured to provide a queryable resource broadly structured across a matrix of module and type of resource; "Learning"- formal resources of educational value, e.g. access to online breeding statistics course, "Services"- digital access to EiB community service resources (e.g. the high throughput genotyping platform, HTPG), "Tools"- resources of value to the breeding community including protocols, manuals guides, software, templates for cost calculation, "Workflows"- space to formally doccument breeding workflows to share with other community members and integrate with other toolbox resources in a structured manner.	1. Toolbox establishes a common infrastructure and frameworks for documentation of best practices, tools, workflows and resources with link to user review system.	Extended		The Toolbox can now be accessed by members via http://excellenceinbreeding.org/. Extended activities relate to more content needed for evaluation, staffing delays and the time demands from improvement plan engagement	http://excellenceinbreeding.org/

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EiB	0	Best practice information made available to EiB members in V1.2 of the Toolbox and a Beta version of course building tool available for testing in V1.2 of the Toolbox.	2. To facilitate access to EiB community resources including current best practice information found within the toolbox and other planned resources (such as member discussion forums, tools to develop and update product profiles, areas and tools to document maintain and track improvement plan activities) a domain within the EiB portal has been developed allowing EiB members to register themselves and access EiB internal resources. This registration page allows members to create their own profile detailing not only their name, contact and institutional affiliation but their disciplinary interests, particular area of interest within EiB and the species they have experience of.	2. Restricted domain developed in the Toolbox for members documenting their breeding programs and progress.	Complete		The Toolbox can now be accessed by members via http://excellenceinbreeding.org/. Extended activities relate to more content needed for evaluation, staffing delays and the time demands from improvement plan engagement	
EiB	0	Best practice information made available to EiB members in V1.2 of the Toolbox and a Beta version of course building tool available for testing in V1.2 of the Toolbox.	3. In parallel with the technical development of the online toolbox for EiB, community members were surveyed at two face to face meetings held in 2018 (the EiB main meetings in March in Nairobi and November in Amsterdam) to obtain long lists of resources the members thought would be of value to the EiB community. These resources primarily comprised tools already adopted by some community members. A primary content review of these long list resources was conducted coordinated by Module leaders engaging with relevant CoPs from their subject matter areas. As a result of this review the toolbox was initially populated with a short list of tools considered by EiB community members and module leaders to be of high quality and relevance for the broad breeding community.	3. Communication with CoPs from relevant modules for upload of, and feedback to content.	Complete		The Toolbox can now be accessed by members via http://excellenceinbreeding.org/. Extended activities relate to more content needed for evaluation, staffing delays and the time demands from improvement plan engagement	

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EiB	0	Best practice information made available to EiB members in V1.2 of the Toolbox and a Beta version of course building tool available for testing in V1.2 of the Toolbox.	4. In line with the technical development and initial content population of the toolbox a series of discussions with EiB module leadership, communications specialists, legal experts and IT experts was held exploring the needs and requirements for formalized processes and procedures for toolbox content management and user reviews. These discussions will continue into 2019, the efforts being postponed somewhat given the enahnced focus on and prioritisation of improvement plan development in 2018 and 2019. Additional toolbox content will aid in providing a richer context for these discussions providing concrete examples of the needs for processes and procedures.	4. Draft review guidelines and infrastructure developed.	Extended		The Toolbox can now be accessed by members via http://excellenceinbreeding.org/. Extended activities relate to more content needed for evaluation, staffing delays and the time demands from improvement plan engagement	
EiB	0	Best practice information made available to EiB members in V1.2 of the Toolbox and a Beta version of course building tool available for testing in V1.2 of the Toolbox.	5. Best practice knowledge (online education process management and course administration expertiese) has been provided by the team working on the Learning management system (LMS) at CIMMYT. The digital infrastructure developed within the LMS embeds these best practices. The LMS will be used for EiB e-learning content development and implementation and will be evaluated for course and workshop administration.	5. Development of best practice documentation for e-learning based on materials used at regional workshops	Complete		The Toolbox can now be accessed by members via http://excellenceinbreeding.org/. Extended activities relate to more content needed for evaluation, staffing delays and the time demands from improvement plan engagement	
EiB	0	Best practice information made available to EiB members in V1.2 of the Toolbox and a Beta version of course building tool available for testing in V1.2 of the Toolbox.	6. A list of e-learning and training resources of potential value to EiB have been identified. We will fully evaluate the content and where of high value provide links in the toolbox after alignment with prioritized capacity needs identified through program BPAT and improvement plans.	6. Identification of and links to relevant external e-modules and courses.	Extended		The Toolbox can now be accessed by members via http://excellenceinbreeding.org/. Extended activities relate to more content needed for evaluation, staffing delays and the time demands from improvement plan engagement	

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FISH	F1	Outcome 1.1: 1.5 million households have access to and are using our selectively improved, faster growing and more resilient strains of tilapia and carp seed.	Progress is being made in production of new generations of tilapia and carp at the 3 genetics research platforms (in Bangladesh, Egypt and Malaysia) and in dissemination of existing strains. Continued development of public and private partnerships within FISH focal and scaling countries also contribute to establishing the institutional and investments that support adoption at scale.	Milestone 1.1.1: FISH genetics research platforms operating in three countries: Bangladesh for carps; Egypt (Abbassa) for tilapia; Malaysia (Jitra) for tilapia.	Complete		Complete, though continual improvements are being made to the genetic research platforms, including through cooperation with the CGIAR Excellence in Breeding Platform, and host country in Malaysia for the Jitra facility. Biosecurity is also being prioritized for future investment, particularly with respect to risk management for TiLV (Tilapia Lake Virus).	
FISH	F1	Outcome 1.1: 1.5 million households have access to and are using our selectively improved, faster growing and more resilient strains of tilapia and carp seed.	Progress is being made in production of new generations of tilapia and carp at the 3 genetics research platforms (in Bangladesh, Egypt and Malaysia) and in dissemination of existing strains. Continued development of public and private partnerships within FISH focal and scaling countries also contribute to establishing the institutional and investments that support adoption at scale.	Milestone 1.1.2: New public/private sector partnerships established for tilapia genetic improvement and dissemination in two focal countries, one in Asia (Myanmar) and one in Africa (Zambia).	Complete		Myanmar partnership established with the Department of Fisheries and Myanmar Fisheries Federation, incorporating two public and two private satellite hatcheries for dissemination of the **GIFT strain that was introduced in 2016.** Zambia partnership established with the Department of Fisheries for a genetic improvement program for Oreochromis andersonii. **Training was provided for key Zambian partners in Penang in March 2018.**	https://fish.cgiar.org/impact/stories-of-change/improved-tilapia-seed-arrives-myanmar
FISH	F1	Outcome 1.1: 1.5 million households have access to and are using our selectively improved, faster growing and more resilient strains of tilapia and carp seed.	Progress is being made in production of new generations of tilapia and carp at the 3 genetics research platforms (in Bangladesh, Egypt and Malaysia) and in dissemination of existing strains. Continued development of public and private partnerships within FISH focal and scaling countries also contribute to establishing the institutional and investments that support adoption at scale.	Milestone 1.1.3: IT-based performance assessment methods and tools adopted by national partners in three countries (Bangladesh, Egypt, and Myanmar). * Extended, with an ongoing process continuing to develop a suite of performance assessment tools	Extended		Tablet-based performance assessment tools were designed and tested in Bangladesh, Egypt and Myanmar. **A new partnership with a private company** (Skretting) was agreed to further develop these tools and extend the use performance assessment tools in tilapia aquaculture, with a focus on Africa. A new digital tool for fish epidemiology and surveillance was also developed with Norwegian research partners.	https://fish.cgiar.org/news-and-updates/press-releases/worldfish-and-skretting-sign-mou-develop-aquaculture-africa

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FISH	F1	Outcome 1.2: 2.5 million households have adopted disease detection and control strategies, cost-effective and sustainable aqua-feeds and/or improved aquaculture management practices	Progress is being made in production of new diagnostics tools for fish disease, improved health management practices and fish feed ingredients, all of which contribute towards this outcome. As in Outcome 1.1, continued development of public and private partnerships also contributes to achieving this outcome.	Milestone 1.2.1: The benefits of better management practices (disease, feed and husbandry) assessed and yield-limiting factors identified for further improvement in four focal countries.	Complete		**Part 1:** Study on adoption of better management practices was completed in Bangladesh and will be **published in 2019**. The study indicated that farmers adopting simple operational improvements had 50% higher productivity. A systematic review of yield gap in tilapia covering multiple countries was also submitted for publication (**published in 2019**).	http://hdl.handle.net/20.500.12348/3342
FISH	F1	Outcome 1.2: 2.5 million households have adopted disease detection and control strategies, cost-effective and sustainable aqua-feeds and/or improved aquaculture management practices	Progress is being made in production of new diagnostics tools for fish disease, improved health management practices and fish feed ingredients, all of which contribute towards this outcome. As in Outcome 1.1, continued development of public and private partnerships also contributes to achieving this outcome.	Milestone 1.2.1: The benefits of better management practices (disease, feed and husbandry) assessed and yield-limiting factors identified for further improvement in four focal countries.	Complete		**Part 2:** More specific issues-based management guidance was released, including management of the risks of **TiLV** to the global tilapia industry; management of disease risk and biosecurity from an aquaculture area-based management perspective; decision-making for managing infectious diseases in the aquaculture sector; and a growing set of management interventions related to the emergence of antimicrobial resistance and occupational hazards; biosecurity principles and plans in genetically improved tilapia dissemination programs. An inventory of locally available ingredients in six FISH countries was produced and will be published by May 2019. **A microbial biomass-based diet** (NovacqTM) was shown to outperform benchmark commercial fish diets in laboratory experiments with Genetically Improved Farmed Tilapia (GIFT) fingerlings. In a series of experiments in Bangladesh, low-protein (nitrogen), high-energy (high non-starch polysaccharide	https://onlinelibrary.wiley.com/doi/epdf/10.1111/raq.12254

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							carbon) diets stimulated natural food production in the pond, which compensated not only for the reduced supply of dietary protein but also contributed to a higher fish growth.	
FISH	F1	Outcome 1.3: 4.8 million metric tons of annual farmed fish production with reduced environmental impact and increased resource-use efficiency (measured by 20% reduction in greenhouse gas (GHG) emissions and 10% increase in water and nutrient-use efficiency).	Progress is being made towards this outcome through increased understanding of the interventions for significantly reducing GHG emissions and increasing water and nutrient use efficiency (**Henrikson et al, 2018**). As in Outcome 1.1 and 1.2, continued development of public and private partnerships also contributes to achieving this outcome.	Milestone 1.3.1: Environmental improvement plans prepared from FISH research to be adopted by public and/or private sector partners in three countries: one in Africa (Egypt) and two in Asia (Bangladesh, Indonesia).	Extended		Three focal countries and one scaling country, namely Bangladesh, Myanmar, Egypt and Vietnam, are being examined. The research uses existing life-cycle assessment data to identify the interventions that had the best possibility to deal with the most urgent greenhouse gas emissions and other environmental constraints related to aquaculture in each of the countries. Geographic information system mapping has been used to highlight areas where conflicts could occur between aquaculture farms and forests (especially mangroves), recognizing that deforestation is a significant contributor to greenhouse gas emissions. A paper was prepared on **sustainable intensification of aquaculture in Bangladesh**. Findings from other countries are currently being incorporated into journal articles, providing insights into the current baselines of greenhouse gas emissions from aquaculture in the above focal countries and the opportunities and pathways for improvement within the context of growing fish demand.	(Henrikson et al, 2018).

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FISH	F1	Outcome 1.4: 2.3 million poor men, women and youth access improved livelihood opportunities resulting from increased aquaculture production and associated value chains and enterprise development (of which 50% are women).	Progress is being made towards this outcome through public and private sector partners, policy and investments in FISH focal countries, informed by outcome and impact studies. Recognizing the importance of private sector pathways and entrepreneurship for achieving this goal, FISH research has initiated research on identification of entrepreneurship opportunities for women in Nigeria and received USAID and BMGF grants for private sector cooperation to achieve goals of smallholder income, women's empowerment and nutrition outcomes at scale in Bangladesh and Nigeria.	Milestone 1.4.1: Public-private sector partnerships or platforms for sustainable aquaculture R&D convened (and led by national partners) in one more focal country in Africa and two focal countries in Asia.	Complete		In 2017, FISH reported partners/platforms in Bangladesh, Myanmar, Vietnam and Egypt. These are still operational in 2018. In addition, new public-private partnerships or platforms were established and/or strengthened in India, Solomon Islands, Timor-Leste, Nigeria and Zambia. A new cooperation with the African Development Bank under the **Technologies for African Agriculture Transformation initiative** will extend public/private partnerships for accelerating aquaculture R&D to ten African countries from 2019-2021.	https://fish.cgiar.org/research-areas/projects/technologies-african-agriculture-transformation-taat
FISH	F1	Outcome 1.4: 2.3 million poor men, women and youth access improved livelihood opportunities resulting from increased aquaculture production and associated value chains and enterprise development (of which 50% are women).	Progress is being made towards this outcome through public and private sector partners, policy and investments in FISH focal countries, informed by outcome and impact studies. Recognizing the importance of private sector pathways and entrepreneurship for achieving this goal, FISH research has initiated research on identification of entrepreneurship opportunities for women in Nigeria and received USAID and BMGF grants for private sector cooperation to achieve goals of smallholder income, women's empowerment and nutrition outcomes at scale in Bangladesh and Nigeria.	Milestone 1.4.2: FISH research has identified business and entrepreneurship approaches and models with potential for scaling within focal countries.	Complete		A review of business and entrepreneurship approaches was completed and a journal article submitted for publication in Q1 2019. Private sector cooperation was established in **Zambia** on business model development and a successful proposal submitted to GIZ for scaling of business models associated with tilapia value chains in Zambia and Malawi. Country-specific studies were conducted in **Nigeria to identify entrepreneurship opportunities for women.**	http://blog.worldfishcenter.org/2018/04/private-sector-collaboration-boosts-aquaculture-development-in-africa/
FISH	F2	Outcome 2.1: 1 million fishery-dependent households have reduced poverty as a result of adopting improved fisheries management.	Progress is being made towards this outcome through complementary fisheries management interventions being initiated/monitored at multiple scales from community to global, informed by evidence gathered through outcome and impact studies. A new bilateral grant from the Oak Foundation is supporting enhanced Monitoring and Evaluation (M&E) of co-management interventions in FISH.	Milestone 2.1.1: Adaptive management, technology and livelihood interventions identified in marine and inland small-scale fisheries systems in at least three FISH focal and/or scaling countries.	Complete		Country-level research of co-management systems are available/under refinement in Bangladesh, Cambodia, Myanmar and Solomon Islands.	

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FISH	F2	Outcome 2.1: 1 million fishery-dependent households have reduced poverty as a result of adopting improved fisheries management.	Progress is being made towards this outcome through complementary fisheries management interventions being initiated/monitored at multiple scales from community to global, informed by evidence gathered through outcome and impact studies. A new bilateral grant from the Oak Foundation is supporting enhanced Monitoring and Evaluation (M&E) of co-management interventions in FISH.	Milestone 2.1.2: Evidence gathered and policy recommendations prepared on (i) Small-Scale Fisheries (SSF) functions for food security, poverty alleviation and threats; and (ii) impacts of intra-regional and global trade patterns and policies on the pro-poor functions of SSF.	Extended		Significant progress. (i) The first paper of the Illuminating Hidden Harvest study, focusing on nutrition, **was published,** with methodological recommendations for 60 national-level evidence-gathering case studies to be implemented with the FAO and other partners during 2019. A journal paper on production and trade patterns and their influence on nutritional potential of capture fisheries was submitted and is in review. (ii) Analyses of intra-regional fish and reported in trade in Africa and five policy briefs illustrated the scale of cross-border trade for income and food security, and the impact of inadequate market and trade infrastructure were also drafted. An analysis of seafood trade duration in ASEAN **was completed.** Pacific research is pending.	http://hdl.handle.net/20.500.12348/684
FISH	F2	Outcome 2.1: 1 million fishery-dependent households have reduced poverty as a result of adopting improved fisheries management.	Progress is being made towards this outcome through complementary fisheries management interventions being initiated/monitored at multiple scales from community to global, informed by evidence gathered through outcome and impact studies. A new bilateral grant from the Oak Foundation is supporting enhanced M&E of co-management interventions in FISH.	Milestone 2.1.3: Establishment of partnerships and networks that span communities, national agencies and government bodies.	Complete		Complete, though partnership building continues at all levels from local to global. Partnership development in small-scale fisheries research for development has been further facilitated by a USD 1.5 million investment secured from the Oak Foundation to build collaborative networks, via the project Building Capacity, Coordination and Communication for Collective Action on Small-Scale Fisheries. **Collaboration was also strengthened with the FAO** for global-level network development.	http://www.fao.org/news/story/en/item/1144888/icode/

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FISH	F2	Outcome 2.2: 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements.	Progress is also being made towards this outcome, following the approach provided in Outcome 2.2, underpinned by a strengthening portfolio of research focused on women in fisheries management investments.	Milestone 2.2.1: New knowledge on gender-sensitive models and gender-transformative approaches to livelihood innovations for focal countries.	Complete		Complete, though research on this frontier continues. New knowledge was generated across several FISH focal countries on women's empowerment and the application of gender-transformative approaches to fisheries management, reviewed in this **blog** created for International Women's Day 2019 and associated **timeline**.	http://blog.worldfishcenter.org/2019/03/gender-research-inclusive-equitable-blue-future/
FISH	F2	Outcome 2.2: 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements.	Progress is also being made towards this outcome, following the approach provided in Outcome 2.2, underpinned by a strengthening portfolio of research focused on women in fisheries management investments.	Milestone 2.2.2: Completed production of new knowledge on gender barriers and implications in fisheries-dependent communities, surfacing hidden micro-level barriers to equality in fisheries management and innovation.	Complete		**Three** key papers indicate the process on this milestone	Gender and marine protected areas: A case study of Danajon Bank, Philippines
FISH	F2	Outcome 2.2: 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements.	Progress is also being made towards this outcome, following the approach provided in Outcome 2.2, underpinned by a strengthening portfolio of research focused on women in fisheries management investments.	Milestones 2.2.3: Conceptual framework for small-scale fisheries in fish food systems completed and being used to convene policy engagement, align investment in fisheries and re-invigorate global dialogue and strategies concerning the role of small-scale fisheries in poverty reduction. Complete; with one further study on fish in food systems frameworks and research agendas in preparation for submission as a journal article in 2019	Complete		A conceptual framework for fish in food systems was developed through a workshop held in Penang in March 2018, and engagement in several A4NH events. The results are being integrated into the Illuminating Hidden Harvests research with the FAO in 52 countries. Research fed into a rapid assessment of fish in food systems and value chains in the Great Lakes region¾reported in keynote presentations and a side event at the Pan-African Fish and Fisheries Association conference. See the side session co-hosted by SADC at the conference: **Fish for food and nutrition security in the SADC region.**	http://www.bunda.luanar.mw/conference/paffa/index.php

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FISH	F2	Outcome 2.3: 2.1 million hectares of inland aquatic and coastal marine habitat restored and under more productive and equitable management.	Progress is being made towards this outcome through a portfolio of W3/bilateral project investments in FISH focal and scaling countries.	Milestone 2.3.1: New knowledge and collaboration on cross-scale governance mechanism, accounting for impacts of external drivers and resource competition.	Complete		**Multiple studies** (coastal and inland capture fisheries) contributed to the completion of this milestone. Key papers produced as evidence of progress with this milestone	Intersectorality in the governance of inland fisheries
FISH	F2	Outcome 2.3: 2.1 million hectares of inland aquatic and coastal marine habitat restored and under more productive and equitable management.	Progress is being made towards this outcome through a portfolio of W3/bilateral project investments in FISH focal and scaling countries.	Milestone 2.3.2: New knowledge of trade-offs between small-scale fisheries, infrastructure and land use.	Extended		Paper and practice brief in draft generated through multi-stakeholder expert group meetings in 2018. Draft prepared of a guide for water planners, managers and engineers to enhance fisheries in water control infrastructure (brief and paper to be submitted 2019). Preliminary evidence summarized in a WLE/FISH practice brief and blog that was used as the basis of dialogue at Stockholm World Water Week to raise profile of the integration of fisheries within water management infrastructure. Special session highlighted here **Water for Fish; Sustainable Inland Fisheries** The associated brief is **Improving opportunities for reservoir fisheries.**	https://wle.cgiar.org/water-fish-sustainable-inland-fisheries
FISH	F2	Outcome 2.3: 2.1 million hectares of inland aquatic and coastal marine habitat restored and under more productive and equitable management.	Progress is being made towards this outcome through a portfolio of W3/bilateral project investments in FISH focal and scaling countries.	Milestone 2.3.3. Completion of foresight analysis (accounting for environmental, demand, production trends) of small-scale fisheries performance.	Extended		Foresight analysis completed at Africa regional level and one focal country (Zambia) but delayed for other to permit inclusion of Illuminating Hidden Harvest data. Key papers from Africa are 2: **Prospects and challenges of fish for food security in Africa** and **Fish supply and demand for food security in sub-Saharan Africa: An analysis of the Zambian fish sector. .**	http://hdl.handle.net/20.500.12348/2098

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							A paper on Bangladesh is in preparation and further research on futures is pending in Asia and Pacific.	
FTA	F1	Managers and policy-makers adopt effective monitoring methods, tools and practices to mitigate threats to valuable TGR, and implement suitable safeguarding strategies in line with international initiatives, such as the Global Plan of Action for Forest Genetic Resources and the Global Strategy on Conservation and Use of Cacao Genetic Resources	In 2017 and 2018 the target indicator of achievement used has been the number of key boundary partner institutions engaged/ adopting/applying the innovations provided, i.e. # of national institutions and international organisations engaged in tree genetic resource conservation adopting tools and indicators (threat analysis) in developing tree genetic resource conservation plans; with an annual target of 3-5 institutions in three regions – achieved.	Valuing tree genetic resources and feasibility of conservation for more productive and resilient tropical agroforest landscapes and their importance for delivering SDGs	Complete		Distribution maps of 72 species in process, 7 journal articles on the screening of diversity and measures for maintenance (safeguarding and conservation), and one journal article on processes that shape ecosystem service provisioning of brazil nut in the Amazon	
FTA	F1	Agricultural and horticultural research and development partners adopt cost-effective domestication approaches for priority tree species, based on impacts and maximizing efficiency, and considering trade-offs involved in intensification, while paying attention to smallholder breeders' rights	In 2017 and 2018 the target indicator of achievement used has been the number of key boundary partner institutions engaged/ adopting/applying the innovations provided, i.e. # of national (private or public) tree breeding institutions or entities adopting 'genetic business plans' applying diversity, adaptation and economic returns in their breeding strategy; with an annual target of 3-5 institutions in three regions - achieved.	Integrating new and orphan food trees into evolving African food systems using enhanced domestication approaches	Complete		A strategy developed for supporting human nutrition in Africa through the integration of new and orphan crops, using exemplar crop analysis to guide the building of business models and breeding. Five genomes, nine articles on characterization, three articles on cultivar development, and one article on suitability modelling published.	

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FTA	F1	National governments, extension services and private partners adopt cost-effective and equitable tree-planting material delivery approaches, with attention to appropriate policies governing material transfer/use agreements and using the most appropriate decision support tools, to supply high-quality site-appropriate tree-planting material to smallholders and other growers	In 2017 and 2018 the target indicator of achievement used has been the number of key boundary partner institutions engaged/ adopting/applying the innovations provided, i.e. # of national (private or public) tree germplasm supplying institutions or entities adopting 'genetic business plans' applying diversity, adaptation and economic returns in their deployment strategy; with an annual target of 3-5 institutions in three regions -achieved.	Policy measures, regulatory frameworks, decision support tools, and mass breeding of reproductive material in support of application of appropriate tree genetic resource portfolios in production systems, for landscape restoration and biodiversity conservation	Complete		A general policy review is in process; a regulatory strategy informing national tree seed systems developed for Latin America and underway in Asia. A global indicator framework for monitoring diversity has been prepared; and mass breeding is applied at scale in East Africa. Suitability modelling of tree species to current and future climates has developed further, in the form of theory (articles), tools (web and mobile based), and field application.	
FTA	F2	Improved food security and livelihood opportunities for 100 million people in smallholder households and more productive and equitable management of natural resources over an area of at least 50 million ha. This outcome integrates some outputs from other research clusters through their scaling.	Progress towards the outcome evidenced by (i) IFAD loan programmes in Niger, Mali, Ethiopia and Kenya, (ii) an impact pathway in 12 African countries through the GEF programme on resilient food security in sub-Saharan Africa, (iii) embedded staff in the Ethiopian ministry to assist national agroforestry scaling strategy delivery and agroforestry policies in Rwanda, Uganda and Nepal, (iv) agroecological initiatives in two Indian states and (v) control of fall army worm in Africa. Livelihood system models in the milestone not only demonstrate food security outcomes associated with trees over time but also inform option design capable of producing transformative outcomes.	Livelihood system models and predictions of impact from better use of tree resources for at least five countries in Africa, Asia and Latin America	Complete		Livelihood trajectory models for Kenya and Ethiopia; ecophysiological and local knowledge models for coffee applied in Rwanda, Uganda and China; and oil palm agroforestry fostering socially inclusive and sustainable production in Brazil (ETFRN News 59)	

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FTA	F2	Improved livelihood opportunities involving timber, fruit and NTFPs contributing a 25% increase in income for over 5 million people and more equitable management of natural resources including a 25% increase in women's participation in decisions involving tree and forest management and utilization and improvement in substantive representation of women in community forest management institutions	A key feature of the FP2 theory of change relates to perverse effects of forest policy and agricultural incentives as barriers to adoption of market-based agroforestry practices, the reform of which often requires innovative cross sector and interministerial action to unlock livelihood opportunities for smallholder farmers	Impacts of forest policy on socially and economically differentiated groups of actors collated across at least six countries and three regions	Complete		National: agroforestry and strategy plan in Rwanda, parliamentary policy process in Uganda, scaling strategy in Ethiopia, policy in Nepal, regional regreening policy in northern Ghana and implementation of agroforestry concessions in Peru.	
FTA	F2	Diversified tree-crop production systems covering 5 million ha and improving diets and livelihood opportunities for 20 million people in smallholder producer households.	The majority of tree-crop commodity production is by smallholder farmers but they accrue a low proportion of the industry value of the products they produce and are subject to price fluctuations. Diversification of rubber production systems in China js a key sustainable intensification strategy - already reported in previous years and augmented here with progress in coffee diversification.	Options for managing intensive rubber production systems in environmentally sustainable ways in China	Complete		Performance measures for climate change mitigation of rubber agroforestry from previously reported green rubber options in SW China are augmented by progress in promoting sustainable coffee agroforestry.	

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FTA	F2	Increased access to diverse, nutrient rich food for 20 million people through closing yield gaps by trees in agricultural systems improving and maintaining soil health as well as intensifying system interactions (fodder and firewood) and directly contributing to production, reducing and reversing land degradation and increasing the resilience of smallholder livelihoods.	A key constraint to farmer managed regeneration of trees is free grazing of livestock, measures to integrate livestock and trees are therefore critical for realizing benefits of trees on farm land and across agricultural landscapes in sub-Saharan Africa	Governance models required to reconcile free grazing of animals with tree regeneration across sub-Saharan Africa evaluated.	Complete		Integrating crop and livestock in smallholder production systems for food security and poverty reduction in sub-Saharan Africa.	https://doi.org/10.5897/ajar2018.13020#https://doi.org/10.5897/ajar2018.13020
FTA	F2	Reducing yield gaps through improved pasture management and animal husbandry on over 15 million ha and 1 million animals and contributing to reducing and reversing land degradation on over 5 million ha	Ruminant livestock are a major contributor of green house gas emissions but integrating livestock with trees and crops in silvopastoral systems can reduce emissions at the same time as improving productivity and sustainability of production systems, particularly through avoiding or reversing land degradation	Strategy for development of climate smart silvopastoral systems developed	Complete		Ortiz-Gonzalo D., de Neergaard A., Vaast P., Suárez-Villanueva V., Oelofse M., Rosenstock T.S.. 2018. Multi-scale measurements show limited soil greenhouse gas emissions in Kenyan smallholder coffee-dairy systems. Science of The Total Environment, 626 : p. 328-339. Amejo, A. G., Gebere, Y. M., Kassa, H., & Tana, T. (2018). Comparative analysis of climate change impact on livestock in relation to biomass base feed availability using standardized precipitation index in south-western Ethiopia. International Journal of Livestock Production, 9(7), 184-191. **(See links 2 and 3)**	https://doi.org/10.5897/IJLP2018.0478

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FTA	F3	Public and private actors adopt effective governance arrangements, mechanisms and tools for ensuring sustainable and inclusive commodity supply in at least 3 major producer countries	Performed analysis of implementation gaps behind - Forest Stewardship Council (FSC) certification in 7 countries - Livestock zero-deforestation commitments in Brazil - Oil palm sustainable commitments in Indonesia - Livestock and Cacao zero-deforestation commitments in Colombia - Cocoa and Forest initiative in Ghana - Engagement with stakeholders in 7 landscapes	Completed assessment of the implementation gaps, challenges and opportunities in sustainable value chain governance with analysis social, economic and environmental impacts (based on key select indicators) in at least five landscapes	Complete		Complete but slightly changed. Technical reports for Ghana and Colombia and Brazil, and analytical framework of P18 available upon request and the following links	https://www.cifor.org/library/6884/implementing-sustainability-commitments-for-palm-oil-in-indonesia-governance-arrangements-of-sustainability-initiatives-involving-public-and-private-actors/
FTA	F3	5 business platforms and 20 businesses and service providers develop and implement business models that are more inclusive, economically viable and environmentally sustainable	FP3 conducted structured consultations with over 50 inclusive business proponents, including 4 multi-stakeholder seminars. This helped establish new partnerships to develop collaborative and need-driven research in 2019. This will form the foundation for supporting a change in business (model) practices in 2019. Interactive map (on Papua) under development. Blogs planned for October. Session at ICBE conference in Papua in October.	Platforms that involve private sector actors from three sectors relevant to our research are informed about the socio-environmental performance of value chain and business models	Complete		Workshop reports available upon request	
FTA	F3	At least 30% of financial service providers lending to timber, tree and agricultural crops adopt ESG criteria, and increase in 25% the lending to models that integrate smallholders and SMEs	FP3 developed a conceptual framework identifying the main barriers for access to finance of smallholders and SMEs and are working on a compendium of successful blended finance initiatives and their approaches towards inclusive landscape financing.	Develop a conceptual framework for inclusive financing of landscapes and value chains taking stock of current development of financing landscape initiatives, approaches and modes of operation for inclusive landscape financing	Extended		Due to changes in personnel the development of the conceptual framework was delayed. The framework document is still an open document and can be accessed on:	

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FTA	F4	(Sub)national governance systems in at least 10 countries use contextualized theories of change to guide transitions to integral achievement of sustainable development goals through restoration, conservation and management of landscape multi-functionality, using similarity domains based on patterns and intensities of forest and tree cover change in space and time in sentinel landscapes understood on the basis of 'drivers' that operate at larger scales.	Synthesis of information from 3 Sentinel Landscapes (Cameroon, Nicaragua-Honduras and Indonesia) carried out in 2018, including a broader stock take on progress in the Sentinel Landscape agenda. A Portfolio approach to be explored in 2019 building on the stock take targeting broader theories of change and theories of place development. Other work has been achieved outside Sentinel Landscapes in this regard.	Adjustments to portfolio of sentinel landscapes for round-2 characterization based on explicit account of representativeness for wider domains, track record of connecting results to local development planning (local governments and external supporting agencies) and interventions balancing livelihood opportunities and reversal of land degradation and deforestation. Decision support tools for prioritizing sites and defining objectives for restoration of forests, at the landscape and local scale, tested and adopted in three priority countries.	Complete		Nicaragua-Honduras in **link 2.** Cameroon and Indonesia (Borneo) reports are being finalized.	https://paisajecentinela.org/NicaraguaHonduras/wp-content/uploads/2019/02/Resumen_avances_Paisaje_Centinela_Nicaragua-Honduras_final.pdf.
FTA	F4	Sub-national governance systems in landscapes covering 100 M ha and inhabited by 70 M people use quantified and valued functions of FT&A for biodiversity, full hydrological cycle and ecosystem services analyzed across knowledge domains and available for policy-level synthesis and planning.	Important steps were taken towards achieving the outcome in 2018. A portfolio of 29 and 25 community forest enterprises established in Cameroon and the Gambia respectively. As well as large degraded area put under governance mechanism through several projects in Asia, Africa and Latin America	Synthesis of options for achieving Aichi targets of biodiversity conservation through managed transition zones around protected areas, landscape connectivity and ecological corridors and development zoning utilizing full spectrum of FTA land use systems	Complete		Evidence for completed milestone available **here**	https://www.dropbox.com/s/hohv4ji2hwrkr0z/FP4 Milestone 1 Evidence.docx?dl=0

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FTA	F4	Diverse diets from tree cover in mosaic landscapes recognized and enhanced as contributions to balanced diets through Increase of availability, and access to, nutrient-rich wild and cultivated food products from these landscapes (10 sentinel landscapes 10 M people).	A systematic review on tropical forests and fisheries was completed. With other important studies and policy recommendations made on diets and nutrition were done in Indonesia, Ethiopia, Tanzania, Kenya and Gabon. New tree-portfolio based nutrition and diverse diet recommendations have also been contributed to the literature.	Evidence on the contribution of nutritious foods from forests, trees and mosaic landscapes to healthy diets produced and shared at national levels, in international fora, and to general audiences.	Complete		Evidence for completed milestone available **here**	https://www.dropbox.com/s/y8k1g7zsudgkcuf/Evidence of FP4 completed Milestone 3.docx?dl=0
FTA	F4	Adaptive landscape institutions empowered and supported on 6 M ha inhabited by 4 M people to manage changing landscape mosaics towards more balanced and adaptive multifunctionality and successful 'forest landscape restoration' through 'action research' and inclusive, participatory learning. This is aligned with efforts in PIM.5.2 -oe6 million hectares of shared landscapes under more productive and equitable management.	Progress has been recorded in supporting sustainable forests, tree and agroforestry governance across Africa, Asia and Latin America notably in the areas of developing business cases and implementing community forestry, ecosystem-based adaptation, co-investments in ecosystem services and restoration. More than 500 people trained as well.	Reflection on the multi-scale character of the 'common but differentiated responsibility' phrase that so far is primarily used at international negotiation tables but that may increase space for local adaptive landscape management.	Complete		Evidence for completed milestone available **here**	https://www.dropbox.com/s/wf522u3gdc1qigx/Evidence for FP4 completed milestone 4.docx?dl=0

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FTA	F5	Efficient, effective and equitable climate national and international mitigation policies and funding, aligned with development objectives (3E+ goals).	CIFOR's Global Comparative Study on REDD+ published a book **Transforming REDD+: Lessons and new directions** ICRAF published a Special Feature on Twenty Years of Community Forestry in Cameroon: **Opportunities and Challenges for Sustainable Development** - Ecology and Society Journal FTA is supporting the establishment of the International Tropical Peatland Center in Indonesia.	Research on avoided emissions from deforestation/ degradation, forest restoration and enhanced forest carbon sink capacity, and their development implications, available and used (e.g. in the Bonn Challenge; NDCs, REDD+)	Complete			https://www.cifor.org/library/7045/).
FTA	F5	Risk-assessed ecosystem-based adaptation (EbA) policy and practice in place including joint mitigation and adaptation approaches.	FP5 continued analysing ecosystem-based adaptation (EbA) and joint mitigation and adaptation approaches in policies (e.g., through policy network analysis in Peru, Indonesia and Brazil) and practices (e.g., through systematic reviews and comparative case studies on the management of ecosystem services for climate change solutions). Terra-I shines a light on deforestation throughout the tropics to help government agencies, civil society and the private sector monitor forest change on a monthly timescale and at 250 m spatial resolution. Through the project website, Global Forest Watch and other platforms, Terra-I supports reductions in deforestation using "sticks" such as government control functions, as well as "carrots" such as the private sector touting zero deforestation supply chains. The reductions in deforestation leads to a corresponding reduction in greenhouse gas emissions.	Approaches and tools for risk and vulnerability assessment for both people and forests to climate change made available and used, e.g. in the 'loss and damage' debate	Complete		Terra-i was improved to 1) incorporate 3 levels of analysis (Level 1: Early alerts of changes, Level 2: Quantification of the loss of forest cover, Level 3: Identification of causes and drivers of deforestation) and use new radar	
FTA	F5	Food and bioenergy production policy and practice integrated more visibly in the intervention areas.		Analysis of options for bioenergy production to understand land allocation to bioenergy production concluded and used in national policies	Complete		Evidence for completed milestone available **here**	https://www.dropbox.com/s/vuxthhvdit4i87w/FP5 Evidence of completed milestones.docx?dl=0

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FTA	F5	Performance assessment of mitigation and adaptation policy and practice widely implemented following good evaluation practice.	The global survey of subnational REDD+ initiatives has grown tremendously through a new partnership with Earth Innovation Institute (EII), the Governors' Forests and Climate (GCF) Task Force, and the Climate Community and Biodiversity Alliance (CCBA). FP5 now refers to this collaborative work as the assessment of jurisdictional sustainability across the tropics, which better reflects its broader scope.	Performance assessment of carbon and non-carbon outcomes of mitigation policies and practices carried out, and methods refined, e.g. for use in multi-stakeholder platforms	Complete			
Genebanks	0	Output 1.1 Disease-free, viable documented germplasm made available	Achieved 57% seed accessions safety duplication 72% clonal accessions safety duplicated 90% requests met	80% accessions available 60% seed accessions safety duplicated 75% clonal accessions safety duplicated 80% relevant requests met			Online reporting, Genesys Safety duplication is currently hampered by various factors Safety duplication of clonal collections is repeated annually and is influenced by multiple factors. Online reporting	
Genebanks	0	Output 1.2 Crop diversity conserved in a rational and effective global system	156 Standard Operating Procedures (SOPs) in place, 702 accessions introduced into cryo: 55 banana at Bioversity, 563 potato at CIP, 60 sweetpotato at CIP, 24 cassava at IITA Achieved 186 NARS staff involved capacity-building events at Platform level and >2,000 NARS staff involved in Center-organized capacity building events and >5,000 participated in genebank visits	40 SOPs in place 500 accessions successfully introduced into cryobanks Diversity trees developed representing 14 crop genepools 20 NARS staff involved in capacity building events			Drafted SOPs are compiled but not yet publicly available Cryotanks at Bioversity, CIP and IITA Online reporting Online reporting	
Genebanks	0	Output 2 More effective access and use of germplasm enabled	97% accessions with Digital Object Identifiers (DOIs) Achieved	100% accessions with DOIs One new subset for a defined user developed in each genebank			Genesys Report available. Subsets will be made available through Genesys in 2019.	
Genebanks	0	Output 3 Supportive policy environment developed	CGIAR representation at 6 international meetings Guidance provided in 2 documents: i) Guidelines on the Nagoya Protocol for CGIAR Research Centers ii) Guidance Note on CGIAR Research Center Public Disclosures related to the Management of Intellectual Assets	CGIAR contributions to four intergovernmental meetings under rubric of the CBD/Nagoya Protocol and the ITPGRFA CGIAR guidance document on transferring PGRFA under development			Reports available at CGIAR Sharepoint upon request. Documents available at **CGSpace**	https://hdl.handle.net/10568/96240

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GLDC	F1	Outcome 1. Improved targeting and responsiveness of research to market and household demands in the face of climate change for greater technology adoption, food and nutrition security, resilience and poverty reduction.	With the identification of priority GLDC crops and countries based largely on the initial foresight and ex-ante impact evaluation work, a sound foundation has been laid to enhance the targeting, responsiveness, and impacts of CRP-GLDC research.	Expanded foresight and ex-ante evaluation of CRP-GLDC research and technology options conducted and preliminary results shared on the potential poverty reduction impacts.	Complete		Results of the ex-ante economic and poverty impact evaluation of CRP-GLDC research and technology options were shared with GLDC researchers and stakeholders at the annual review and planning meeting in 2018. **A draft report is also available.** Note: The work was expanded in 2019 to include a nutrition impact dimension in addition to the planned ex-ante economic and poverty reduction impact assessment.	https://dx.doi.org/20.500.11766/9469
GLDC	F1	Outcome 2. Market and household demands identified, and trade- offs assessed for more inclusive value chains that improve income and nutrition status in target regions.	Building on past market and value chain studies documenting market and household demands and preferences, the ongoing work introduces new dimensions such as household aspirations to better identify end-user demands and profile.	Diversity of farm household preferences vis-a-vis market demand by context outlined in view of research in CRP-GLDC.	Extended	Other	Ongoing work. As 2018 was the first year of CRP-GLDC, the work started in March/April and the milestone was planned to be completed only in 2019.	
GLDC	F1	Outcome 3. Inclusive and equitable technologies and innovation systems established for accelerated and broadened impact across the agri-food system.	By enhancing our understanding of the participation of women and youth in CRP-GLDC value chains as well as in technology and support service delivery, ongoing strategic gender research is generating insights that lead to inclusive and equitable technologies and innovation Systems.	Inclusive and equitable innovation system to accelerate impacts for women and young people designed and piloted, underlying design principles proven.	Extended	Other	As 2018 was the first year of CRP-GLDC, the work started in March/April and the milestone was planned to be completed only in 2019.	
GLDC	F1	Outcome 4. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress on enhanced adoption and impact.	By identifying successful approaches to technology scaling and the underlying institutional and policy contexts, the ongoing review of scaling approaches and impact evaluations is generating useful lessons for increased technology adoption and impact.	Joint systematic review with CoA 1.2.	Extended	Other	As 2018 was the first year of CRP-GLDC, the work started in March/April and the milestone was planned to be completed only in 2019.	

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GLDC	F1	Outcome 4. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress on enhanced adoption and impact.	By identifying successful approaches to technology scaling and the underlying institutional and policy contexts, the ongoing review of scaling approaches and impact evaluations is generating useful lessons for increased technology adoption and impact.	Evaluation designed and implementation underway to evaluate current CRP-GLDC scaling approaches & associated impact evidence.	Extended	Other	As 2018 was the first year of CRP-GLDC, the work started in March/April and the milestone was planned to be completed only in 2019.	
GLDC	F1	Outcome 4. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress on enhanced adoption and impact.	By identifying successful approaches to technology scaling and the underlying institutional and policy contexts, the ongoing review of scaling approaches and impact evaluations is generating useful lessons for increased technology adoption and impact.	Scaling toolkit for Design, Execution, Monitoring, and Evaluation (DEME) content agreed to support improved horizontal and vertical scaling of CRP-GLDC commodities and management practices.	Extended	Other	As 2018 was the first year of CRP-GLDC, the work started in March/April and the milestone was planned to be completed only in 2019.	
GLDC	F3	FP3.O1. Cropping systems sustainably intensified and diversified.	Several participatory field trials on crop rotation, intercropping and agro-pastoral systems were conducted in West Africa and South Asia under smallholder production systems involving NARS partners and Farmers. Crop yields under intensified and diversified systems were higher than under conventional practice; land equivalent ratios for intercrops were greater than unity indicating efficient andproductive use of resources.	Participatory field trials under smallholder conditions in different cropping systems and environments evaluated.	Extended	Other	As we initiated the study in the first year, we expect to provide an update (sharable link) in 2019.This is a long-term study that will generate more data over time.	
GLDC	F3	FP3.O1. Cropping systems sustainably intensified and diversified.	Cropping system modelling tools were assessed/validated for their integration with breeding programs as a decision-making support tool on optimization of GxExM for target population of environments. Field testing of co-designed improved farm systems on integrated crop, composting and animal feeding is ongoing with the Malian farmers.	3,000 farmers trained in the use of crop mixes and sequences which have been jointly identified with the researcher for better water and soil management.	Complete		Over 2,849 farmers gained knowledge and skills in Mozambique and Malawi through training on improved agronomy including rotation sequence, cropping patterns in intercrops, variety selection, appropriate planting time, row spacing and plant population, fertilizer and inoculant application, integrated pest and disease management and aflatoxin management in	

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							groundnut and post-harvest management of legumes. Evidence available for internal use in MEL.	
GLDC	F3	FP3.O2. Pest and diseases controlled safely and with reduced agro-chemical inputs.	Reported work covers West Africa and South Asia and includes testing the efficiency of plant extracts, parasitoids, fungicides, genetics for both varieties and pathogens and changes in disease incidence linked with climate change. It includes also resource and soil management options. Milestones to achieved FP3.02 outcome have been re-oriented (ref. FP3 Narrative section in the AR).	1) Pest and diseases management components for the target pestsand, 2) Resource and soil management options in different regions fine-tuned.	Changed	Other	During the FP3 meeting in Nairobi early October 2018, CoA3.2 has reoriented its activity portfolio into two major clusters, abiotic and biotic stresses. To reflect the re-orientation, the milestone for 2019 has been reworded to read "Efficacy of (1) selected pest and diseases management options and (2) resource and soil management options confirmed at pilot scale". Hence, we expect to be able to assess the efficacy of at least one plant growth promoting micro-organism and to target recommendations for organic fertilizers at pilot scale. Also, the impact of released biological control organisms, particularly against the cowpea pod borer, will be evaluated at selected sites, while novel diagnostic tools and protocols willbemade available for emerging bioticthreats.	
GLDC	F3	FP3.O2. Pest and diseases controlled safely and with reduced agro-chemical inputs.	The milestone was canceled as result of the FP3 meeting in Nairobi early October 2018. CoA3.2 has reoriented its activity portfolio into two major clusters, abiotic and biotic stresses. More details are provided in the ongoing milestone and FP Narrative	Pest and diseases management components for the target pests in different regions Evaluated.	Cancelled	Other	This milestone has been replaced by the new re-oriented activity portfolio, as described above.	
GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity &	The milestone was canceled as result of the FP3 meeting in Nairobi early October 2018. CoA3.2 has reoriented its activity portfolio into two major clusters, abiotic and biotic stresses. More details are provided in the ongoing milestone and FP Narrative	Breeding lines from Phase I of the CRP being tested by NARS and CGIAR; 8 crops × 3 trait clusters × 2 regions advanced.	Cancelled	Other	To reflect the re-orientation, the milestone for 2019 has been reworded to read "Efficacy of (1) selected pest and diseases management options and (2) resource and soil management options confirmed at pilot scale". Hence, we expect to be able to assess the efficacy of at least one plant growth promoting micro-	

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		stabilizing food supply					organism and to target recommendations for organic fertilizers at pilot scale. Also, the impact of released biological control organisms, particularly against the cowpea pod borer, will be evaluated at selected sites, while novel diagnostic tools and protocols willbemade available for emerging bioticthreats.	
GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing foodsupply.	Refer to full narrative submitted. There was not change of outcome but only of milestones and related pathways among the three clusters in the FP. Team members agreed that CoA3.2 which operates at plot level should be the first cluster and coded CoA3.1 while former CoA3.1 will become CoA3.2.	Phase I genetic materials deployed in CRP-GLDC crop improvement by CGIAR centers; annually 8 crops × 3 trait clusters × 2 regions tested by NARS.	Cancelled	Other	Moved from CoA4.1 to 4.2.	
GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing foodsupply.	The pathways among the three clusters in the FP was changed since CoA3.2 which operates at plot level should be the first cluster and coded CoA3.1 while former CoA3.1 will become CoA3.2.	Breeding lines from Phase I enter the National Performance Trials (NPT) or release; 8 crops × 3 trait clusters (3-4 lines per trait) × 2 regions entered in NPT.	Cancelled	Other	Moved from CoA 4.1 to 4.3.	
GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing foodsupply.	The pathways among the three clusters in the FP was changed since CoA3.2 which operates at plot level should be the first cluster and coded CoA3.1 while former CoA3.1 will become CoA3.2.	Nursery management strengthened to support early generation seed availability for evaluations; 9 crops × 2 priority trait clusters (1° & 2°)- 20 lines per trait × 2 regionssupplied.	Cancelled	Other	Moved from CoA 4.1 to 4.2.	

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GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing foodsupply.	Multi-location testing and national testing were carried out to commercialize 73 cultivars in sixteen countries of South Asia and Sub-Sahara Africa. The commercialization of new cultivars and their adoption contributes to expanded, resilient and inclusive production, value addition, trading and consumption of nutritious grain legumes and dryland cereals in the target countries. Engagement with private seed sector, including small- and medium-seed companies through Crop Network Groups (CNGs) were enhanced to deliver seeds of new varieties to farmers and achieve expanded production of climate resilient and nutritious GLDC crops.	Initial steps to generate crop indices from drone-based imaging in place in Senegal.	Complete		Refer to narrative statement. Evidence available for internal use in MEL.	
GLDC	F4	FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scaleand scope.	Seed value chain studies in Uganda showed potential for lateral and vertical growth for GLDC crops. Digital Seed Road Map a strategy to anchor GLDC seed systems.	Studies conducted to inform the seed systems strengthening areas for target cereals and legumes; at least 1 study per crop xagri-foodsystems x region.	Complete			http://seedsystems.icrisat.org/
GLDC	F4	FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scaleand scope.	Training stakeholders of seed systems and enhancing engagement with private seed sector partners. Optima Soy Africa (OSA), a crop network group (CNG), is a platform to harness partnerships to ensure the development of market-driven soybean varieties and technologies and their dissemination. The platform is an innovative initiative by CRP- GLDC, AGRA and IITA that will provide leadership and facilitate the co-ordination and engagement of industry stakeholders to support increased and stable upscaling ofsoybean research outputs.	Complementary partners engaged to support scaling efforts based on country strategies.	Complete			https://www.icrisat.org/training-on-digital-seed-roadmap-use-enables-delivery-of-quality-seeds-to-smallholder-farmers/

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GLDC	F4	FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scaleand scope.	Gendered aspirations and occupations among rural youth, in agriculture and beyond studied in India, Mali, Nigeria and Malawi showed that young rural women and men predominantly aspire for formal blue- and white-collar jobs.Various gender norms that discriminate against women in agriculture dissuade young women from aspiring for agriculture-related occupations. Gender analysis of trait preferences was conducted to guide the design of crop Product Profiles for crop breedingprograms in Asia.	Gender studies and opportunities for youth in agriculture conducted. At least 2 interventions per region studied, 2 in Africa and 2 in Asia.	Complete		Gendered aspirations and occupations among rural youth, in agriculture and beyond studied in India, Mali, Nigeria and Malawi showed that young rural women and men predominantly aspire for formal blue- and white-collar jobs.Various gender norms that discriminate against women in agriculture dissuade young women from aspiring for agriculture-related occupations. Gender analysis of trait preferences was conducted to guide the design of crop Product Profiles for crop breedingprograms in Asia.	
GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing foodsupply.	Heat tolerance in chickpea and pearl millet breeding pipelines was mainstreamed in South Asia for specific target sites, and breeding for low nutrient adaptation was targeted in crops like cowpea and groundnut. Early maturity as an escape mechanism to water deficit stress was targeted in GLDC crop commodities. Crop biofortification has been mainstreamed in some crop breeding program that significantly contribute to the Program level outcome on increased consumption of nutritious GLDC crops. Biofortified cultivars of Sorghum, Pearl millet, Finger millet and Lentil are being commercialized.	Phase I genetic materials deployed in GLDC crop improvement by CGIAR centers; annually 8 crops × 3 trait clusters × 2 regions tested by NARS.	Complete		Elite lines and donors for target traits used as parents in crop hybridization. Heat-tolerant donors of chickpea, lentil, pigeonpea, groundnut, cowpea, sorghum and pearl millet are used in breeding. High Iron (Fe) and Zinc (Zn) donors are used as parents in seven GLDC crops. The information on inheritance studies guides the breeding strategy to achieve enhanced genetic gain, as in the example of recurrent selection for enhancing grain Fe and Zninsorghum. Evidence: https://dx.doi.org/20.500.11766/9269	https://dx.doi.org/20.500.11766/9269

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GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing food supply.	International training course on Breeding approaches for enhancing genetic gains in Grain Legumes and Dryland Cereals for the NARS partners of East and Southern Africa (ESA), West and Central Africa (WCA) and South Asia (SA) working in nine GLDC crops provided a platform for exchange of knowledge on best practices to modernize breeding programs. Standard operating procedures for crop breeding and testing pipelines were valuable resources for the NARS partners. The training was unique in that it leverages the capacities of the Indian Council of Agricultural Research (ICAR)inhigh-throughput phenotyping.	Nursery management strengthened to support early generation seed availability for evaluations - 9 crops × 2 priority trait clusters (1° & 2°) - 20 lines per trait × 2 regions supplied.	Complete		MEL's link is accessible only with MEL active credential in order to protect personal identifiable information – ref. EU-GDPR compliance https://dx.doi.org/20.500.11766/9663 https://mel.cgiar.org/capdev/capdev/type/crp/id/3685# (This link is accessible only with MEL active credential in order to protect personal identifiable information – ref. EU-GDPR compliance).	https://dx.doi.org/20.500.11766/9663
GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing food supply.	Developed breeding material for improved quality traits and for tolerance to heat, drought, water-logging and short duration in target crop and shared with the NARS.	Breeding lines from Phase I of the CRP being tested by NARS and CGIAR; 8 crops × 3 trait clusters × 2 regions advanced.	Complete		Developed breeding material for improved quality traits and for tolerance to heat, drought, water-logging and short duration in target crop and shared with the NARS.	https://dx.doi.org/20.500.11766/9285

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GLDC	F4	FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilizing food supply	Development of new varieties aiming at improving productivity and sustain agribusiness opportunity progressed with the development of 73 GLDC cultivars.	Breeding lines from Phase I enter the National Performance Trials or release; 8 crops × 3 trait clusters (3-4 lines per trait) × 2 regions entered in NPT.	Complete		Based on the data from national testing and participatory varietal selection, 73 cultivars of chickpea (11), pigeonpea (3),groundnut (25), cowpea (2),soybean (6), lentil (4), sorghum(6), pearl millets (10) and finger millets (6) breeding lines were developed from Phase 1 of the CRP in 16 countries of South Asia and Sub-Saharan Africa	https://mailchi.mp/illinois/new-published-research-tasty-soy-badjias-in-sils-weekly-digest?e=ef90aaaeb5
GLDC	F5	FP5.O1. Pre-breeding products through the use of gene banks and other sources and modern tools to increase genetic diversity in breeding programs globally.	Pre-breeding focused on advancing the prioritized traits through ongoing activities on exploring the natural diversity in wild/un-adapted germplasm.	Prioritization of 2 traits in one crop for pre-breeding and identification of germplasm and cultivars to initiate pre-breeding.	Complete		Advancing the introgression (molecular breeding) lines in groundnut (high oleic trait), chickpea (Botrytis grey mould, drought tolerant) and pearl millet (Downy mildew and Blast) were major achievements.	http://oar.icrisat.org/10509/
GLDC	F5	FP5.O2. Trait discovery and development based on genomics and phenomics to generate new markers to support trait integration through the use of modern enabling technologies and forwardbreeding	Priority traits for each CRP-GLDC crop were identified and discovery/mapping work is in progress.	Germplasm reference sets, other germplasm sets, mapping populations assembled, and traits prioritized for discovery research in 3 legumes (chickpea, pigeonpea and groundnut) and 3 cereals (sorghum, pearl millet and finger millet).	Complete			http://oar.icrisat.org/10381/
GLDC	F5	FP5.O3. Development of enabling technologies and platforms to be used for rapid trait discovery, trait validation, trait development, and trait introgression.	Public-private partnerships established to access and expedite development of enabling technologies such as gain/loss of function and genome editing.	Public-private partnerships established. Data management in at least 3 of the CRP-GLDC crops (sorghum, chickpea and groundnut) digitalized.	Complete		a) Expertise and learnings from private partners (e. g., recent MOAs with Corteva, KeyGene) is being leveraged. b) Impementation of strong data management & analytical research support tools have taken crop breeding activities to next level. This includes Breeding Management System (BMS) , genomic data management systems (GOBii) and public data sharing portals such as Dataverse and CKAN. Such databases render crop breeding highly efficient through access to pedigrees,	http://oar.icrisat.org/10474/

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							electronic field books, in-field auto data validation, automated workflows to generate barcodes, tools for auto-generation of field books with updated records of pedigree data and quick exploratory statistical analysis.	
Livestock	F1	F1 Outcome: 1.1 - Data on livestock diversity and systems, including from a gendered lens, used to develop or refine genetic improvement and / or conservation strategies by policymakers, national research and development partners, and the private sector, in 5 CRP priority countries and other locations.	A methodology for developing environmental suitability maps has been published and maps produced for several chicken and small ruminant breeds. The flagship now has considerable new genome information on diversity and adaptation of chicken, sheep and cattle, which is being integrated in genetic improvement (e.g. for the dissemination of improved genotypes in suitable habitats) and conservation (e.g. selection of population for ex-situ conservation of primordial germ cell in chicken) in Ethiopia and Tanzania. The chicken phenotypic platform is fully functioning with the first experiment at the interphase of chicken genetics, health and nutrition due to take place in March/April 2019.	2018 - 1.1.2 Environmental suitability maps for sheep, goat and chicken available for Ethiopia by end of 2018.	Complete		Several relevant papers and publications where such environmental suitability maps are presented and being applied in relation to breed productivity and adaptability e.g. D6254, and D13063	https://cgspace.cgiar.org/handle/10568/98850
Livestock	F1	F1 Outcome: 1.1 - Data on livestock diversity and systems, including from a gendered lens, used to develop or refine genetic improvement and / or conservation strategies by policymakers, national research and development partners, and the private sector, in 5 CRP priority countries and other locations.	A methodology for developing environmental suitability maps has been published and maps produced for several chicken and small ruminant breeds. The flagship now has considerable new genome information on diversity and adaptation of chicken, sheep and cattle, which is being integrated in genetic improvement (e.g. for the dissemination of improved genotypes in suitable habitats) and conservation (e.g. selection of population for ex-situ conservation of primordial germ cell in chicken) in Ethiopia and Tanzania. The chicken phenotypic platform is fully functioning with the first experiment at the interphase of chicken genetics, health and nutrition due to take place in March/April 2019.	2018 - 1.1.3 Baseline genome characterization information of existing livestock (small ruminant, cattle, chicken) populations, including genome sequencing, available for Ethiopia and Tanzania, as well as for Ethiopian sheep, by end of 2018.	Complete		Several relevant peer-reviewed papers have been published (chicken, sheep, cattle). Now that this baseline genome characterization is complete, the focus will be on the identification of causative polymorphism.	https://hdl.handle.net/10568/100246,

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Livestock	F1	F1 Outcome: 1.1 - Data on livestock diversity and systems, including from a gendered lens, used to develop or refine genetic improvement and / or conservation strategies by policymakers, national research and development partners, and the private sector, in 5 CRP priority countries and other locations.	A methodology for developing environmental suitability maps has been published and maps produced for several chicken and small ruminant breeds. The flagship now has considerable new genome information on diversity and adaptation of chicken, sheep and cattle, which is being integrated in genetic improvement (e.g. for the dissemination of improved genotypes in suitable habitats) and conservation (e.g. selection of population for ex-situ conservation of primordial germ cell in chicken) in Ethiopia and Tanzania. The chicken phenotypic platform is fully functioning with the first experiment at the interphase of chicken genetics, health and nutrition due to take place in March/April 2019.	2018 - 1.1.4 A poultry phenotypic characterization platform available at ILRI Ethiopia by end of 2018.	Complete		The opening of the platform, D4716, attracted a lot of media attention. It is fully functional with several experiments planned in 2019.	https://hdl.handle.net/10568/92429
Livestock	F1	F1 Outcome: 1.2 - Genetic improvement strategies for improved livestock genetics implemented by national research and development partners, and the private sector in 6 CRP priority countries and other locations.	A panel of suitable Genomic selections using single nucleotide polymorphisms (SNPs) was identified but the new SNPs chips have yet to be produced. For now, a more expensive commercially available SNPs chip is being used to avoid delays in program implementation. It will be replaced as soon as a new, more affordable chip is produced – expected in 2019, with a new private sector partner. The tool will allow selection of the best admixed bulls, a central component of the genetic improvement strategy for dairy cows.	2018 - 1.2.4 Availability of zebu x taurine admixture SNPs chips for screening of dairy cattle crossbreed in Ethiopia and Tanzania by August 2018.	Extended	3. Partnership	Several deliverables e.g. D9236, D12568, and publications (see Table 6) have contributed to the identification of the SNPs panel. The new SNPs chips were not produced because it was not possible to reach agreement with the initial private sector partner (on price and timeframe for product availability).	https://cgspace.cgiar.org/handle/10568/98243

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Livestock	F1	F1 Outcome: 1.3 - Business models for multiplication and delivery of improved livestock genetics, to resource poor women and men livestock keepers, implemented by national research and development partners, and the private sector in five CRP priority countries and other locations.	Milestone 1.3.2 dealing with the development of a business model is key to achieving this outcome. Following the successful implementation of the African Chicken Genetic Gains and African Dairy Genetic Gains projects, funded by the Bill & Melinda Gates Foundation (BMGF), and the development of business models for both projects (see https://cgspace.cgiar.org/handle/10568/100242 and https://cgspace.cgiar.org/handle/10568/100328), a meeting took place in the second half of 2018 between the project leaders and the BMGF officers to lay the ground for new W3 funding to support, among other activities, the geographic upscaling of these two projects in the targeted countries (Ethiopia, Tanzania, Nigeria).	2018 - 1.3.2 Development of a business model for the delivery and improvement of chicken relevant to Ethiopia, Tanzania and Nigeria, by end of 2018.	Complete		The business case for the multiplication and delivery of improved chickens has now been established, D9255	https://hdl.handle.net/10568/100242
Livestock	F1	F1 Outcome: 1.4 - Women and men resource poor livestock keepers sustainably utilizing improved livestock genetics, both productive and adapted, in 3 priority countries and other locations.	Outcome 1.4 was supported by the publication of gender analysis for poultry in three countries (Ethiopia, Tanzania and Nigeria).	2018 - 1.4.1 Publication of a study reporting how gender dynamics may affect genetics interventions and which institutional arrangements may help ensure gender equitable outcomes of genetics interventions by August 2018.	Complete		Gender dynamics are now understood in relation to genetics interventions (multiplication and delivery of improved genotypes). See D12770, D12772, D12774, D12820, D12821	https://cgspace.cgiar.org/handle/10568/91218,
Livestock	F1	F1 Outcome: 1.5 - Guidelines on policy and institutional arrangements for improvement and conservation of animal genetic resources (AnGR) adopted by policymakers, national research and development partners, and the private sector, in at least 4 priority countries and other locations.	Substantial progress was made on the small ruminant side, the guidelines being a pre-requisite for the distribution of improved ram outputs from the small ruminant community-based breeding programs (CBBP).	2018 - 1.5.2 Guidelines established on institutional arrangements needed for certification of breeding rams/bucks by August 2018.	Complete		These guidelines are now available for Ethiopia, D4731	https://dx.doi.org/20.500.11766/9586

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Livestock	F2	F2 Outcome: Outcome 2.1 Assessment tools for significance of animal diseases and risk maps for emergence of animal diseases are used by 100 local and national and 50 international research partners and donors for priorities research and development interventions to reduce livestock disease risks for livestock keepers.	An assessment tool to understand disease priorities at local level is complete. Using porcine reproductive and respiratory syndrome (PPRS), a framework for epidemiological models and risk mapping has been developed and tested in Vietnam and the data used in discussions with partners. The aim is to apply the same approach for other diseases in Vietnam and for Uganda. The successful tick mapping in Tunisia has just started to expand into Kenya. Overall, the work on assessment tools and risk maps is well underway in several countries, while dialogue with national stakeholders has been initiated.	2018 - A gender-sensitive assessment tool for identifying disease priorities in CRP sites available in the public domain by the end of 2018.	Complete		Tool complete (will be available in open domain by 30th June 2019, in the meantime information can be obtained from b.wieland@cgiar.org).	
Livestock	F2	F2 Outcome: Outcome 2.1 Assessment tools for significance of animal diseases and risk maps for emergence of animal diseases are used by 100 local and national and 50 international research partners and donors for priorities research and development interventions to reduce livestock disease risks for livestock keepers.	An assessment tool to understand disease priorities at local level is complete. Using porcine reproductive and respiratory syndrome (PPRS), a framework for epidemiological models and risk mapping has been developed and tested in Vietnam and the data used in discussions with partners. The aim is to apply the same approach for other diseases in Vietnam and for Uganda. The successful tick mapping in Tunisia has just started to expand into Kenya. Overall, the work on assessment tools and risk maps is well underway in several countries, while dialogue with national stakeholders has been initiated.	2018 - 2 epidemiological risk models (pig and small ruminant disease) developed, and modelling framework for assessment of PPR control and eradication defined, by end of 2018.	Extended	2. Financial	Some papers published, some drafted; distribution maps put on-line for Vietnam. The development of the peste des petits ruminants (PPR) framework is postponed to 2019 as the start of the bilateral project supporting its development has been delayed.	

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Livestock	F2	F2 Outcome: Outcome 2.2 Context specific herd health management packages adopted by farmers, extension and animal health workers in priority countries and other locations.	In Uganda, longitudinal data collection from pig farms on herd health management is ongoing, with completion estimated in mid-2019. In Ethiopia, the work is more advanced and assessment of health interventions has been conducted, with promising results. In addition, evidence of behavior change and household dynamics is emerging, following implementation of community conversations around gender, division of labor, and risk of zoonotic diseases.	2018 - Tool to determine herd health packages for the pig value chain in Uganda developed by the end of 2018.	Extended	1. Research/science	The recruitment of a suitable junior scientist for conducting the field work and collecting data took longer than anticipated.	
Livestock	F2	F2 Outcome: Outcome 2.3 - Livestock keepers have necessary knowledge of AMR and antiparasitic resistance (APR) to change their practices; piloted in two priority countries.	A tool has been developed for collecting data on knowledge, attitudes and practices for farmers use of antimicrobials and data has been collected from three countries (Ethiopia, Uganda and Vietnam, approximately 400 farms per country) and is being analysed. The next step will be to tailor interventions, based on these data, to reduce the unnecessary use of antibiotics. Preliminary analysis showed that the tool can identify key issues, such as wrong behavior around use and withdrawal periods but needs to be more context specific – some areas of the questionnaire are difficult to harmonize across production systems and countries.	2018 - Availability and use of antimicrobials and Knowledge, Attitudes and Practices regarding AMR recorded among smallholders in the small ruminant (Ethiopia) and pig (Vietnam and Uganda) value chains by September 2018.	Complete			https://www.dropbox.com/s/9dky7v7gjp1uby9/KAP%20AMUSE%20to%20share%20Nov%202018.docx?dl=0
Livestock	F2	F2 Outcome: Outcome 2.4 - National and international research partners, government agencies and the private sector use 2 novel diagnostic assays and vaccines for control of ASF, CBPP, CCPP, ECF and PPR in at least 6 priority countries	A CCPP challenge model was established in goats that will be helpful for testing new vaccine candidates. The model causes high mortality and morbidity, reducing the numbers of animals needed to test vaccine efficiency. The bacterial capsule polysaccharide of a goat mycoplasma which is used as a model for CBPP was identified as a virulence factor, indicating that the capsule is a possible vaccine target. Achievements were made towards a proof-of concept stage for an ECF vaccine with sporozoite and schizont antigens and selection of methods for immunization. Three promising nanoparticle technologies have been taken forward into challenge experiments.	2018 - Down selection, i.e. reduction in the number of candidate ECF, CBPP, CCPP vaccine antigens and vaccination methods.	Complete		Lacasta et al, 2018, DOI: [10.1016/j.vaccine.2018.01.087; Svitek et al, 2018, DOI:10.1038/s41541-018-0073-5); Nyagwange et al, 2018, DOI:10.1016/j.ijpara.2017.09.007; Nyagwange et al, 2018, DOI:10.1016/j.vetimm.2018.03.004 .	https://ilvac.net/2018/12/17/development-of-a-challenge-model-for-contagious-caprine-pleuropneumonia-ccpp/

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Livestock	F2	F2 Outcome: Outcome 2.4 - National and international research partners, government agencies and the private sector use 2 novel diagnostic assays and vaccines for control of ASF, CBPP, CCPP, ECF and PPR in at least 6 priority countries	A CCPP challenge model was established in goats that will be helpful for testing new vaccine candidates. The model causes high mortality and morbidity, reducing the numbers of animals needed to test vaccine efficiency. The bacterial capsule polysaccharide of a goat mycoplasma which is used as a model for CBPP was identified as a virulence factor, indicating that the capsule is a possible vaccine target. Achievements were made towards a proof-of concept stage for an ECF vaccine with sporozoite and schizont antigens and selection of methods for immunization. Three promising nanoparticle technologies have been taken forward into challenge experiments.	2018 - Agreements with at least 2 private partners to commercialize improved diagnostic tests for CBPP in Kenya, Uganda, Ethiopia, Tanzania and Mali by the end of 2018.	Extended	3. Partnership	Discussions have stalled due to turnover of ILRI personnel and the need for better market assessment.	
Livestock	F2	F2 Outcome: Outcome 2.4 - National and international research partners, government agencies and the private sector use 2 novel diagnostic assays and vaccines for control of ASF, CBPP, CCPP, ECF and PPR in at least 6 priority countries	A CCPP challenge model was established in goats that will be helpful for testing new vaccine candidates. The model causes high mortality and morbidity, reducing the numbers of animals needed to test vaccine efficiency. The bacterial capsule polysaccharide of a goat mycoplasma which is used as a model for CBPP was identified as a virulence factor, indicating that the capsule is a possible vaccine target. Achievements were made towards a proof-of concept stage for an ECF vaccine with sporozoite and schizont antigens and selection of methods for immunization. Three promising nanoparticle technologies have been taken forward into challenge experiments.	2018 - A booting up system developed for African swine fever (ASF) virus.	Complete		The first viral genome modification using CRISPR-Cas technology is currently being confirmed, and on the synthetic component of the project, the building blocks of the complete viral genome are ready for assembly from sub-fragments. A procedure for initiating production of ASF virus from transfected viral genomic DNA is developed.	https://ilvac.net/2018/12/10/establishment-of-a-vaccine-technology-platform-for-african-swine-fever-as-the-first-target/.

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Livestock	F2	F2 Outcome: Outcome 2.5 - Improved access to livestock-related health services and products for female and male livestock keepers in 4 priority countries	In Mali, innovation platforms led to considerable improvement in vaccine coverage. A thermostable batch of PPR vaccine was produced but at the final quality assessment step failed to meet the moisture level targets. Following investigations, the reasons were identified and corrected, and production of a new batch is underway. In Kenya, two animal health service delivery models were piloted, both of which were very successful in improving access to animal health services by pastoralists; scaling is however hampered by policy constraints which are currently being addressed. In Ethiopia, activities were delayed due to late inception of an EU-funded bilateral project.	2018 - Two novel delivery models of animal health services and products and cap dev/training methods tested in collaboration with partners in Kenya, Tanzania, Ethiopia and Mali by the end of 2018.	Complete		The Accelerated Value Chain Development bilateral project, ended in 2018, tested vet-runs in Kenya and in Mali, innovation platforms continued to improve participation of different stakeholders in vaccination control and the approach has been taken up by other projects (e.g. the Harande (food security) project of CARE).	https://www.ilri.org/publications/feed-future-mali-livestock-technology-scaling-program-ftf-mltsp-annual-report-october
Livestock	F2	F2 Outcome: Outcome 2.5 - Improved access to livestock-related health services and products for female and male livestock keepers in 4 priority countries	In Mali, innovation platforms led to considerable improvement in vaccine coverage. A thermostable batch of PPR vaccine was produced but at the final quality assessment step failed to meet the moisture level targets. Following investigations, the reasons were identified and corrected, and production of a new batch is underway. In Kenya, two animal health service delivery models were piloted, both of which were very successful in improving access to animal health services by pastoralists; scaling is however hampered by policy constraints which are currently being addressed. In Ethiopia, activities were delayed due to late inception of an EU-funded bilateral project.	2018 - Market for diagnostics in Kenya, Uganda, Tanzania, Ethiopia and Mali assessed and cost effectiveness of producing thermostable PPR vaccine analysed by July 2018.	Extended	2. Financial	A planned market assessment for veterinary diagnostics was cancelled due to a change in external funding arrangements, and new funding is being sought. The initial batch of PPR vaccine produced did not meet the thermostability targets as per the protocol.	

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Livestock	F3	F3 Outcome: 3.1 - Local, national and international research and development partners, the private sector, decision-makers and livestock producers are able to diagnose feed constraints and opportunities and to effectively prioritize and target feed and forage interventions, resulting in: a 10% improvement in utilization of feeds and forages, a 20% increase in animal production using improved feed and forage technologies, a 10% accuracy increase for biomass and quality estimation and at least 250,000 annual visitors to global databases, repositories, interactive tools and maps and the Tropical Grasslands/Forrajes Tropicales journal website.	The TGFT online journal reached 120,000 users and the Tropical Forages tool (SoFT) reached 180,000 users in 2018. The LegumeChoice and G-FEAST tools were launched: G-FEAST enhances the existing FEAST tool to address gender considerations in feed assessment and selection, making it more demand-oriented to specific target groups; LegumeChoice focuses on selection of high protein feed options. These tools capitalize on CCIAR research and are contributing to prioritization of feed interventions in target regions, which should result in improvements in feed utilization and biomass and quality increases. Unfortunately, the AFAWA website could not be launched as planned in 2018 due to software development setbacks.	2018 - Research and development partners, decision makers and input suppliers use at least 2 tools designed or promoted by the CRP (e.g. Legume CHOICE) for regional and national feed supply and demand scenarios in 2 priority countries (Vietnam, Ethiopia) by December 2018.	Complete		The Genderized FEAST and the LegumeChoice tool were advanced and promoted. FEAST; LegumeChoice.	https://www.ilri.org/feast-resources-0

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Livestock	F3	F3 Outcome: 3.1 - Local, national and international research and development partners, the private sector, decision-makers and livestock producers are able to diagnose feed constraints and opportunities and to effectively prioritize and target feed and forage interventions, resulting in: a 10% improvement in utilization of feeds and forages, a 20% increase in animal production using improved feed and forage technologies, a 10% accuracy increase for biomass and quality estimation and at least 250,000 annual visitors to global databases, repositories, interactive tools and maps and the Tropical Grasslands/Forrajes Tropicales journal website.	The TGFT online journal reached 120,000 users and the Tropical Forages tool (SoFT) reached 180,000 users in 2018. The LegumeChoice and G-FEAST tools were launched: G-FEAST enhances the existing FEAST tool to address gender considerations in feed assessment and selection, making it more demand-oriented to specific target groups; LegumeChoice focuses on selection of high protein feed options. These tools capitalize on CCIAR research and are contributing to prioritization of feed interventions in target regions, which should result in improvements in feed utilization and biomass and quality increases. Unfortunately, the AFAWA website could not be launched as planned in 2018 due to software development setbacks.	2018 - The ICARDA Animal Feed Analysis Web Application (AFAWA) has reached at least 5,000 users by the end of 2018.	Extended	Other	An improved version of the AFAWA website is still being finalized and will be officially launched in 2019. Thus, the expected number of users (5,000) could not be reached in 2018. The website is still under construction and will be launched by 2019.	https://afawa.icarda.org/

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Livestock	F3	F3 Outcome: 3.3 - National and international research and development partners and the private sector are using CRP developed forage and rangeland resources (with enhanced traits) in 30 countries, reaching producers who plant over 2 million ha, to increase the rate of genetic gain and exploit the genetic diversity of forages and rangeland species to enhance stress-tolerance, biomass productivity and nutritive value.	The commercialization of CIAT's Urochloa hybrids by the private sector partner is advancing significantly. Information on seed sales for 2018 is not yet available (due to be availed by Papalotla in June 2019). However, through continuous exchange with Papalotla, we are confident to have reached an additional 100,000 hectares sown with CIAT's Urochloa hybrids in 2018. The 100,000 hectares per year are cumulative. The planned work on the annotated reference genome of diploid Urochloa and the establishment of (a) drought and (b) agronomic performance protocols for Cenchrus purpureus was conducted and will contribute to increasing the efficiency in forage breeding.	2018 - 1 Urochloa hybrid commercialized by the private sector in at least 1 country and current available forage hybrids scaled with private sector partner in at least 15 countries on 100,000 hectares by the end of 2018.	Complete		The total area sown with CIAT Urochloa hybrids is estimated to be 930,000 hectares in 15 countries by 2018 (evidence available by mid-2019). Evidence link for 2017	https://www.slideshare.net/secret/3S2oOlB2yCv5xt
Livestock	F3	F3 Outcome: 3.3 - National and international research and development partners and the private sector are using CRP developed forage and rangeland resources (with enhanced traits) in 30 countries, reaching producers who plant over 2 million ha, to increase the rate of genetic gain and exploit the genetic diversity of forages and rangeland species to enhance stress-tolerance,	The commercialization of CIAT's Urochloa hybrids by the private sector partner is advancing significantly. Information on seed sales for 2018 is not yet available (due to be availed by Papalotla in June 2019). However, through continuous exchange with Papalotla, we are confident to have reached an additional 100,000 hectares sown with CIAT's Urochloa hybrids in 2018. The 100,000 hectares per year are cumulative. The planned work on the annotated reference genome of diploid Urochloa and the establishment of (a) drought and (b) agronomic performance protocols for Cenchrus purpureus was conducted and will contribute to increasing the efficiency in forage breeding.	2018 - 3 forage ontologies established and accessible (through reports and publications) to research partners and the private sector, to advance selection and breeding of forages.	Complete		An ontology for tropical grass forages was created (a web page with the consensus metric system to be used when measuring forage attributes) which is applicable to all Urochloa species (formerly called Brachiaria: B. ruzisiensis, B, decumbens, B. brizantha), Megathyrsus maximus (formerly called Panicum maximus) and Cenchrus spp.	https://www.cropontology.org/ontology/CO_345/Brachiaria

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		biomass productivity and nutritive value.						
Livestock	F3	F3 Outcome: 3.5 - National and international development partners, government agencies and extension services, the private sector and community-based organizations in 3 priority countries are using CRP-related research outputs for better utilization of existing and novel feed and forage resources. This will be through (a) scalable processing technologies, (b) management strategies to conserve and rehabilitate rangelands and (c) diet formulation that increases productivity while reducing overall feed and forage costs and environment impacts.	FeedAssist was modified for the state of Odisha in India by using the local language in the App and incorporating Odisah feed data as input. A second further simplified ration balancing tool was designed for and is currently being made operational by a tool developer. The impact of ration balancing in dairy in India was explored for more than 2.7 million dairy cows. Average monetary gain after application of ration balancing was 24 Indian Rupees per dairy animal per day.	2018 - At least 2 tools developed to increase productivity while reducing feed and labor costs, considering gender-responsiveness and scalability for 1 priority country (Ethiopia) and 2 further countries (India, Malawi) by December 2018.	Complete		The FeedBase tool for Ethiopia was presented and in Malawi feed quality and feed price data was input into a lower cost feed tool, which is currently being tested. Evidence link to FeedAssist (downloadable only in India).	https://hdl.handle.net/10568/100359

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Livestock	F3	F3 Outcome: 3.6 - Livestock producers in 3 priority countries: apply management strategies to conserve and rehabilitate rangelands and pastures while ensuring ongoing ability to produce, preserve and store feed biomass and use diets that increase productivity while reducing overall feed and forage costs and environmental impacts (with the environment and livelihoods flagships).	In India a business unit was set up harvesting road side grasses and converting them into silages. In Malawi poultry grower rations have been designed that provide a similar level of nutrients to the current commercial rations at about half the cost and feed processing equipment is installed with farmer groups. For Ethiopia, the guidelines for decentralized feed compounding are in the final preparation stage and will be finalized in 2019.	2018 - Two off-farm feed processing options delivered (tested, with farmers and NARS staff trained in their use) and 1 agronomic rangeland practice developed in 1 priority country (Ethiopia) and 3 further countries (India, Malawi, Afghanistan) by December 2018.	Extended	1. Research/science	The milestone was extended because the least cost diet designed with EthioFeed can only be mixed and tested with maize stover harvested now in the cropping season 2019. India report:	https://hdl.handle.net/10568/100484
Livestock	F3	F3 Outcome: 3.8 - Increased delivery and uptake of feed and forage resources through proof-of-concept scaling, business model development and value-chain approaches by development partners, the private sector (feed and forage traders, feed processors) and (1 million by 2022) farmers across diverse environments in priority countries and other locations in Latin America, North and East	Progress was made on business model development: several economic analyses for forage technologies were conducted (Colombia, Kenya) and different forages business cases (on-farm use, sale, forage conservation, feed processing) were described (Kenya) and tested (Tunisia). Progress was made on extension approaches through developing and testing of different extension models (Colombia, Tunisia, Kenya) and extension materials (Colombia, Kenya). Progress was made on innovation platforms in Kenya (development of Brachiaria Roundtable), Colombia (contributing to the Roundtable for Sustainable Beef), and Tunisia (IP evaluation).	2018 - Six feed/seed business approaches developed in at least 3 countries (Tunisia, Kenya, Colombia/Nicaragua) by end of 2018.	Complete		Colombia: 3 economic analyses for forage technologies. Kenya: 1 economic analysis and evaluation of 3 different forages business cases (on-farm use, sale, forage conservation). Tunisia: 1 report on performance of feed processing technologies (hydroponic barley production) and 1 report on cactus establishment. Colombia; 2 x Kenya; Tunisia.	https://cgspace.cgiar.org/handle/10568/99204

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		Africa and South and Southeast Asia.						
Livestock	F3	F3 Outcome: 3.8 - Increased delivery and uptake of feed and forage resources through proof-of-concept scaling, business model development and value-chain approaches by development partners, the private sector (feed and forage traders, feed processors) and (1 million by 2022) farmers across diverse environments in priority countries and other locations in Latin America, North and East Africa and South and Southeast Asia.	Progress was made on business model development: several economic analyses for forage technologies were conducted (Colombia, Kenya) and different forages business cases (on-farm use, sale, forage conservation, feed processing) were described (Kenya) and tested (Tunisia). Progress was made on extension approaches through developing and testing of different extension models (Colombia, Tunisia, Kenya) and extension materials (Colombia, Kenya). Progress was made on innovation platforms in Kenya (development of Brachiaria Roundtable), Colombia (contributing to the Roundtable for Sustainable Beef), and Tunisia (IP evaluation).	2018 - At least 4 different extension approaches for feed and forages implemented in 5 countries (Tunisia, Kenya, Rwanda, Tanzania, Ethiopia).	Complete		Colombia: 1 extension approach tested; 1 manual distributed. Kenya: 2 factsheets developed; 1 training approach for forage conservation and seed marketing developed; field days and demonstration plots organized. Tunisia: 4 different extension approaches tested, applied and validated. 2 x Colombia; 3 x Kenya, Tunisia.	https://cgspace.cgiar.org/handle/10568/99208
Livestock	F3	F3 Outcome: 3.8 - Increased delivery and uptake of feed and forage resources through proof-of-concept scaling, business model development and value-chain approaches by development partners, the private sector (feed and forage traders, feed processors) and (1 million by 2022) farmers across diverse environments in priority countries and other locations	Progress was made on business model development: several economic analyses for forage technologies were conducted (Colombia, Kenya) and different forages business cases (on-farm use, sale, forage conservation, feed processing) were described (Kenya) and tested (Tunisia). Progress was made on extension approaches through developing and testing of different extension models (Colombia, Tunisia, Kenya) and extension materials (Colombia, Kenya). Progress was made on innovation platforms in Kenya (development of Brachiaria Roundtable), Colombia (contributing to the Roundtable for Sustainable Beef), and Tunisia (IP evaluation).	2018 - Exchange with Innovation Platforms, roundtables and private sector around feed, forage and processing technologies consolidated (e.g. through meetings, workshops, fairs, information events) in at least 3 countries (Tunisia, Kenya, Colombia) by the end of 2018	Complete		Kenya: Advances were made towards establishing the Brachiaria Roundtable. Colombia: CIAT contributed strongly to the Colombian Roundtable for Sustainable Beef through knowledge sharing/validation and inputs to a national policy. Tunisia: evaluation of the established innovation platforms provided valuable insights for future activities. Kenya; Colombia; Tunisia.	https://cgspace.cgiar.org/handle/10568/99411

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		in Latin America, North and East Africa and South and Southeast Asia.						
Livestock	F4	F4 Outcome: 4.1 - Environmental concerns are considered in decision making across at least 10 priority countries and other locations, by national and international development partners, government agencies and extension systems, including technology developers seeking to improve cattle, small ruminant and pig production.	GHG baselines for Kenya were published in collaboration with CCAFS. Without these baselines, countries cannot monitor progress towards their Nationally Determined Contribution (NDC) commitments. Additional environmental footprint baselines (hydrology and soils) were also published for Kenya. In Vietnam (with CCAFS) a report was written on the GHG emissions baseline undertaken there – a publication is forthcoming; the data have been handed over by the national partner and will be available in 2019. A third country, Tanzania, has been added: the data collection has finished and is being written up. Delays are due to lengthy processing of research permits.	2018 - GHG baseline emissions are published for Kenya and Vietnam by the end of 2018.	Complete		The first papers of GHG emissions baselines for African Livestock Systems are published: Ndung'u et al (2018) Animal Production Science, Onyango et al (2018) Asian-Australasian Journal of Animal Sciences, Zhu et al (2018) Global Biogeochemical Cycles and 5 x Published papers on additional footprints	https://doi.org/10.1071/AN17809
Livestock	F4	F4 Outcome: 4.2 - Targeted solutions are used by research and development partners, across at least 10 priority countries and other locations, to increase the productivity of cattle, small ruminants and pigs in the face of ongoing environmental changes.	Forage intensification options have been identified and disseminated in Tanzania and Rwanda (under the Environment Flagship) and will be disseminated in Kenya and Ethiopia through the Feeds and Forages flagship. This shows how the Environment Flagship works with the technology generating flagships to assess the possible impact of environmental change on the technologies such as forage intensification. In Kenya and Ethiopia, farmers are starting to express preferences for Brachiaria Hybrids cvs. Cobra and Mulato II and Panicum maximum cv. Mombasa, and asking for support to plant more of these species across many farms.	2018 - Three forage intensification options adapted to climate change are disseminated in Tanzania, Kenya and Ethiopia by the end of 2018.	Complete		The dissemination under the Environment Flagship is taking place in Kenya and Ethiopia, with funding from BMZ and SNV. Many farmer demonstrations are ongoing and about 7,500 farmers are being reached in Kenya	https://doi.org/10.7910/DVN/FNEGDP

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Livestock	F4	F4 Outcome: 4.3 - Government agencies and development partners at local and national levels, across at least 10 priority countries and other locations, are promoting environmental management options.	Five rangeland interventions have been identified across three countries. Dissemination is ongoing in Tunisia through a range of workshops, posters and information briefs. Dissemination of additional interventions will start in Kenya and Ethiopia in 2019. In Tanzania the focus has been on land use planning to secure grazing lands and management interventions have not yet started.	2018 - Five sustainable rangelands interventions in Kenya, Tanzania, Tunisia and Ethiopia are identified, tested and disseminated to livestock producers by the end of 2018.	Extended	4. Internal resources	The evidence of the dissemination is covered in the following	http://repo.mel.cgiar.org/handle/20.500.11766/8493
Livestock	F4	F4 Outcome: 4.4 - Gender responsive environmental management options that are well adapted to Global Environmental Change are adopted by households (women and youth) in 6 countries.	Progress was delayed due to personnel change in 2018, hence the milestone is extended. A full time gender specialist (2/3 funded by CCAFS) has now been recruited. She has almost finished the global review and it will be published in 2019.	2018 - Tools to enhance gender inclusion in environmental management identified: four tools identified by end of 2018 across five types of sustainable land management projects, based on a global review.	Extended	4. Internal resources	To be published in 2019	
Livestock	F4	F4 Outcome: 4.5 - National government agencies across at least 5 priority countries design and implement key policies to improve the environmental management of livestock systems	The flagship is on track in three countries (Tunisia, Kenya and Tanzania) to see government agencies design and implement policies to support the improved environmental management of livestock systems, e.g. use of grazing to improve rangeland condition. This approach is based on strong collaborations with key government partners who are willing to consider the importance of land use planning to support improved rangeland management at local, district and national levels.	2018 - National environmental policy for Tunisia completed by the end of 2018.	Complete		See "A new pastoral code for Tunisia: Reversing degradation across the country's critical rangelands". This shows that the Tunisian government is providing policy support for sustainable livestock production. The code also offers a framework for other countries experiencing degradation in rangeland areas	http://repo.mel.cgiar.org/handle/20.500.11766/8806
Livestock	F4	F4 Outcome: 4.5 - National government agencies across at least 5 priority countries design and implement key policies to improve the environmental management of livestock systems	The flagship is on track in three countries (Tunisia, Kenya and Tanzania) to see government agencies design and implement policies to support the improved environmental management of livestock systems, e.g. use of grazing to improve rangeland condition. This approach is based on strong collaborations with key government partners who are willing to consider the importance of land use planning to support improved rangeland management at local, district and national levels.	2018 - Dissemination of manuals/ tools for rangeland and land use planning processes in Tunisia, Kenya and Tanzania to community leaders, local government officials and national line ministry staff by the end of 2018.	Complete		Government staff were trained to use the manuals which have been published and shared. See the following for evidence	http://hdl.handle.net/20.500.11766/8262

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Livestock	F4	F4 Outcome: 4.6 - Evidence generated by the flagship influences key global livestock agendas (IPCC, Global agenda for Sustainable Livestock)	The Global Forum for Food & Agriculture (GFFA) ministerial communication in January 2018 mentioned environmental issues specifically. Through engagement with the Global Landscapes Forum in Nairobi in August 2018, and ongoing engagement with the International Land Coalition Rangelands Initiative as well as the Land Portal, research results have been shared and policymakers and advocates engaged, identifying approaches to creating enabling environments for effective rangeland management. The push in these engagements is for landscape restoration initiatives to also consider rangelands, not only forests.	2018 - Two events will be influenced by the end of 2018. High level communication on livestock and environment at the GFFA (January 2018); side event on livestock and environment at UNFCCC COP 24 in November 2018.	Complete		These engagements were publicized through blog posts as follows. Engagements on policy for rangelands included: link 2, link 3, link 4, link 5, link 6. The GFFA communication is described here: link 7.	https://cgspace.cgiar.org/handle/10568/99173
Livestock	F5	F5 Outcome: 5.1 - National and international research partners and policymakers use analyses of livestock-sector dynamics, investment and ex-ante impact assessments to guide priority setting, investment and policy development for the livestock sector in 5 priority countries and within the Livestock CRP	Progress includes the engagement, including capacity development, with national decision makers, researchers, development agencies and donors, through work on Livestock Master Plans (LMPs) and through the 'why livestock matter' website that was completed, with evidence generated for 5 topics: nutrition, health, economic opportunity, gender and climate environment. Setbacks includes the delay in launching the LMPs in Bihar and Tanzania. In Ethiopia, the LMP guided both public and private sector investments.	2018 - Livestock Master Plans completed in Bihar and Tanzania by December 2018.	Complete		For the Bihar LMP, documents were completed in 2018, although the official launch only took place in January 2019. See link 2. The same applied to Tanzania, with the launch taking place in March 2019, see link 3.	https://news.ilri.org/2019/04/18/a-livestock-master-plan-is-mission-critical-for-indias-state-of-bihar
Livestock	F5	F5 Outcome: 5.1 - National and international research partners and policymakers use analyses of livestock-sector dynamics, investment and ex-ante impact assessments to guide priority setting, investment and policy	Progress includes the engagement, including capacity development, with national decision makers, researchers, development agencies and donors, through work on Livestock Master Plans (LMPs) and through the 'why livestock matter' website that was completed, with evidence generated for 5 topics: nutrition, health, economic opportunity, gender and climate environment. Setbacks includes the delay in launching the LMPs in Bihar and Tanzania. In Ethiopia, the LMP guided both public and private sector investments.	2018 - LMP Bihar, completed in December 2018, includes a gender analysis section (objective and data).	Complete		For the Bihar LMP, documents were completed in 2018, although the official launch only took place in January 2019. See link 2. The same applied to Tanzania, with the launch taking place in March 2019, see link 3.	

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		development for the livestock sector in 5 priority countries and within the Livestock CRP						
Livestock	F5	F5 Outcome: 5.1 - National and international research partners and policymakers use analyses of livestock-sector dynamics, investment and ex-ante impact assessments to guide priority setting, investment and policy development for the livestock sector in 5 priority countries and within the Livestock CRP	Progress includes the engagement, including capacity development, with national decision makers, researchers, development agencies and donors, through work on Livestock Master Plans (LMPs) and through the 'why livestock matter' website that was completed, with evidence generated for 5 topics: nutrition, health, economic opportunity, gender and climate environment. Setbacks includes the delay in launching the LMPs in Bihar and Tanzania. In Ethiopia, the LMP guided both public and private sector investments.	2018 - GLAD message map on key livestock facts generated and dissemination on global portal by end of 2018.	Complete		The website www.whylivestockmatter.org is up and running.	www.whylivestockmatter.org
Livestock	F5	F5 Outcome: 5.1 - National and international research partners and policymakers use analyses of livestock-sector dynamics, investment and ex-ante impact assessments to guide priority setting, investment and policy development for the livestock sector in 5	Progress includes the engagement, including capacity development, with national decision makers, researchers, development agencies and donors, through work on Livestock Master Plans (LMPs) and through the 'why livestock matter' website that was completed, with evidence generated for 5 topics: nutrition, health, economic opportunity, gender and climate environment. Setbacks includes the delay in launching the LMPs in Bihar and Tanzania. In Ethiopia, the LMP guided both public and private sector investments.	2018 - Gov of Ethiopia uses completed LMP to share major livestock loan request with WB during 2018.	Complete		The World Bank loan of about $170M was launched in 2018, based on the completed Livestock Master Plan.	Section 8 in: http://documents.worldbank.org/curated/en/392591478726570546/pdf/ITM00184-P159382-11-09-2016-1478726567434.pdf

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		priority countries and within the Livestock CRP						
Livestock	F5	F5 Outcome: 5.2 - International researchers and agencies use improved livestock system modelling tools and apply them to new problems based on their mandate areas	Initial discussions in September 2018 outlined redesigned Livestock Sector Policy and Investment Toolkit (LSIPT) principles. Progress at the end of 2018 included organizing an early-2019 meeting by FAO to apply tools in Ethiopia (a Memorandum of Understanding will be signed to formalize collaboration in 2019). Work on LMP protocols included a meeting in December 2018 with ILRI, CIRAD, and CIAT researchers to develop work plans for new draft model packages in 2019. Progress is also being made towards the use of participatory tools to develop integrated systems models for ex-ante impact assessment of value chain interventions (Nicaragua, South Asia, Myanmar).	2018 - Scenarios and modeling approaches agreed upon for integrated macro-meso analyses	Extended	4. Internal resources	Work is ongoing on the improvement of the LSIPT. Modeling approaches have converged on integrating herd models with multi-sector modeling. Though the work took longer than anticipated, proof of concept models were developed to show these links, to allow for better alignment.	
Livestock	F5	F5 Outcome: 5.3 - Policy- or decision-makers in 4 countries use the packages developed and the evidence on the benefits of including gender equity considerations in the development of livestock projects and planning at community and national level (Ethiopia, Kenya, Nicaragua, Vietnam)	While the benchmark publication on gender and livestock is delayed, work is ongoing regarding this outcome. For example, ILRI was requested to conduct the gender mid-term review of the World Bank funded project PRAPS in West Africa, that is expected to guide the gender activities in the next 3 years of this 6-country project. Also in Ethiopia, ICARDA and ILRI, with CIMMYT, provided training on gender to Ethiopia Institute of Agricultural Research (EIAR) staff who then used a Training of Trainers approach to further train other staff in their regional centres. At the CRP level, gender has been embedded in all the flagships.	2018 - Benchmark publication on gender and livestock to identify frontiers in research and development published by December 2018.	Extended	4. Internal resources	The work couldn't be completed due to the need to conduct a broader literature review. The team will prioritize this publication in 2019.	

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Livestock	F5	F5 Outcome: 5.3 - Policy- or decision-makers in 4 countries use the packages developed and the evidence on the benefits of including gender equity considerations in the development of livestock projects and planning at community and national level (Ethiopia, Kenya, Nicaragua, Vietnam)	While the benchmark publication on gender and livestock is delayed, work is ongoing regarding this outcome. For example, ILRI was requested to conduct the gender mid-term review of the World Bank funded project PRAPS in West Africa, that is expected to guide the gender activities in the next 3 years of this 6-country project. Also in Ethiopia, ICARDA and ILRI, with CIMMYT, provided training on gender to Ethiopia Institute of Agricultural Research (EIAR) staff who then used a Training of Trainers approach to further train other staff in their regional centres. At the CRP level, gender has been embedded in all the flagships.	2018 - CRP Gender strategy published by June 2018.	Extended	4. Internal resources	The strategy document has not been finalized. The main points of the gender strategy are available in PowerPoint presentations and have been embedded in all flagships, through: agreeing on gender outputs for some projects (e.g. poultry genetics); gender staff as contact person to each flagship; and joint fundraising.	
Livestock	F5	F5 Outcome: 5.3 - Policy- or decision-makers in 4 countries use the packages developed and the evidence on the benefits of including gender equity considerations in the development of livestock projects and planning at community and national level (Ethiopia, Kenya, Nicaragua, Vietnam)	While the benchmark publication on gender and livestock is delayed, work is ongoing regarding this outcome. For example, ILRI was requested to conduct the gender mid-term review of the World Bank funded project PRAPS in West Africa, that is expected to guide the gender activities in the next 3 years of this 6-country project. Also in Ethiopia, ICARDA and ILRI, with CIMMYT, provided training on gender to Ethiopia Institute of Agricultural Research (EIAR) staff who then used a Training of Trainers approach to further train other staff in their regional centres. At the CRP level, gender has been embedded in all the flagships.	2018 - CRP Youth strategy published by June 2018.	Complete		The document has been discussed through an online consultation that resulted in the finalization of the strategy. The document is being English edited. Sharepoint link for the online consultation	https://cgiar.sharepoint.com/sites/YouthStrategy
Livestock	F5	F5 Outcome: 5.4 - Local or national development partners in four priority countries adopt gender-transformative and youth-supportive approaches (using the evidence from the strategic gender research done under the CRP)	The Women's Empowerment in Livestock Index (WELI) tool, and paper, have been finalized. The uptake has been great, as the tool may be used in a set of IDRC livestock projects and also within ILRI. ILRI is about to start a project with CARE in Ghana on assessing the feasibility to implement gender transformative approaches in vaccine delivery systems for goats and chicken. A women-driven project on chicken is also about to start in Tanzania and Ethiopia, that includes a strong capacity development component.	2018 - Finalized version of the WELI produced by September 2018.	Complete		The paper and tool have been published, see link 2. The tool measures the level of women empowerment, to be used in systems where livestock is an important agricultural activity. This fills the gap from other tools that do not adequately capture livestock considerations.	https://www.cgiar.org/research/publication/womens-empowerment-livestock-index/

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Livestock	F5	F5 Outcome: 5.5 - Local and national development actors, government agencies, and the private sector invest in and adopt the most successful approaches for enhancing livestock-mediated nutritional impact, including institutional arrangements and behavioural change, in 3 priority countries.	Progress on this outcome was achieved through the combination of (a) the publication of a major report on the importance of animal source foods during the first 1,000 days, written in collaboration with A4NH and a major UK think tank, and (b) the on-the-ground work in the dairy and livestock value chains of ILRI-led development project, Accelerated Value Chain Development (AVCD).	2018 - Social and Behavioural Change Communication (SBCC) strategy for nutrition-related behaviour implemented among 5,000 households, (targeting women and children aged 6-23 months in Kenya) by October 2018.	Complete		The target was met and surpassed. Moreover, the project developed community cards to support the work, in collaboration with the government of Kenya. Note that the Accelerated Value Chain Development project report citing the figures is not in the public domain but can be available on request.	https://cgspace.cgiar.org/handle/10568/98538
Livestock	F5	F5 Outcome: 5.5 - Local and national development actors, government agencies, and the private sector invest in and adopt the most successful approaches for enhancing livestock-mediated nutritional impact, including institutional arrangements and behavioural change, in 3 priority countries.	Progress on this outcome was achieved through the combination of (a) the publication of a major report on the importance of animal source foods during the first 1,000 days, written in collaboration with A4NH and a major UK think tank, and (b) the on-the-ground work in the dairy and livestock value chains of ILRI-led development project, Accelerated Value Chain Development (AVCD).	2018 - Major report on influence of animal-sourced foods on child and mother nutrition published by June 2018.	Complete		The report has been published and a blog was written. A series of events was organized to disseminate the results, e.g. the joint ILRI-Chatham side event at the EAT Stockholm Food Forum on 11 Jun 2018.	https://cgspace.cgiar.org/handle/10568/92907

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Livestock	F5	F5 Outcome: 5.6 - Livestock communities across 4 priority countries apply tested technologies, management strategies and institutional arrangements, taking the multiple functions of livestock into account	From 2008-2018, ILRI researchers guided the choice of interventions (technologies and market-related) and supported monitoring and evaluation of the East Africa Dairy Development (EADD) project. By end 2018, 68,628 farmers in Uganda and Tanzania were supplying milk or accessing services. The evidence in the Result Tracker submitted to the donor by lead partner Heifer International is not public; a large body of EADD outputs is available on CGSPACE. Under the Kenya Accelerated Value Chain Development (AVCD) project, the team worked with 9 county governments, leading to budgetary allocation to flagship technologies including vaccine, fodder/forage planting material, and synchronized artificial insemination.	2018 – By December 2018, target dairy/livestock communities under AVCD and EADD projects in Kenya, Tanzania and Uganda apply tested feed, health and breeding technologies and/or management strategies (combined total of over 140,000 households: 78,000 in Kenya, 26,000 in Tanzania and 36,000 in Uganda).	Complete		The number of farmers registered to EADD-supported hubs are 46,671 in Uganda and 21,957 in Tanzania. In Kenya, the number of farmers who applied improved technologies or management practices are 92,762 in the AVCD livestock component and 79,947 in the dairy component (project lifetime – report not in public domain).	
Livestock	F5	F5 Outcome: 5.6 - Livestock communities across 4 priority countries apply tested technologies, management strategies and institutional arrangements, taking the multiple functions of livestock into account	The team worked with county governments in 9 counties for the dairy value chain and 5 counties for live animal value chains, in Kenya, Tanzania and Uganda, leading to budgetary allocation to flagship technologies including ECF vaccine, fodder/forage planting material, and synchronized artificial insemination (AI). Other partners including NGOs (Heifer, TechnoServe and FIPS-Africa), and private sector (AI service providers, vaccine distributors, milk traders) enhanced livestock keepers' access to inputs and services. Following trainings on good animal husbandry practices and business development services, dairy farmers applied new technologies including planting improved fodder (Brachiaria). This increased milk production, motivating further investment in dairy feed and management.	2018 - Protocol to guide testing, evaluation and scaling of technologies, for use by Livestock CRP and other researchers, developed by December 2018.	Cancelled	Other	Due to an internal miscommunication, the protocol was not written. However, another protocol focused on evaluating of institutional innovations was finalised (see 5.7), the principles of which can also be used for the evaluation of technologies.	

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Livestock	F5	F5 Outcome: 5.7 - Development partners, private sector and government agencies across 4 priority countries apply innovative institutional arrangements to enhance competitiveness and inclusiveness	The first milestone reports on the AVCD (Kenya) and EADD (Kenya, Uganda and Tanzania) projects, where CRP scientists are applying past research expertise to guide the implementation of new institutional arrangements (e.g. agent networks in AVCD, hub approach in EADD). The protocol is expected to be used from 2019, to identify lessons learned and allow synthesis when testing institutional innovations across countries and value chains.	2018 – Target dairy/livestock communities under AVCD and EADD in Kenya, Tanzania and Uganda apply tested organizational and business models among over 133,000 households combined.	Complete		The number of farmers using EADD-supported hubs are 8,717 in Tanzania, 17,824 in Uganda and 60,081 in Kenya (Heifer email communication). For AVCD Kenya, 4,561 farmers are members of 5 dairy business hubs (Heifer); 10,447 smallholder farmers from 29 dairy businesses have enhanced access to finance, inputs and services (Technoserve).	
Livestock	F5	F5 Outcome: 5.7 - Development partners, private sector and government agencies across 4 priority countries apply innovative institutional arrangements to enhance competitiveness and inclusiveness	The first milestone reports on the AVCD (Kenya) and EADD (Kenya, Uganda and Tanzania) projects, whereby CRP scientists are applying past research expertise to guide the implementation of new institutional arrangements (e.g. agent networks in AVCD, hub approach in EADD). The protocol proposes a way to harmonize procedures and methods of designing and evaluating research and development efforts for some of the 'experiments' conducted within the Livestock CRP framework. Doing so will help in synthesizing lessons over space and time. It would also help in enhancing efficiency of scaling up and out of the 'experiments' identified through comparable efforts.	2018 - Protocol to guide testing, evaluation and scaling of technologies, for use by Livestock CRP and other researchers, developed by December 2018.	Complete		The objective of testing integrated packages of technological and institutional innovations in the four priority CRP countries puts the Livestock CRP in a unique position to generate lessons from different 'experiments'. The protocol has been circulated amongst the team and is available to them on SharePoint:	https://cgiar.sharepoint.com/:w:/r/sites/livestock/_layouts/15/Doc.aspx?sourcedoc=%7B5B01CC99-0850-42A1-9F4E-A3769E662B3A%7D&file=ProtocolTestEvaluateInnovations-LivestockCRP%20Feb%202019.docx&action=default&mobileredirect=true
MAIZE	F1	FP1 Outcome: 1.8 National and regional policy makers improved policy-making and increased investment based on evidence CC Increase capacity of beneficiaries to adopt research outputs	Highlights foresight/targeting studies to inform policy: -abiotic stresses (drought/heat), weather risk and climate change implications for maize in Africa and South Asia -maize lethal necrosis ex ante analysis of agronomic and genetic interventions in Africa -Market potential & targeting biofortified maize in Mexico -review of potential of crop modelling in crop research -synergies between MAIZE foresight/targeting and CRP PIM and Big Data	2018 - Targeting incorporates competition for land and spatial dimensions of soil & water degradation	Complete		Published 7 papers 2018 -CSA and targeting DiP -Weather risk and innovation benefits SSA AgEcon -MLN ex ante AS -Potential benefits drought/heat tolerant maize CRM -drought Ethiopia IJCCSM -crop modelling Agronomy -Market potential & targeting biofortified maize Mexico RFM 41, 327-337	https://doi.org/10.1080/09614524.2018.1492516

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MAIZE	F1	FP1 Outcome: 1.10 Farmers have greater awareness and access to, and increased adoption and adaptation of improved technologies CC Increase capacity of beneficiaries to adopt research outputs	Highlights studies to enhance adoption/impact and gender/social-inclusiveness: -MAIZE Impact assessment strategy developed and pragmatically and strategically operationalized with various 2018 adoptions studies on germplasm and sustainable intensification/CSA innovations. -Reviews of remote sensing opportunities for monitoring adoption dynamics. -Potential of DNA fingerprinting in Ethiopia for adoption studies. -MAIZE supported gender cross-CRP flagship project (GENNOVATE) brought to completion, with release special issue (Agri-Gender-JGAFS3(1)) and resource materials. -Gender research and mainstreaming position created and recruited in South Asia - including linkage with CCAFS.	2018 - Adoption and impact studies on technologies rolling plan based on progress of technologies along the theory of change	Complete		Published 17 papers 2018 - I 9 adoption/impact papers -3xCA: Malawi-IJAS, 2xAfrica-LUP, JAEE -5x maize: 3xEthiopia-JAE, FS, LUP, Nigeria-FS; India-AR -QPM-Child nutrition Ethiopia-Nutrients	https://doi.org/10.1080/14735903.2018.1472411
MAIZE	F1	FP1 Outcome: 1.10 Farmers have greater awareness and access to, and increased adoption and adaptation of improved technologies CC Increase capacity of beneficiaries to adopt research outputs	Highlights studies to enhance adoption/impact and gender/social-inclusiveness: -MAIZE Impact assessment strategy developed and pragmatically and strategically operationalized; with various 2018 adoptions studies on germplasm and sustainable intensification/CSA innovations. -reviews of remote sensing opportunities for monitoring adoption dynamics -Potential of DNA fingerprinting in Ethiopia for adoption studies. -MAIZE supported gender cross-CRP flagship project (GENNOVATE) brought to completion, with release special issue (Agri-Gender-JGAFS3(1)) and resource materials. -gender research and mainstreaming position created and recruited in S Asia - incl linkage with CCAFS.	2018 - Adoption and impact studies on technologies rolling plan based on progress of technologies along the theory of change	Complete		Published 17 papers 2018 - II 8 gender papers -6x GENNOVATE special issue JGAFS -Gender-Innovation Platforms Rwanda CP -Land-youth Tanzania LE	http://agrigender.net/views/insights-from-women-and-men-small-scale-farmers-in-Africa-Asia-and-Latin-America-JGAFS-312018-3.php

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MAIZE	F1	FP1 Outcome: 1.9 Last mile provider (extension partners, farmer organization, community-based organizations, private sector) increased access and promotion of technologies to farmers CC Increase capacity of beneficiaries to adopt research outputs	Highlights markets/value chain studies to enhance last mile linkages: -value-chain opportunities in relation to seed systems; mechanization; VC development; innovation; storage - Maize production dynamics and opportunities in Bangladesh - Nutritional opportunities MAIZE-AFS, including maize-based foods. Analysis in various countries using secondary data including evolving diets and food security implications. Visiting fellow identified but only available in 2019 Q4. Nutrition and food systems task force initiated at CIMMYT in 2019 building on earlier preparatory work in 2018 (science week; Nutrition Learning Initiative).	2018 - Rapid value chain assessments with proper gender lens conducted in selected countries to identify opportunities and bottlenecks in MAIZE	Complete		2018 Published 17 papers - I Maize Bangladesh-JCI -cereal markets–JADEE -review gender-equitable value-chain development guides DiP -3x Value-chain development JADEE, JADEE, JADEE -2xSeed systems – Africa-IFAMR, global FS	https://dssat.net/models-and-applications/components/ceres-maize
MAIZE	F1	FP1 Outcome: 1.9 Last mile provider (extension partners, farmer organization, community-based organizations, private sector) increased access and promotion of technologies to farmers CC Increase capacity of beneficiaries to adopt research outputs	Highlights markets/value chain studies to enhance last mile linkages: -value-chain opportunities in relation to seed systems; mechanization; VC development; innovation; storage - Maize production dynamics and opportunities in Bangladesh - Nutritional opportunities MAIZE-AFS, incl maize-based foods. Analysis in various countries using secondary data incl evolving diets and food security implications. Visiting fellow identified but only available in 2019 Q4. Nutrition and food systems task force initiated at CIMMYT in 2019 building on earlier preparatory work in 2018 (science week; Nutrition Learning Initiative).	2018 - Rapid value chain assessments with proper gender lens conducted in selected countries to identify opportunities and bottlenecks in MAIZE	Complete		2018 Published 17 papers - II -2xInnovation capacity: ESA-JAEE, LAC-CCTA -2xMechanization: Kenya-AMAALA49:20-32; ESA-JDS -native value chains Mexico-JRS -foods Africa-GFS -storage Benin-AE -2xWTP Pakistan-GMCF, Ghana-CJAE	https://maize.org/fall-armyworm-reported-in-india-battle-against-the-pest-extends-now-to-asia/

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MAIZE	F2	FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products Adoption of CGIAR materials with enhanced genetic gains	Important sets of pre-bred lines and source germplasm was made available for drought tolerance, tar spot disease resistance and maize lethal necrosis tolerance. In addition, progress was made in developing and/or validating novel tools for: 1) discovery and use of novel diversity from germplasm accessions, and 2) enhancing the efficiency of doubled haploid technologies to accelerate breeding progress. Formal capacity development activities, e.g. student thesis projects and formal workshops, are not highlighted in this report, but were/are an important component of FP2 strategy to enhance the effectiveness of MAIZE researchers worldwide.	2018 - Tools and protocols adopted for enhanced efficiency and lower cost of maize doubled haploid (DH) line development in tropical germplasm and environments	Extended	1. Research/science	Novel methods to shorten the time required to identify haploid embryos were developed and will be validated and deployed in 2019. These will reduce the cost and/or time of producing DH lines for breeding programs. the discovery research was completed and validation initiated in 2018. Validation and deployment will be completed in 2019.	
MAIZE	F2	FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products Adoption of CGIAR materials with enhanced genetic gains	Important sets of pre-bred lines and source germplasm was made available for drought tolerance, tar spot disease resistance and maize lethal necrosis tolerance. In addition, progress was made in developing and/or validating novel tools for: 1) discovery and use of novel diversity from germplasm accessions, and 2) enhancing the efficiency of doubled haploid technologies to accelerate breeding progress. Formal capacity development activities, e.g. student thesis projects and formal workshops, are not highlighted in this report, but were/are an important component of FP2 strategy to enhance the effectiveness of MAIZE researchers worldwide.	2018 - Novel alleles, haplotypes and landrace donors identified for at least three priority traits (MLN, TSC and drought) and moved into pre-breeding and/or breeding pipeline	Complete		68 ears from 4 large landrace-based genomic selection pre-breeding populations selected for potential tolerance to drought, heat and low soil nitrogen based on calculated genomic estimate of breeding values - evidenced by breeding trial and analysis files in institutional data repositories. 524 landrace accessions identified using GIS selection with potential for salinity tolerance - evidenced by analysis files in institutional data repositories. Novel allele contributing to drought tolerance identified in landrace germplasm and validated through in-silicoanalysis of trial and expression data - evidenced via draft publication held in internal institutional repository. These landrace donors for MLN, TSC and Drought are listed in the SeeD Product Catalog and are available on request: MLN: 13 landraces out of 1000 evaluated were identified as having superior tolerance to MCMV virus, the major component virus of MLN. TSC: 2 landraces and 4 CIMMYT populations have been identified	https://seedsofdiscovery.org/catalogue/

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							with good resistance to Tar Spot Complex. Drought: 52 landraces identified as donors for resistance to drought out of over 600 evaluated.	
MAIZE	F2	FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products Adoption of CGIAR materials with enhanced genetic gains	Important sets of pre-bred lines and source germplasm was made available for drought tolerance, tar spot disease resistance and maize lethal necrosis tolerance. In addition, progress was made in developing and/or validating novel tools for: 1) discovery and use of novel diversity from germplasm accessions, and 2) enhancing the efficiency of doubled haploid technologies to accelerate breeding progress. Formal capacity development activities, e.g. student thesis projects and formal workshops, are not highlighted in this report, but were/are an important component of FP2 strategy to enhance the effectiveness of MAIZE researchers worldwide.	2018 - At least 15 early generation pre-bred lines available for TSC and drought, incorporating useful genetic diversity from selected landraces into elite or semi-elite backgrounds	Complete		Drought: 32 lines are listed in the SeeD Product Catalog and are available for distribution. These lines were evaluated as testcrosses in multi-year, multi-location trials under managed drought conditions as well as under normal conditions (with irrigation or rain-fed). TSC: 54 lines are listed in the SeeD Product Catalog and are available for distribution. These lines have been screened per se for TSC resistance and evaluated as testcrosses in multi-year, multi-location trials for yield.	https://seedsofdiscovery.org/catalogue/
MAIZE	F2	FP2 Outcome: 2.5 Breeders develop improved varieties more efficiently through greater access and use of documented germplasm and tools Adoption of CGIAR materials with enhanced genetic gains	Strong progress was made in development of improved data management tools for breeding. Genetic markers for use in routine breeding were also deployed during 2018, and a full pipeline of development and validation of additional markers is in progress.	2018 - Established tools and methods that enable more efficient management and utilization of data and knowledge implemented and used by all MAIZE breeders	Complete		Comparison of approaches for genotype driven germplasm selection from germplasm banks for primary phenotypic evaluation for traits of interest conducted and documented, evidenced by a draft publication in internal institutional repository. Release of enhanced Germinate data warehouse (3.4) with new within and cross trial data query capacities. Development of a new version of Germinate data warehouse (3.5) facilitating the integration of and query across data from projects subject to different data licensing terms, evidenced by institutional installation in an internal staging pre-deployment environment. Good progress was made in design and development of an enterprise breeding system software for management of breeding programs, integrating use of "big" genomic data.	http://germinate.seedsofdiscovery.org/maize/

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							Breeder-ready markers were developed for turcicum leaf blight and maize streak virus. Markers are under development or validation for several additional traits, mainly important diseases.	
MAIZE	F3	FP3 Outcome: 3.1 Improved exchange and utilization of germplasm and data by MAIZE partner breeding teams CC Increased capacity for innovations in partner research organizations	Four new MAIZE-derived maize lethal necrosis (MLN) tolerant maize hybrids were released in 2018 in Kenya. 537 tons of certified drought tolerant (DT)+ MLN tolerant maize hybrids were commercialized in eastern Africa. Four new CIMMYT heat-tolerant (HT) maize hybrids allocated to three seed company partners, based on yield advantage of 1.5 tons under heat stress over popular commercial maize hybrid checks in South Asia in Stage 4 trials Three CIMMYT HT maize hybrids released in India in 2018. Nine HT maize hybrids under commercialization in Bangladesh, India and Nepal 70 tons of certified maize seed produced and sold to farmers	2018 - Multiple stress tolerant MAIZE hybrids (with MLN resistance) replace at least 5 dominant but 15+ year old maize varieties in MLN-endemic countries in eastern Africa; At least 20% yield advantage under heat stress in Stage 4 hybrids cohort relative to popular commercial hybrids grown in the spring season in South Asia.	Extended	2. Financial	Replacement of 15+ year old maize varieties in MLN-endemic countries in eastern Africa is work in progress. However, 20% yield advantage under heat stress in stage 4 hybrids cohort has been achieved.	

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MAIZE	F3	FP3 Outcome: 3.2 Effective pest/disease surveillance, monitoring and diagnostics protocols/procedures for controlling the spread and impact of existing/emerging threats Reduce pre- and post-harvest losses, including those caused by climate change	MLN Information Portal and MLN Phytosanitary Community of Practice, established by CIMMYT 242 NPPO staff across 8 countries in Eastern and Southern Africa trained on MLN diagnostics and surveillance MLN-free seed production and exchange SOPs/Check-lists are presently implemented by 45 seed companies across Eastern Africa A comprehensive IPM manual on FAW published; the manual was further translated into French and Portuguese versions and released in Sept-Oct 2018. FAW R4D International Conference organized in Addis, jointly by CIMMYT, IITA, CABI, icipe, USAID, AUC, FAO, and AGRA FAW R4D International Consortium established jointly by CIMMYT and IITA, with membership of nearly 45 institutions	2018 - A dedicated MAIZE pathogen/pest/parasitic weed web portal and data management system (toolbox) with core databases, established under MAIZE Atlas; Reliable and cost-effective diagnostic protocols for curbing the spread of pathogens (e.g., MCMV) through seed implemented by NPPOs and commercial seed companies in Eastern and Southern Africa.	Complete		Portal established for MLN, but not FAW- FAO and CABI have separately established Web Portals for Fall Armyworm management, and therefore, not replicated under MAIZE.	
MAIZE	F3	FP3 Outcome: 3.3 Partner breeding teams access and adopt improved breeding processes, including new technologies, methodologies, approaches and genetic resources CC Increased capacity for innovations in partner research organizations	Ongoing activities under IMIC-Africa, Asia, LAC (e.g. PPP) and bilateral breeding research collaborations. Doubled haploid (DH) technology optimized and deployed in Sub-Saharan Africa, reducing time taken to develop parental lines.	2018 - Precision phenotyping sites, including well-equipped benchmark phenotyping sites and complementary satellite phenotyping sites, established in SSA and South Asia in partnership with public and private sector partners.	Complete		Asia: large heat-stress phenotyping network, 23 sites, 4 Asian countries established. Since 2009, ESA abiotic/biotic screening network expanded to 59 locations across 11 countries. Expanded for managed drought, low nitrogen stress screening. Regional testing network allowed greater selection intensity for stress tolerance, maximized benefits of limited resources.	
MAIZE	F3	FP3 Outcome: 3.4 Increased deployment of improved MAIZE varieties by seed companies in target agro-ecologies Closed yield gaps through improved agronomic and animal husbandry practices	Approx. 6 tons of breeder, pre-basic and basic seed of CIMMYT maize lines produced in Zimbabwe and Kenya; Approx. 2.2 tons of NPT/hybrid demo seed produced and shared with public/private sector partners in 16 countries across Sub-Saharan Africa.	2018 - Seed production studies across a range of target seed production environments in collaboration with public/private sector partners; Research into the economics of seed production of single-cross and three-	Complete		Seed production research undertaken on 421 CIMMYT maize parental lines (236 in southern Africa; 185 in eastern Africa), besides more than 50 parental single-crosses, and relevant information shared with seed company partners.	

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				way cross hybrids in SSA.				
MAIZE	F3	FP3 Outcome: 3.9 Increased availability of nutritious maize with desirable end use quality traits to farmers, food and feed producers, and processors Increased availability of diverse nutrient-rich foods	A total of 20 MAIZE-derived nutritious maize varieties were released by NARS/seed enterprises, including 7 Provitamin A-enriched varieties (Malawi and Cameroon); 6 QPM varieties (Cameroon and Nepal); 6 QPM + high Zn varieties (Guatemala, Nicaragua, Colombia); and 1 high Zn variety in Guatemala. A total of 81 MAIZE varieties (with trait combinations relevant to smallholders in Africa, Asia and Latin America) were released. More than 2 tons of breeder and pre-basic seed of CIMMYT parental lines of commercial climate-resilient hybrids produced and supplied to a basic seed provider for promoting sustainable and quality basic seed to seed companies in ESA	2018 - Donor germplasm with kernel carotenoid stability and processing properties identified and shared with partners in target countries	Complete		6000 seeds from 6 populations were sent to Monsanto (seed chipping) and Intertek (genotyping) for seed chipping proof of concept collaboration initiated.	
MAIZE	F3	FP3 Outcome: 3.9 Increased availability of nutritious maize with desirable end use quality traits to farmers, food and feed producers, and processors Increased availability of diverse nutrient-rich foods	A total of 20 MAIZE-derived nutritious maize varieties were released by NARS/seed enterprises, including 7 Provitamin A-enriched varieties (Malawi and Cameroon); 6 QPM varieties (Cameroon and Nepal); 6 QPM + high Zn varieties (Guatemala, Nicaragua, Colombia); and 1 high Zn variety in Guatemala. A total of 81 MAIZE varieties (with trait combinations relevant to smallholders in Africa, Asia and Latin America) were released. More than 2 tons of breeder and pre-basic seed of CIMMYT parental lines of commercial climate-resilient hybrids produced and supplied to a basic seed provider for promoting sustainable and quality basic seed to seed companies in ESA	2018 - Sustainable early-generation seed (breeder, pre-basic, and foundation seed) supply systems promoted, especially in SSA; Deployment of a new seed system management software in regional hubs, linked to institutional phenotypic and genotypic databases, to streamline inventory management, routine QC/QA operations, phytosanitary regulation compliance, and shipment tracking.	Extended	4. Internal resources	The seed system management software will be developed in 2019, to streamline product flow, inventory management, routine QC/QA operations, phytosanitary regulation compliance, and shipment tracking.	

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MAIZE	F4	FP4 Outcome: 4.9 Smallholder farmers increased their capacity to adopt and adapt SI practices and products (associated with cross-cutting sub-IDO) Increased access to productive assets, including natural resources	Major progress in scaling SI practices have been achieved across the regions (LATIN AMERICA, ESA-Eastern and Southern Africa, SA South Asia). Detailed progress on the outcome can be found in individual project reports (mainly CSISA, SRFSI, MasAgro, Buena Milpa, TAMASA, SIMLESA). The capacity to adopt is not only through direct interaction with smallholder but through collobaration with a range of stackeholder	2018 - Existing scaling approaches including public/ private partnership and context specific business models evaluated in target geographies leading to improve scaling models and critical scaling factors defined	Extended	6. External environment (political, economic, legal, market)	See publication list for MAIZE in 2018 plus capacity development/training documents	
MAIZE	F4	FP4 Outcome: 4.9 Smallholder farmers increased their capacity to adopt and adapt SI practices and products (associated with cross-cutting sub-IDO) Increased access to productive assets, including natural resources	Major progress in scaling SI practices have been achieved across the regions (LATIN AMERICA, ESA- Eastern and Southern Africa, SA South Asia). Detailed progress on the outcome can be found in individual project reports (mainly CSISA, SRFSI, MasAgro, Buena Milpa, TAMASA, SIMLESA). The capacity to adopt is not only through direct interaction with smallholder but through collobaration with a range of stackeholder	2018 - adapt precision water mgmt practices w/ use of remote, proximal sensing info	Extended	Other	Want to push it to a further scaling stage and find viable ICT business models and use cases. Prototype application developed for smartphone (PANI) in Bangladesh. Scaling still needs to take place	
MAIZE	F4	FP4 Outcome: 4.9 Smallholder farmers increased their capacity to adopt and adapt SI practices and products (associated with cross-cutting sub-IDO) Increased access to productive assets, including natural resources	Major progress in scaling SI practices have been achieved across the regions (LATIN AMERICA, ESA-Eastern and Southern Africa, SA South Asia). Detailed progress on the outcome can be found in individual project reports (mainly CSISA, SRFSI, MasAgro, Buena Milpa, TAMASA, SIMLESA). The capacity to adopt is not only through direct interaction with smallholder but through collobaration with a range of stackeholder	2018 - optimisation of cropping systems support adaptation to climate change validated in specific MAIZE target geographies	Extended	4. Internal resources	More resilient cropping systems in SSA (ESA) through CA based approaches and diversification. Range of Farming Systems analysis tools developed and tested to target specific interventions according to agroecologies and farm types	

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MAIZE	F4	FP4 Outcome: 4.6 Private sector (and public sector) increased provision of services to smallholder farmers to increase their ability to adopt SI practices and products CC Increase capacity of beneficiaries to adopt research outputs	Responsible sourcing strategies for various agro-ecologies in Mexico developed and tested. Significant scaling of mechanization option through service provision in Bangladesh and India. Progress on service provision in ESA- Eastern and Southern Africa(FACASI)	2018 - Better understand scaling up processes in multi-actor innovation networks, to ensure sustainability of institutional mechanisms, structures	Extended	1. Research/science	Needs further scaling in Mexico and other regions where CIMMYT works. CSISA-MI phase funder for further scaling of mech. business model. See reports of GIZ projects in Ethiopia, FACASI in ESA, CSISA and CSISA-MI in South Asia	
PIM	F1	Foresight models and results are used by 12 regional and national research organizations or government agencies in Africa, Asia and Latin America and global development organizations as inputs to their priority-setting	The capacity of researchers to use foresight tools and results has been improving steadily. Many reports and articles have been produced by CGIAR centers on this topic in the past years. Engagement with USAID and other donors on use of foresight modeling for future investments as well as engagement with the National Economic and Development Authority in the Philippines are two examples of use of the foresight work by government and global development organizations.	Foresight models are used within CGIAR to help set priorities at Center, CRP, and System level	Complete		Outcome template "Influencing policies for improved food security and adaptation to climate change in the Philippines"	https://doi.org/10.1016/j.gfs.2018.08.002
PIM	F1	Studies on policies, regulations, and investment in support of agricultural science, technology, and innovation are used by key government entities in 3 CGIAR countries	Progress towards the development of functional biosafety systems has occurred. While most countries demonstrated significant regulatory progress, including a reported outcome in Malawi, a few continued to advance slowly, due to structural issues, contradictory political support, and a general lack of funding. Significant progress was made towards improving extension methods used by implementing organizations. The Developing Local Extension Capacity project supported studies on the impact of digital extension in Uganda and Ethiopia to inform these countries' reforms of their extension systems. Research on the volunteer farmer trainer approach has led to a wider use of this approach in East Africa.	In 3 countries, major constraints to adoption of technology and promising innovations to overcome them are identified with national stakeholders	Complete		Biosafety system in Malawi - Outcome template	https://marlo.cgiar.org/projects/PIM/studySummary.do?studyID=2653&cycle=Reporting&year=2018

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PIM	F1	Budget allocations for agricultural research exceed projections of the 2012-2016 trend in 5 CGIAR countries of collaboration	The Agriculture Science and Technology Indicators (ASTI) initiative launched its new strategy focused on countries/regions taking ownership of their data, analysis, and outreach. The partnership with Asia-Pacific Association of Agricultural Research Institutions aims to raise funding for agricultural research in Southeast Asia. An evaluation shows that ASTI supported increased investment in agricultural research by several governments (e.g. Brazil, Ghana, Pakistan). In India ASTI was integrated into the governments science and technology information management system. ASTI contributed to two World Bank investment plans, the West Africa Agricultural Transformation Project and the Agricultural Productivity Program for Southern Africa.	Studies on impacts from increased investment and capacity in national agricultural research are used to support two regional research investments by multilateral donors	Complete		(1) World Bank West Africa Agricultural Transformation Project; (2) World Bank investment Agricultural Productivity Program for Southern Africa (Angola and Lesotho approved in 2018); and (3) Progress at national level: evaluation finds ASTI outputs influential in budgetary decisions on agricultural R&D in Algeria, Brazil, Ethiopia, Ghana, Nepal, Pakistan, Uganda	http://projects.worldbank.org/P164810/?lang=en&tab=overview*
PIM	F2	Governments in at least 3 countries use tools and evidence on the economy-wide factors affecting rural transformation to develop policies that are better targeted towards raising agricultural growth and rural incomes	Ethiopia's Ministry of Planning has requested economywide modeling support for national planning processes. Multiple interactions have taken place with the Federal Ministry of Agriculture and Rural Development in Nigeria to support the Agricultural Promotion Policy. A public event in Accra led to discussions on priority policy and investments in the Ghanaian cocoa sector. PIM collaborated with ministries of agriculture in Rwanda and Malawi to support the development of 2018 National Agricultural Investment Plans. Policy options for cassava and sunflower have also been shared with the Government of Tanzania.	Evidence on viable entry points for integrating research into the policy process used in multistakeholder fora in 2 countries	Complete		Ethiopia, Nigeria, Ghana Malawi, Rwanda - Outcome template "PIM's modeling expertise used to support the design of the agricultural investment strategies of Malawi and Rwanda	http://essp.ifpri.info/2017/12/19/the-future-of-ethiopias-agriculture-towards-a-resilient-system-to-end-hunger-and-undernutrition/

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PIM	F2	Governments in at least 3 CGIAR countries of collaboration use empirical evidence and quantitative methods to modify their allocation of public resource towards better targeted investments favoring inclusive agricultural growth and rural transformation	USAID adopted PIM's estimates in the US Global Food Security Strategy. IFAD uses PIM's Rural Investment and Policy Analysis model model to design country investment strategies. The World Bank used Statistics on public expenditures for economic development (SPEED) in a book which informed development operations in African countries. Work is ongoing with the Bill & Melinda Gates Foundation to enhance the prioritization of Tanzania's Agricultural Sector Development Programme budgeting. Malawi and Rwanda's National Agriculture Investment Plans used PIM's research to identify priority value chains. PIM research on public expenditures led to changes in China's agricultural expenditures.	Tools and databases on public expenditure are used by policy analysts in 2 global, regional, and national institutes to assess investment options of governments	Complete			https://openknowledge.worldbank.org/handle/10986/25996
PIM	F2	Governments in at least 3 CGIAR countries of collaboration use empirical evidence and quantitative methods to modify their allocation of public resource towards better targeted investments favoring inclusive agricultural growth and rural transformation	PIM works with the Government of Malawi and donors to improve service delivery in extension. In Pakistan, Senior Education Department officials expressed interest in scaling-up ICT techniques based on PIM research on randomly-allocated school inspections and improved teacher performance evaluations. Other work with World Bank reviewed service institutional innovations to improve delivery. Finally, PIM research on effectiveness of public expenditure, described above, also generates useful insights on service delivery modalities.	Tools and databases on public service delivery are used by analysts in 2 global, regional, and national institutes to assess service delivery modalities of governments	Complete		(1) Outcome template "Informing the Government of Flanders' investment in agricultural advice services to Malawian farmers" and (2) Joint article between IFPRI and the World Bank	https://marlo.cgiar.org/projects/PIM/studySummary.do?studyID=2677&cycle=Reporting&year=2018

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PIM	F3	Evidence is used to support changes in trade policy and/or regulations with global and regional implications in 3 instances	After supporting the trade negotiations between the EU and the Southern African Development Community and the Economic Community of West African States (ECOWAS), research is focusing on intra-regional integration in Africa. Research has contributed to the trade talks and outcomes of the ECOWAS-Morocco agreement. The UN-ECA is using a PIM methodology in guidelines for countries in the new continental trade agreement. Work on impact of the US-China tensions on LAC was presented in Argentina and Costa Rica, leading to demand from these countries for assistance in understanding the impact of the US-China tensions on their economies.	Evidence is used to support changes in trade policy and/or regulations with global and regional implications in two instances (cumulative total)	Complete		(1) West Africa - EU Economic Partnership Agreement; and (2) African Continental Free Trade Area	https://pim.cgiar.org/pim-outcome-notes/ag-incentives-consortium-improves-global-data-on-agricultural-policies/
PIM	F3	Research and development organizations use PIM tools to address postharvest losses in 10 countries	The PIM tools for assessing food loss in the value chain are now being disseminated through the FAO Technical Platform on the Measurement and Reduction of Food Loss and Waste. A next important step is to track the use of these tools. PIM studies on the extent of losses have led to studies of interventions to reduce losses in Ecuador (potato), Ethiopia (maize), and Guatemala and Honduras (beans), co-funded by PIM.	Postharvest losses are assessed for additional commodities and countries, leading to further actions to address major losses in 3 countries	Complete		The countries in which postharvest losses are assessed are Ecuador, Ethiopia, Guatemala and Honduras. * FAO Technical Platform on the Measurement and Reduction of Food Loss and Waste * PIM webinar "Measuring food losses: a new methodology" * Blog post presenting the new methodology to measure food losses	http://www.fao.org/platform-food-loss-waste/food-loss/food-loss-measurement/ifprimethodology/en/
PIM	F3	Research and development organizations use PIM tools for value chain analysis and development in 20 instances in 6 countries	Distortions in 9 value chains in 4 countries have been analyzed: sheep value chain in Ethiopia, goats value chain in Ethiopia, ethanol-molasses-sugar value chain in India, groundnut value chain in India, rapeseed value chain in India, palm oil value chain in Nigeria, cocoa value chain in Nigeria, maize value chain in Tanzania, groundnut value chain in Tanzania. Interventions to improve value chains using PIM tools are ongoing in Honduras (beans and coffee), Ghana (cocoa), Kenya (maize), and Pakistan (wheat), and additional projects are beginning in 2019.	The main distortions or weaknesses in international and national markets and priority interventions for 5 additional major value chains in countries are identified	Complete		Distortions and interventions have been identified for the following value chains: sheep in Ethiopia, goats in Ethiopia, ethanol-molasses-sugar in India, groundnut in India, rapeseed in India, palm oil in Nigeria, cocoa in Nigeria, maize in Tanzania, groundnut in Tanzania. * Tokgoz, Simla; and Majeed, Fahd. Measuring distortions to agricultural incentives for value chain analysis: Evidence from Indian value chains. * Innovation "Value chain nominal rate of protection": * Discussion paper "Measuring	https://doi.org/10.1111/1477-9552.12305

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							distortions along Tanzanian agricultural value chains" (2018):	
PIM	F3	Implementation partners in three countries use analysis of approaches to scaling to increase numbers of beneficiaries by 50% in designated projects	A review of the market system development approach found that rigorous evaluation of the approach was lacking. The research team then agreed to look more broadly into other scaling approaches to assess their relevance for value chain interventions. The approach used by PIM to disseminate lessons on value chains to partners for scaling changed in 2018, from a focus on value chains hubs (evaluated as lacking effectiveness in representing all centers) to dissemination through the Tools4valuechains website and direct interactions with major implementers.	Analyses of scaling models for value chain are shared with key actors in value chain development	Extended	Research/science	After conducting a review, the team agreed that it was important to consider other scaling approaches before embarking on dissemination. * Osorio-Cortes, Luis E.; Lundy, Mark (2018). **Behaviour Change Scale-Up in Market Systems Development: A literature review.** International Food Policy Research Institute, 79 p.	https://cgspace.cgiar.org/handle/10568/100158
PIM	F3	New insurance products are being used by smallholder farmers in 3 countries	New insurance products developed by PIM are currently being used by smallholder farmers in India (picture based insurance (PBI) and Kenya (a product that insures a loan replayment against weather related losses). In addition, dissemination of findings about picture-based insurance have led to plans to test PBI in Ethiopia and Kenya.	Use of insurance products developed by PIM expands in 1 country	Complete		See here for a description of the work in two new countries, Ethiopia and Kenya:	http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/133017

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PIM	F4	Improved social protection innovations provide food security and nutrition benefits to poor households in 3 countries	Social protection modalities are being tested to study the impact of transfers and complementary nutrition programs in Bangladesh, Ethiopia, Egypt, and Mali. In Bangladesh, the Improved Maternity and Lactating Mothers Allowance Program pilot phase was designed to test how cash transfers, food transfers, and/or nutrition behavior change communication affect newborn health and nutrition. Evidence from Egypt showed positive effects on diets for the poor from rolling back broad food subsidies in favor of targeted cash transfers. The Jigisémèjiri cash transfer program in Mali added preventive nutrition packets in randomly-assigned villages; effects will be tested using endline data from 2018.	New social protection implementation mechanisms are tested in 3 (cumulative total) countries	Complete			https://marlo.cgiar.org/projects/PIM/studySummary.do?studyID=2661&cycle=Reporting&year=2018
PIM	F5	Evidence informs natural resource governance and tenure policy processes/implementation in 12 countries	PIM research led to inclusion of tenure in the German Development Agency (GIZ)'s forest restoration projects in Ethiopia and Madagascar. In India, Foundation for Ecological Security (FES) uses PIM evidence to secure communities' rights to the commons. PIM tools are used for rangeland management in Tanzania and Ethiopia. In India, games for collective action are used in the Promise of Commons initiative led by FES. A PIM methodology is used by International Land Coalition (ILC) to build effective coalitions. Formal linkages are established with ILC through Collaborating for Resilience. MOUs on restoration were signed with FES by IFPRI and CIFOR.	Evidence on tenure security synthesized and tailored to different regions and contexts is used by research and implementation partners in 3 countries	Complete		Ethiopia, Madagascar (summary of workshop with GIZ to present research results and integrate them into new investments) and Tanzania	https://academic.oup.com/ajae/article/100/3/931/4781351
PIM	F5	Evidence informs natural resource governance and tenure policy processes/implementation in 12 countries	Tools with contribution of PIM have been used in the Joint Village Land Use Planning approach in Tanzania and in the Participatory Rangeland Management approach in Ethiopia. The PIM games for collective action have been used in the Promise of Commons initiative in India led by Foundation for Ecological Security. The PIM methodology for multistakeholder approaches to resource management is used by International Land Coalition in several countries to build effective coalitions.	The toolbox of methods for landscape governance is used by researchers and development practitioners in 3 countries	Complete			https://cgspace.cgiar.org/handle/10568/89927

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PIM	F5	Evidence informs natural resource governance and tenure policy processes/implementation in 12 countries	Formal linkages have been established with the International Land Coalition through Collaborating for Resilience. (Collaborating for Resilience, an approach developed with PIM support, provides a structured framework for understanding stakeholder interactions and organizing for social and institutional change.) Memoranda of Understanding have been signed with Foundation for Ecological Security by IFPRI and CIFOR for collaborative work on restoration of degraded lands. Pilot studies to track implementation of the African Union Land Declaration are being implemented with the Africa Union and the United Nations Economic Commission for Africa in four countries (Madagascar, Malawi, Rwanda and Tanzania).	Formal mechanisms are established for CGIAR to provide analytical support to key tenure and resource policy processes at regional and country level	Complete			http://www.landcoalition.org/sites/default/files/documents/resources/ilc_case_study_c0166_africa_en.pdf
PIM	F5	Improved landscape-level governance arrangements are implemented in 6 countries, with more productive and equitable management in at least 2	Collaboration between PIM and LIVESTOCK on implementation of tools for improved rangeland management in Tanzania and Ethiopia led to lessons that are ready for scaling up. A partnership with FTA and WLE on landscape restoration was launched. PIM, FTA, and WLE are developing a partnership with FES on the Promise of the Commons initiative to restore 20 million acres of land in India. FTA and PIM plan to support implementation of the Government of Ethiopia's Forest Act. PIM leads cross-CRP work to synthesize lessons on multistakeholder platforms. A synthesis of lessons on games for collective action is planned for 2019.	Collaborative research among CRPs leads to key lessons in at least 3 countries	Complete		(1) PIM webinar "**Innovations to help secure pastoral land tenure and governance**" (PIM and LIVESTOCK); (2) A meeting between PIM, FTA, and WLE generated lessons that could be applied to **support landscape restoration initiatives and (3)** These lessons were applied at a meeting to develop a **multi-CRP/center collaboration** with Foundation for Ecological Security	https://pim.cgiar.org/files/2019/03/PIM Webinar-Flintan-ppt.pdf

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PIM	F6	National researchers use improved gender research methods in 5 countries	By 2018, 86 organizations in 53 countries have used some form of the Women's Empowerment in Agriculture Index. PIM has partnered with FAO to develop statistics presented in the Gender and Land Rights Database, which is widely used by decision makers. PIM researchers have conducted research employing improved gender research methods with researchers from Data Analysis and Technical Assistance Ltd. (DATA) in Bangladesh. Researchers from all CGIAR centers have used the WEAI and/or other PIM gender research methods. All centers refer to the PIM-developed Standards for Collecting Sex-Disaggregated data. The Gender Platform's annual conferences and webinars disseminate gender research methods.	Researchers from all CGIAR centers use PIM gender research methods and guidelines	Complete		(1) **WEAI** Resource Center; (2) The database on use of WEAI notes use of WEAI by 10 centers. Use of WEAI or other PIM **research methods by other centers** can be found at the following links (Evidence link 3); AfricaRice (**4**), CIMMYT, CIP, and Bioversity International (**5**), ICRISAT (**6**) CIFOR and Bioversity International (**7**), FAO Gender and Land Rights Database (**8**), Gender Platform conferences and webinars (**9**), Standards for Collecting Sex-Disaggregated Data (PIM product) (**10**)	http://weai.ifpri.info/
PIM	F6	Gender dimensions of policies are strengthened in 4 countries	Research on the effects of cash transfers on intimate partner violence in Mali and Bangladesh contributed to a synthesis paper and have been disseminated in those countries and globally. Recommendations related to women's empowerment have been disseminated to the Ministry of Finance of the Russian Federation (a net aid donor to many Central Asian countries) to inform Russia's foreign aid strategy. The policy implications of PIM's work on rural women and decent employment in Egypt were shared in an FAO-ICARDA workshop attended by participants representing various governmental agencies; another workshop with the Department of Agriculture is planned for 2019.	Gender equity-enhancing recommendations from case studies are synthesized and discussed with policy makers in 4 (cumulative total) countries	Complete		Mali, Kyrgystan, Egypt and Bangladesh	http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/133031

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PIM	F6	Indicators of women's empowerment in agriculture increase in 3 countries	PIM researchers work with implementation partners to measure women's empowerment and test interventions that aim to improve it. Research is undertaken to understand how women's empowerment can be strengthened (e.g. in Colombia and Nicaragua on decision making roles) and on interventions that aim to enhance women's empowerment (e.g. in Uganda value chains). In addition, the researchers have enabled a long list of organizations to use the WEAI to diagnose specific areas of dis-empowerment, leading to piloting of interventions designed to overcome them (e.g. in Bangladesh and Bolivia) or to develop strategies and policies (e.g. USAID country plans).	Research on effective interventions for empowering women in agriculture is used by 4 (cumulative total) implementation partners	Complete		(1) Bangladesh and Bolivia, improvements in women's empowerment through interventions informed by WEAI results, outcome template and (2) Interventions to increase women's participation in sugar marketing tested with Tropical Bank and Kakira Sugar Limited; and (3) Colombia and Nicaragua, research examines women's participation in decision making in climate change adaptation	https://marlo.cgiar.org/projects/PIM/studySummary.do?studyID=2680&cycle=Reporting&year=2018
RICE	F1	F1 Outcome: Foresight analyses and priority setting used by RICE and partner scientists to develop and target technology options	Official document from Andhra Pradesh, India, State Level Coordination Committee on Crop Insurance (SLCCI) in 2018 mentioned IRRI Satellite based rice monitoring system to be used to support the 'Pradhan Mantri Fasal Bima Yojana' (PMFBY) crop insurance program for paddy. SLCCI is a legal entity in India responsible for elaborating and implementing crop insurance schemes in that state. IRRI's key partner in Tamil Nadu, Tamil Nadu Agricultural University, registered as member of the State Level Coordination Committee on Crop Insurance. This allow for continued contribution of satellite-based rice monitoring technology in the PMFBY crop insurance program.	2018 - 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	Complete			http://news.irri.org/2017/02/satellite-based-monitoring-system-to.html

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RICE	F1	F1 Outcome: Improved role in decision making by women and youth in rice value chains as evidenced by empowerment measures at key action sites	Evidence in Ecuador for female participation in adoption and sowing of improved rice varieties. In Cote d'Ivoire and Madagascar empowering the rural women not only make them economically empowered, but also help them to get credit for productive work. In Nigeria, it is possible for women to run profitable businesses, but some constraints remain: lack of awareness, skills, capital, basic business tools/equipment and the perception of gender-specific nature of some activities.	2018 - 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	Complete			https://cgspace.cgiar.org/handle/10568/78294
RICE	F1	F1 Outcome: Well-functioning multistakeholder platforms for innovation at six action sites (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	The Economic Rice Observatory has incorporated additional indicators to track rice value chain information and withdraw policy lessons across the region. This initiative is supported by the Latin American Confederation of Entities of Rice (CELARROZ) which is interested into diverse market-related research topics. Well-functioning multi-stakeholder innovation platforms (IP) with active local IP coordination and facilitation teams have been established in Nigeria, Benin, Uganda and Madagascar. IPs have also been initiated in Senegal, Ghana and Cote D'Ivoire and are being facilitated to refine their governance structures. Key lessons on IP governance published in peer-reviewed journal articles.	2018 - Establishment of a formal Economic Rice Observatory to provide policy briefs to the FLAR member countries	Complete			https://flar.org/
RICE	F1	F1 Outcome: New cadre of young, well trained scientists (30% women) engaged in rice research	558 scholars (47% female) were enrolled in long-term degree programs. Around 75,000 people (37% female) participated in short-term training courses and capacity-development events.	2018 - 250-300 scholars (30% women) enrolled in advanced degree training (bachelors, masters, PhD)	Complete			http://www.grisp.net/file_cabinet/folders/270452

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RICE	F1	F1 Outcome: Effective public and private delivery systems for seeds of improved rice varieties in six countries (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	18 tons of foundation seed delivered to seed smaal and medium enterprises for onward multiplication to certified seed which will eventually be made available to farmers. With an expected production of 1,080 tons of certified seed this can potentially reach 43,200 farmers. Seed and variety dissemination roadmaps were developed for Burkina Faso, Gambia, Guinea, Mali, Nigeria, Sierra Leone, Ethiopia, Uganda and Madagascar. In Cote d'Ivoire and Guinea, 20 tons of quality seeds were produced and disseminated. In Bangladesh, in 2017-2018 8.7 ton seeds of improved and stress-tolerant rice varieties were distributed to 2000 farmers.	2018 - 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	Complete			https://www.researchgate.net/publication/326263766_Impact_of_Submergence-Tolerant_Rice_Varieties_on_Smallholders'_Income_and_Expenditure_Farm-Level_Evidence_from_Bangladesh
RICE	F1	F1 Outcome: Impacts and adoption of RICE technologies assessed	See sections on MELIA in RICE synthesis report. Examples: The use of recommendation provided by the Rice Crop Manager (RCM) by farmers resulted in income gains of 100-200 US$/ha in Asia, with about 1.3 M recommendations in Philippines and 55,000 in India. The RiceAdvice in Sub-Saharan Africa has been used about 40,000 times. In Africa, the adoption of the 'smart-valley approach' increased yield by 0.9 t/ha and income by 267 US$/ha. Surveys conducted among rice chain actors in the Bouake region of Cote d'Ivoire revealed that about 44% of farmers have adopted/used at least one variety from AfricaRice in 2018.	2018 - Adoption and impact studies on NRM technologies and/or varieties - rolling plan based on progress of technologies along the impact pathway	Complete			https://csisa.org/wp-content/uploads/sites/2/2018/12/CSISA-III-BD-NP-USAID-annual-report_2017-18.pdf

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RICE	F1	F1 Outcome: Functional and effective results-based management system for RICE and its partners	The RICE CRP has adopted in 2018 the MARLO system as platform of management information system for planning and reporting. MARLO Training for senior RICE staff was organized during the MELIAG workshop in September, 2018. The RICE progress indicator report was completed in 2018 and is now available at www.grisp.net. IRRI initiated an institute wide impact oriented Monitoring and Evaluation strategy (IOMEL). The strategy is still at its early stage of implementation. On September 3-6, 2018 the Monitoring Evaluation, Learning, impact assessment and gender annual workshop was held in Bangkok.	2018 - Annual updates of progress and performance indicators; reflective learning workshops; commissioned reviews and evaluations (rolling plan)	Complete			https://marlo.cgiar.org/Rice/crpDashboard.do?edit=true (accessible to RICE members)
RICE	F2	F2 Outcome: Diversified enterprise opportunities through upgraded value chains at six action sites (Indonesia, Myanmar, Vietnam; Cote d'Ivoire, Nigeria, Tanzania)	This milestone has made significant progress in West Africa but has been extended because not all the sites have been covered particularly in East Africa. Also, one of the scientists involved in this task resigned and has just been recently replaced.	2018 - Upgrading strategies developed with partners for increasing value capture by actors in three action sites	Extended	2. Financial	Insufficient finances to complete. Also, one of the scientists involved in this task resigned and has just been recently replaced.	
RICE	F2	F2 Outcome: 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)		2018 - Rice market value captured by women scale-processors increased thanks to the improved parboiling system introduced for rice products diversification in Cote d'Ivoire.	Extended	2. Financial	Insufficient finances to complete. Also, one of the scientists involved in this task resigned and has just been recently replaced.	

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RICE	F2	F2 Outcome: 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)		2018 - Opportunities for youth engagement in agribusiness services provision identified along the rice value chain in Côte d'Ivoire.	Extended	2. Financial	Insufficient finances to complete Also, one of the scientists involved in this task resigned and has just been recently replaced.	
RICE	F2	F2 Outcome: 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)	The development of the improved parboiling technology called Grain quality-enhancer, Energy efficient and durable Material (GEM) parboiling technology and piloting in sites in West Africa reduced losses and increased the value of rice by adopters. The coupling of the GEM technology to a rice husk gasifier to create the Mini-GEM has increased the value of rice husk in sites by using it as a parboiling fuel. This activity has been extended because publications on this are being prepared.	2018 - At least two loss reduction or value addition options identified and piloted	Extended	4. Internal resources	Lack of internal resources (personpower; finances)	
RICE	F2	F2 Outcome: Functional value chains for improved processing and novel products from rice at six action sites (Bangladesh, Cambodia, Indonesia; Benin, Cote d'Ivoire, Nigeria)	Prototypes of grain quality-enhancer, energy efficient and durable material (GEM) parboiling technology using rice husk as fuel and rice husk gasifier stoves for household use with increased gas burning time have been developed. However, testing has been done only for Mini-GEM system in Cote d'Ivoire. Therefore, this activity has been extended to allow for testing in other sites in West and East Africa.	2018 - Prototype improved processing and novel products developed and tested at six action sites	Extended	4. Internal resources	Lack of internal resources (personpower; finances)	

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RICE	F3	F3 Outcome: 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)	Crop management practices for enhancing rice yield identified in Africa including (1) fertilizer application (Nitroge, Phosphorus, Potassium; micro-nutrients, zinc, gypsum), (2) water management, and (3) other crop management. Effect of phosphorus and sulphur application on yield and nitrogen use efficiency confirmed, and technologies for improving phosphorus cycling tested in Madagascar. Farmers reached in Asia for improved management practices for irrigated lowland rice increased from 379,000 in 2017 to 612,800 in 2018. Of these 125,000 have reduced their yield gap by 10%.	2018 - Integrated management options identified for reducing yield gaps at six action sites (Nigeria, Senegal, Madagascar, Bangladesh, Myanmar, Indonesia)	Complete			https://doi.org/10.1016/j.geoderma.2018.11.036
RICE	F3	F3 Outcome: 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)	Situations of fertilizer recommendations for rice-based systems in SSA including Senegal reviewed, and farmers' inputs use including fertilizer quantified in West Africa. Nutrient (NPK) gap for rice yield quantified in Africa. Baseline input use efficiencies quantified, and constraints and opportunities identified using SRP standard/performance indicators in Nigeria. In Vietnam and Myanmar, outreach of increased input use efficiency has been mediated through two World Bank projects that require farmer organizations to meet best practice guidelines before they can avail of financial support for machinery and infra-structure.	2018 - Baseline input use efficiencies quantified, and constraints and opportunities identified at six action sites (Nigeria, Senegal, Madagascar, Vietnam, Indonesia, Myanmar)	Complete			https://doi.org/10.1007/s10333-018-0649-8

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RICE	F3	F3 Outcome: Options to diversity 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)	Promising diversification options identified in Cote d'Ivoire, Madagascar, Rwanda, Senegal. Rice-legumes rotation systems (pigeon pea, mung bean, and stylosanthes) tested, Cote d'Ivoire. Over 10 short duration vegetables and legumes identified for further development of rice-veg systems in Madagascar. A multi-criteria approach revealed the best rotation options for upland rice ecological intensification in Madagascar. Stylosanthes managed as a living mulch in rice crops showed to be less competitive while controlling the striga. Introduction of cover/relay crops after wet season rice on the hydromorphic plains, rainfed lowlands and irrigated scheme in Cambodia. Research on rice-fish systems established at three sites Myanmar.	2018 - Options for farm diversification developed and tested at four action sites (Cote d'Ivoire, Madagascar, Bangladesh, Myanmar)	Complete			http://www.tropentag.de/2018/abstracts/links/Rajaona_ux7lSiYh.pdf
RICE	F3	F3 Outcome: 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 Madagascar	2018 - Baseline on-farm diets characterized at three action sites (Madagascar, Bangladesh, Myanmar)	Extended	4. Internal resources	Partially completed (Madagascar only)	
RICE	F3	F3 Outcome: Improved rice management practices that reduce GHG by 5% disseminated at three action sites (Bangladesh, Philippines, Vietnam)	Promotion of rice management practices, particularly alternate wetting and drying, in Vietnam, Philippines, and Bangladesh, will lead to reduced emission of the greenhouse gas methane as well as to reduced water use.	2018 - Improved rice management practices that reduce GHG emissions demonstrated in Vietnam	Complete			https://csisa.org/wp-content/uploads/sites/2/2018/12/CSISA-III-BD-NP-USAID-annual-report_2017-18.pdf

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RICE	F3	F3 Outcome: 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)	Predictors of drought in inland valleys and enabling factors for rice farmers' mitigation measures identified in Nigeria. Options for reducing risks caused by climate change identified in Africa including Senegal and East Africa. Development of a hydraulic and agronomic model to support the design and assess a water control facility based on bunded plots with drain/canal system (CAD) for lowland rice in Burkina Faso. IRRI with national agencies of Bangladesh demonstrated strategic land-use pattern and improved water governance to increase resilience against climate change.	2018 - Options for reducing risks caused by climate risks identified at six action sites (Senegal, Madagascar, Vietnam, Indonesia, Myanmar)	Complete			https://doi.org/10.3390/su11010079
RICE	F3	F3 Outcome: 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)	A gender-neutral mechanical weeder for reducing labour identified in Africa. Seeders and 1 fertilizer seed applicator identified which can reduce at least 60% of labor input in Madagascar. Locally manufactured motorized weeder developed that can reduce labor inputs by 80% per cropping season in Africa. In Bangladesh, women have taken lead to be service provider for mechanical harvesting of rice in polders. Laser leveling and mechanical transplanter were identified as new mechanization options in Bangladesh and Philippines.	2018 - Prototype labor-saving technologies identified at two action sites (Madagascar, Myanmar)	Complete		-	https://doi.org/10.1017/S001447971700059X

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RICE	F4	F4 Outcome: Predicted global rice production risks used to guide development and targeting of climate change-adapted technologies at least for the most vulnerable rice agroecosystems	Sequenced Antenna panel distributed to Global Array sites, covering climate vulnerable areas. Effects of climate change on rice production in Africa have been determined and the Distribution of abiotic stresses (drought, cold, Fe toxicity, salinity /sodicity) in Africa was mapped. TPE for upland systems in Brazil were mapped and the impact on breeding evaluated. The antenna panel was sent to countries that cover a wide difference in climate/management and soils. Array sites in southeast Asia, Myanmar and some locations in India were differentiated by high yield potential, presence of abiotic stresses, and high diversity of diseases and pests.	2018 - Global array refined based on preliminary results to capture major TPEs (target populations of environments of breeding programs) and major climate trend scenarios	Changed	4. Internal resources	Staff turnover eliminated the capacity to do modelling and TPE definition within the RICE –CG partners. Fewer sites in the global array than initially planned (due to reduced funding) and departure of GIS and crop modelling specialists.	https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.13967
RICE	F4	F4 Outcome: A functional global phenotyping network composed of 30% non-CRP partners (including self-sponsored), and genetic donors (>10) and ideotypes (2-4) adopted by breeding programs to develop climate-smart rice varieties	Reference panel running in Africa (Senegal and Cote d'Ivoire), Colombia (Palmira), Raipur (India-self sponsored), Yezin (Myanmar), Los Banos and Iloilo (Philippines - self sponsored) Dissemination of drone-base technologies across array sites (India - self sponsored, Colombia, Cote d'Ivoire).	2018 - (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 mechanisms/tools are in place	Extended	4. Internal resources	The full establishment of a drone-based phenotyping platform was delayed either because (i)a strong regulation of drone-base technologies in some countries, (ii) the delay in obtaining the necessary hardware, desktop, GPS platform for planning and operation of field mapping and image processing (iii)late hiring of the plant phenotyping specialists.	
RICE	F4	F4 Outcome: Characterized pathogens populations and diversity used to predict varietal deployment for at least 3 major rice diseases	Different diagnosis tools for Rice Yellow Mottle Virus, blast and bacteria were developed and tested in Africa and Asia. And a Diagnosis web platform developed. Genotypes with increased resistance to blast were generated in Africa. And Maps to guide the deployment of lines were generated.	2018 - Spatial distribution of pests and diseases and deployment of available isolines completed in at least 60% of the target sites	Changed	2. Financial	Due to lack in common operational funding and communication there has not been a common strategy between Coa 4.1 and pathologist to tackle the 3 diseases in the target sites. We will do a workshop to build a common strategy in specific sites where bilateral funding is available	https://www.biorxiv.org/node/137320.abstract

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RICE	F4	F4 Outcome: At least 5 major QTLs/genes that are stable across environment and management, for all rice mega-environments, integrated in the respective varietal development pipelines	Genome-Wide Association Mapping analyses accomplished on GRISP global phenotyping data with interesting regions identified for yield, cold and other traits. AMMI model used for G x E analysis combined with Genome-Wide Association Mapping. Work in progress in Africa for salinity, anaerobic germination and drought	2018 - Value added to candidate genes from Global Phenotyping Network GWAS through postGWAS analyses with data curated.	Complete		Sequencing data aligned to Nipponbare reference genome and SNPs called at high density. With the availability of higher depth genotype data where HDRA genotypes were imputed with 3K genotypes to 5.2M SNPs, analyses of the GRISP phenotyping panels are being revisited to improve the accuracy and power.	
RICE	F4	F4 Outcome: A functional rice data hub providing open access phenotypic and genotypic information and data analysis tools for users worldwide	The components of the rice hub are implemented already. In the pilot stage are the database (GIGWA) and analysis workbench (Galaxy). Already available is the FP4 project website that provides download links to genotype/phenotype datasets and relevant meta-data from FP4. Electronic field books created and staff trained for automated data capture and upload. We will include additional Genome-Wide Association Mapping tools recently benchmarked to be better than existing one installed (FarmCPU). (b) (c) is also still under active development	2018 - (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 and HDRA data.	Changed	1. Research/science	Restructuring of FP activities	
RICE	F5	F5 Outcome: Rice diversity in rice gene banks used globally for identification of traits and discovery of new genes	New donors for seedling-reproductive stage salinity, stagnant flooding, sheath blight, rice yellow mottle virus, rice tungro bacilliform virus identified. Genomic regions for anaerobic germination, sheath blight, Jasmonic Acid root response, panicle architecture, rice hoja blanca virus, striga identified. Blast resistant Pta gene cloned. 6 new constructs based on dCAS9 developed for manipulation of rice root system and gene networks.	2018 - 20% of targeted traits/donors/QTLs/genes identification achieved	Complete			

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RICE	F5	F5 Outcome: Novel tools for precision biotech breeding based on genetic diversity shared open access and globally	Deployment of high-value genes for disease, abiotic stress, grain quality and other characters into IRRI 154. Developed genomic prediction (GP) model to estimate accession performance. 332 diagnostic SNPs were identified that clearly discriminated between the three indigenous Africa species complex. Role of AG04 gene validated for resistance against virus through gene editing. Plants edited for the TDF1 gene showed 100% sterile pollen, in the case of the EA gene, the edited plants did not show the expected phenotype. Two CRISPRs were designed to edit the gene GN1A	2018 - Models and computational methods to characterize inter(sub) specific mosaic structure of rice genomes and its impact on traits transmission	Complete		IRRI,-List of current QTL Deployment products is available at this link (IRRI intranet only). IRRI, CIRAD- genomic predictions in use in GS breeding program AfricaRice identified SNPs in use in current studies.	https://link.springer.com/article/10.1007/s11032-018-0885-z
RICE	F5	F5 Outcome: New rice varieties resulting in 1.3 % genetic gain in intensive systems	Elite germplasm characterized. Breeding cycle reduced to 4 years with potential to reduce to 2 years in a few years Multiline variety for true genes of blast resistant with an Indica Group rice IR 64 genetic background. Product profiles for replacing dominant irrigated lowland varieties were developed for 16 African countries; Rapid generation Advance system in Ndiaye, Senegal delivered 80,000 F2s, 50,000 F3s and 14,000 F4s. Six new improved rice varieties were released for irrigated rice in Latin America (Nicaragua, Panama, Costa Rica, Honduras, Guyana, Venezuela)	2018 - 25-50 New rice varieties for intensive system	Complete		IRRI: 384 lines tested globally. 2,000 more predicted. 50 lines advanced to MET team. Breeding lines available for use. AfricaRice: tables with product profiles are available. Other activities continue each year using new sets of germplasm.	

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RICE	F5	F5 Outcome: 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	Climate smart multiple stress tolerant varieties released in Asia. Genetic gain for yield under irrigated control, moderate drought and severe drought analyzed. Breeding lines with adaptation to low soil fertility selected in farmer's fields in Madagascar: Uplands - 22 F7 lines, lowlands - 16 Pup1 lines. Rapid Generation Advance System has been established for rainfed upland, rainfed lowland and high elevation ecologies, five lines with more than 30% yield advantage over FARO 44 and another five lines with over 36% yield advantage over the best check FARO 67 were identified. Corpoica Porvenir 12 for uplands llanos of Colombia released	2018 - 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	Complete			https://doi.org/10.1186/s12284-019-0269-y
RICE	F5	F5 Outcome: High quality and high nutritious rice varieties that are preferred by men and women farmers and consumers	Phenotyping methods estimated for capturing cooking quality traits and defined genetic regions. Diagnostic markers developed for use in forward breeding to improve Zinc content in rice and MAGIC lines identified with enriched Zn. Studies on consumer preferred grain quality traits in Benin identified that for domestic rice, grain length should be increased (3.2mm) and chalkiness and amylose contents should be reduced (16-18% and 22%, respectively).A diverse panel of 209 genotypes was sown in Palmira in an alpha-lattice design with three replications. Quality traits were measured (apparent amylose content, gelatinization temperature and grain chalkiness). Marker genotyping and validation underway.	2018 - Novel tools and processes to capture specialty traits developed at key action sites to minimize chalk, enhance head rice recovery, capture cooking quality	Complete		(1) R.P.O. Cuevas, C.J. Domingo, N. Sreenivasulu. Multivariate-based classification of predicting cooking quality ideotypes in rice (Oryza sativa L.) indica germplasm. Rice 11(1): 56, 2018 (2) G. Misra, et al. Deciphering the genetic architecture of cooked rice texture. Frontiers in Plant Science 9:1405, 2018.	https://www.doi.org/10.1186/s12284-018-0245-y
RICE	F5	F5 Outcome: Prototype C4 rice lines with increased yield potential available	Rice lines generated containing 10 C4 genes	2018 - 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	Complete		None	

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RTB	F1	Outcome 1.1: For each RTB crop, populations with at least 3 endusers preferred traits and adapted to 2 targeted regions are available (For more details please refer to Table FP1.4)	RTB breeding programs are implementing a stage-gate approach to advance breeding lines, based on defined product profiles with clear targeted agronomic and quality traits (http://excellenceinbreeding.org/blog/a pplying-stage-gates-better-managepublic-breeding-programs). RTB varieties selected with superior performances compared to local checks, while maintaining good quality traits for consumer acceptability, are being advanced to multilocation trials prior to official release. This includes IITA improved cassava varieties and new lines from the Nextgen project in Nigeria, potato lines from CIP in Ethiopia, Kenya, Uganda and Rwanda, and Mchare and East African Highland Bananas (EAHB) from IITA in Uganda and Tanzania. In addition, the RTB Foods project is defining the critical traits for quality of 11 processed products for all RTB crops, in order to develop high throughput screening assays for critical end-user preferred quality traits.	Successful application of genomic mapping and editing tools documented in at least three RTB crops	Extended	Evidence presented for 2 (banana and cassava) out of 3 crops. Milestone has been exteded to complete an additional crop.	Using genomic approaches, a number of genome wide associations and implementation of genomic selection were documented in 2018. Genome-Wide Association Study of Resistance to Cassava Green Mite Pest and Related Traits in Cassava. Found QTL markers for several traits related to green mite resistance cassava-genomic mapping. Training Population Optimization for Prediction of Cassava Brown Streak Disease Resistance in West African Clones Applied genomic selection and improved predictions by applying different strategies, such as including published QTLs in the models. Genomic Prediction in a Multiploid Crop: Genotype by Environment Interaction and Allele Dosage Effects on Predictive Ability in Banana. Genomic selection models applied to predict traits in banana. Fruit filling and fruit bunch traits had the highest predictive ability. The results demonstrate that genomic prediction in multi-ploidy population is possible and the prediction accuracy can be improved by using models based on data from many different environments.	https://doi.org/10.2135/cropsci2018.01.0024
RTB	F1	Outcome 1.2: Across RTB crops, average 25% reduction of time needed for traits discovery and incorporation into breeding pipelines	Trait dictionaries have been developed for agronomic traits and are now being developed for more qualitative traits arising from Participatory Variety Selection trials. These are converted into ontologies and incorporated into the RTB databases to allow data collection and analysis (www.rtbbase.org). The digitization of breeding data collection and analysis is accelerating and enhancing breeding activities.	Harmonized protocols and trait dictionaries including gender-responsive scoring for Participatory variety selection (PVS) have been validated and are available for uptake.	Complete		Trait dictionaries for Participatory Variety Selection, including gender-responsive scoring, have been incorporated into the crop ontology platform	http://www.cropontology.org/

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RTB	F1	Outcome 1.2: Across RTB crops, average 25% reduction of time needed for traits discovery and incorporation into breeding pipelines	Trait dictionaries have been developed for agronomic traits and are now being developed for more qualitative traits arising from Participatory Variety Selection trials. These are converted into ontologies and incorporated into the RTB databases to allow data collection and analysis (www.rtbbase.org). The digitization of breeding data collection and analysis is accelerating and enhancing breeding activities. Functional genomic techniques (RNA transcriptomics, protein proteomics, and metabolite metabolomics) are accelerating the discovery of candidate genes for important traits such as drought stress tolerance in banana and sweetpotato. The data provide a resource for geneticists and breeders toward identifying and utilizing drought tolerance genes.	Harmonized protocols and trait dictionaries including gender-responsive scoring for Participatory variety selection (PVS) have been validated and are available for uptake.	Complete		Functional genomics studies accelerate the discovery of candidate genes involved in complex traits such as drought tolerance that could be used in breeding pipelines. Trait dictionaries for Participatory Variety Selection, including gender-responsive scoring, have been incorporated into the crop ontology platform: http://www.cropontology.org/ Functional genomics studies accelerate the discovery of candidate genes involved in complex traits suchs as drought tolerance that could be used in breeding pipelines: Van Wesemael et al., 2018. Homeolog expression analysis in an allotriploid non-model crop via integration of transcriptomics and proteomics. Scientific Reports 8:1353 and Lau et al., 2018. Transcriptomic analysis of sweet potato under dehydration stress identifies candidate genes for drought tolerancees in sweet potato. Plant Direct 1-13.	https://doi.org/10.1038/s41598-018-19684-5

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RTB	F1	Outcome 1.3: Conservation status of wild relatives and landraces of at least 3 RTB crops improved in 3 key hotspots	Updated checklists of Crop wild relatives (CWRs) and landraces in hotspots for the RTB crops have been generated. Rapid assessment surveys were carried out in different hotspots. For banana, in Papua New Guinea (PNG), 158 and 80 landraces were identified in two diversity hotspot sites. For cassava, in the two diversity sites in Peru (North and South Corridors) the surveys revealed a total of 410 and 392 landraces. As in the case of PNG for bananas, there was a lot of overlaps in naming of the landraces. For potato, an inventory of two Peruvian potato diversity hotspots was provided in 2017, revealing a total of 542 and 188 potato landraces in the two sites. In 2017, the checklist of yam CWR and landraces in Benin was based on georeferenced occurrences of Dioscorea rotundata (Guinea yam) and its two wild relatives D. praehensilis and D. abyssinica and 469 landraces were identified.	A conceptual framework for monitoring in-situ conservation of RTB crops diversity has been validated and a prototype developed	Complete		The methodology of participatory monitoring has contributed to build the conceptual framework. A prototype Global in situ Information System has been developed, and data for banana collected by teams in Papua New Guinea (PNG) and for potato in Peru have been uploaded on the website to test the import process, the user interface and display. Plasencia, Franklin; Juarez, Henry; Polreich, Severin; De Haan, Stef. (2018). Evaluación de la distribución espacial de la biodiversidad de papa en los distritos de Challabamba en Cusco y Quilcas en Junín mediante el uso del mapeo participativo = Assessment of the spatial distribution of potato biodiversity in the districts of Challabamba in Cusco and Quilcas in Junín through the use of participatory mapping. Revista del Instituto de Investigaciones de la Facultad de Geología, Minas, Metalurgia y Ciencias Geográfica, 21(41): 17-24	https://hdl.handle.net/10568/97454
RTB	F1	Outcome 1.6: Enhanced capacity in genomic selection and advanced breeding methods of at least 150 R&D partners, of which at least 30% are female, through short and long-term trainings	Genomic selection and genomics-assisted breeding is being piloted across the RTB program, in banana, cassava, potato, sweetpotato and yam. Projects combine breeding with genomics, with several R&D partners each, that are being capacitated in genomics-assisted breeding and advanced breeding methods. The partners include NRCRI and EBSU (Nigeria), WACCI, CRI and CSIR (Ghana), Makere U, NARO and NaCRRI (Uganda), TARI and NM-AIST (Tanzania), and CNRA (Cote d'Ivoire), where staff and students are being capacitated.	Partner institutions identify at least 20 candidates (at least 30% female) for advanced training on breeding tools	Complete		See Table 7 on Capacity development activities. Also, four capacity development workshops were reported under Output DI1.1.1.3 representing specific training on a banana breeding tool, BTracT, and sessions on sweetpotato breeding data management tools and genomic assisted breeding included 24 females and 35 males from NARS programs.	

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RTB	F2	Outcome 2.1: 20,000,000 people (4,000,000 HH), of which 50% are women, increased their annual income by increasing RTB sales and diversifying market strategies	Training and support of smallholder seed multipliers in potato, sweetpotato, banana and cassava are ongoing in more than 20 countries in several projects, with all of them having a large proportion of women producers. Moreover, the seed producers are linked to ware producers that themselves are linked to markets such as sweetpotato purée processors. Consequently, the RTB seed value chains are both contributing to improved yields from access to improved varieties with clean planting material, but also allowing the growth of product value chains dependent not only on raw material, but access by RTB crop producers to quality planting material of the appropriate varieties.	Rapid multiplication techniques for seed/planting material validated and framework to support best fitting options for different seed multipliers categories developed	Extended	Milestone extended, as the rapid multiplication techniques are further validated and compared for best fitting options.	Milestone extended, as the rapid multiplication techniques are further validated and compared for best fitting options.Publications made by: Harahagazwe, D. et al, Bentley, J.W et al, as well as assessed in previous years: Mignouna, Djana. Researchers employ Semi-Autotropic Hydroponics (SAH) technology to speed up multiplication of cassava planting materials. Other rapid multiplication coming from CIAT: Castañeda-Méndez et al. Harahagazwe, D.; Andrade-Piedra, J.L.; Parker, M.; Schulte-Geldermann, E. 2018. Current situation of rapid multiplication techniques for early generation seed potato production in Sub-Saharan Africa. Lima (Peru). 46 p. RTB Working Paper. ISSN 2309-6586. no.2018-1. Bentley, J.W.; Andrade-Piedra, J.L.; Demo, P.; Dzomeku, B.; Jacobsen, K.; Kikulwe, E.; Kromann, P.; Lava Kumar, P.; McEwan, M.; Mudege, N.; Ogero, K.; Okechukwu, R.; Orrego, R.; Ospina, B.; Sperling, L.; Walsh, S.; Thiele, G. 2018. Understanding root, tuber, and banana seed systems and coordination breakdown: a multi-stakeholder framework. Journal of Crop Improvement. ISSN 1542-7528. Published online 18 Jun 2018:23 p. https://hdl.handle.net/10568/93374 Assessed in previous years: Mignouna, Djana & Akinola, Adebayo A. & Abdoulaye, Tahirou & Maroya, Norbert, 2016. "Economic impacts of yam productivity research in West Africa: A case of YIIFSWA Project," 2016 Fifth International Conference, September 23-26, 2016, Addis Ababa, Ethiopia	https://hdl.handle.net/10568/96609

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							246453, African Association of Agricultural Economists (AAAE). Researchers employ SAH technology to speed up multiplication of cassava planting materials. Other rapid multiplication coming from CIAT: Castañeda-Méndez, O., Ogawa, S., Medina, A. et al. In Vitro Cell.Dev.Biol.-Plant (2017) 53: 75.	
RTB	F2	Outcome 2.2: At least 5,000,000 HH increased their annual RTB yield by at least 10%	Improved RTB-bred varieties (or locally-bred varieties that used RTB material in the crosses) with superior performance and important disease resistances are being released in target regions of the RTB program. Estimates of adoption of cassava varieties in nine countries in South and Southeast Asia indicate that 2.7 million hectares (65% of total area) are grown using CIAT-related varieties. In 2018, a study in Southeast and South Asia showed CIP-related varieties adopted on 19% (7.4M ha in 7 countries; estimated 3M households) of the area under improved potato and on 5% (0.14M ha in 8 countries) of the area under improved sweetpotato varieties. In West, East, Central and Southern Africa, improved cassava, banana, plantain, yam, potato and sweetpotato varieties are being evaluated and released, having higher yields and resistances to major diseases.	Five potato varieties recommended for release in Rwanda and Kenya	Complete		21 potato clones that CIP shared with Rwanda Agricultural and Animal Resources Development Board (RAB) were grown for several seasons at 10 sites scattered across Rwanda, to test their disease resistance and adaptation to the country's varied climates and soils. Farmers evaluated their agronomic, cooking and table qualities while processing companies tested their suitability for potato chip and crisp production. The top 5 clones are expected to be released in 2019. In Tanzania, 3 of 14 clones brought into the country by the International Potato Centre (CIP) for field trials in Lushoto district did well and two of them will soon be released. These are Unica, locally known as Mkanano, and Shangii. They will be released to farmers for cultivation after proving resilience to climate vagaries. The third variety, Mvono, is now with the Tanzania Official Seed Certification Institute (Tosci) for national performance trials in the southern highlands regions. In Kenya, results of Advanced Yield Trials (AYT) realized by the Kenya Agricultural and Livestock Research Institute (KALRO) were published	https://cipotato.org/blog/growing-farmer-incomes-with-better-potato-varieties-in-rwanda/

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							in 2018. From AYT, 18 clones were selected, 11 of them good for crisping. These clones were recommended for the National Performance Trials (NPT) before release of new varieties. Among the five high yielding clones, four of them had a CIP clone as the female parent.	
RTB	F2	Outcome 2.2: At least 5,000,000 HH increased their annual RTB yield by at least 10%	Large numbers of improved EAHB banana varieties are in the pipeline, having high yields and resistances to diseases that cause strong yield losses. The varieties are in different stages of evaluation, and as they are released and adopted, this will result in more HH with increased yields.	Matoke hybrids (more than two hundred) evaluated in different locations and by consumers	Extended	Several hundred hybrids are being evaluated at different locations but not all have been evaluated by consumers yet. Evaluation is an ongoing process.	IITA and NARO gained momentum in breeding EAHB and Mchare hybrids with resistance to several pests and diseases as part of the consortium **Breeding Better Bananas**. 216 Matooke hybrids have been selected from Early Evaluation Trials and in a ground-breaking achievement, the first Mchare hybrids were planted into the field; 542 hybrids from 2042 crosses are currently being evaluated, while 79 doubled chromosome Mchare plants were generated. The first joint preliminary yield trial evaluation by NARO and IITA of independently developed hybrids is also in progress with 92 hybrids. Consumer acceptability of Matooke hybrids is ongoing and so far, 5 Matooke hybrids have been found to be acceptable.	http://breedingbetterbananas.org
RTB	F2	Outcome 2.2: At least 5,000,000 HH increased their annual RTB yield by at least 10%	Sweetpotato varieties continuously released in East and South Africa with drought tolerance and high yields. Trials have shown high yield increases and good consumer acceptability. As these varieties increase in their adoption, the number of HH with increased yields will grow.	Interactive web-based catalog of sweetpotato varieties accessible to farmers, seed producers, breeders, and researchers	Extended	Milestone extended as catalog is being finalized.	Milestone extended as catalog is being finalized.	

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RTB	F2	Outcome 2.3: Targeted breeding programs increased by 10% the diversity of the genetic base used (e.g. number of banana wild species used as parental lines)	A diversity panel representing the Musa diversity in the IITA collection was screened for Xanthomonas resistance. Resistance was found in two subspecies of M. acuminata which can be used in breeding of bananas and plantains. Potato lines incorporating bacterial wilt resistance derived from wild potato species have been used to develop breeding populations now being screened in Kenya. Likewise, potato late blight resistant populations were derived from 7 wild species, and another 7 species were used for introgressing drought tolerance. In the yam breeding program, about 15% of the parents used in crosses are landraces and/or genebank accessions. Crossing studies have been carried out between 9 closely related wild species in sweetpotato, to inform future pre-breeding approaches. Moreover, 2 wild species have been identified with resistance to the most severe virus disease in sweetpotato, SPVD, which can be used as sources of resistance in breeding.	Gender-differentiated users-need and preferences for trait selection assessed in collaboration with FP4 and results communicated to orient breeding programs	Complete		A baseline study was carried out in Uganda and Tanzania. The understanding gained from the baseline research will be fed into the banana breeding pipeline at multiple entry points to assist with breeding banana cultivars that better meet the requirements of the users, including participatory varietal selection taking into account the criteria (or 'trait preferences') that are important to multiple and different users. Crichton, R., Madalla, M., Ainembabazi, J.H., Caron, C., and Van den Bergh, I. 2018. Understanding the agricultural production systems and their socio-economic context in target regions for the introduction of new banana cultivars - Baseline intra-household survey – Summary charts and tables. Bioversity International, Montpellier, France. 72p. A study by IITA on gender-differentiated user needs of cassava showed that the difference between cassava trait preferences expressed by women and men mostly related to the expertise they have on cassava-related work. Although women mentioned processing-related traits more often than men, this appeared to be related to their higher involvement in processing. Teeken, B., O. Olaosebikan, I. Haleegoah, E. Oladejo, T. Madu, A. Bello, E. Parkes, C. Egesi, P. Kulakow, H. Kirscht and H.A. Tufan. 2018. Cassava trait preferences of men and women farmers in Nigeria: implications for breeding. Economic Botany 72(3), pp. 263–277	https://doi.org/10.1007/s12231-018-9421-7

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RTB	F2	Outcome 2.4: Annual production of at least one nutrient-rich RTB crop increased by 5-10% in 10 targeted countries	CIP breeding programs continue releasing new Orange-fleshed sweetpotato (OFSP) varieties in Africa, having high yields and good organoleptic properties, including a new variety in Nigeria, Solo Gold. In addition, potato breeding lines biofortified for iron and zinc have been distributed to Ethiopia, Buthan, Kenya, Rwanda and India for evaluation and variety selection. In Nigeria, cassava lines biofortified for pro-Vit A have been selected from advanced yield trials across several locations to be targeted for final release, having high carotenoid and high dry matter content. In addition, the IITA plantain breeding program has incorporated high pro-VitA diploids from Papua New Guinea in the breeding strategy aiming for pro-VitA improvement. Testing of high Pro-VItA banana types in DRC and Burundi identified several varieties with consumer acceptability for subsequent dissemination.	Clones of nutrient-rich potatoes and cassava evaluated in 5 countries.	Extended	Milestone extended as nutrient-rich varieties are still under evaluation.	Two potato varieties with high levels of iron and zinc released in Bhutan in 2014 and 2017. In 2018, 57 new advanced clones with high levels of iron and zinc, high yield and resistance to late blight and PVY virus were selected and included in the CIP catalogue. These were already dispatched to Ethiopia, Bhutan, Kenya, Rwanda and India for evaluation and variety selection. In Nigeria, 33 genotypes selected from different advanced yield trials across several locations have been identified as potential pipeline genotypes targeted for final release, having high carotenoid content and high dry matter content. Some of these genotypes are already been rapidly multiplied using SAH technique to make provision for enough planting materials ready to go into on-farm trials for final release. Milestone extended as nutrient-rich varieties are still under evaluation.	
RTB	F2	Outcome 2.5: Capacity to deal with climate risks and extremes increased for at least 1,000,000 HH	Resilience to climate change, especially heat and drought are important targets in RTB breeding programs. An automated phenotyping facility has been set up to screen banana genotypes for drought tolerance, and screening protocols are being perfected. Varieties are being released and further developed with resistances to diseases that will be affected by climate change (e.g. late blight in potato, and CMD and CBSD viruses in cassava). In addition, potato varieties with increased heat tolerance have been tested and released in dry hot areas of India and heat tolerant lines have been identified in sweetpotato for inclusion in breeding programs.	Breeding populations showing improved resilience under future climates identified for inclusion in breeding programs	Extended	Milestone extended because development of breeding populations with improved resilience for future climates is a continous activity, with new material being developed and incorported into breeding programs continously	Milestone extended because development of breeding populations with improved resilience for future climates is a continous activity, with new material being developed and incorported into breeding programs continously	https://doi.org/10.5897/JDAE2017.0877

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RTB	F2	Outcome 2.6: At least 35% increase in number of female and young beneficiaries of at least 500,000 HH perceive to have better control over assets and resources	Recent gender analysis of sweetpotato vine multiplication interventions in Malawi identified gender-based constraints where the institutional contexts were detrimental to women leading to them not being able to fully and independently adopt the technologies. Therefore, scaling up strategies to promote technology adoption by women should go beyond the technology itself to restructuring both the technical and nontechnical aspects of agriculture so that women can fully benefit from improved technologies. In addition, a study in Nigeria identified gender-based constraints affecting the production, processing and marketing of biofortified cassava in two states. The study proposes integration of gender-responsive strategies to further enhance the delivery of biofortified cassava products in Nigeria. Both studies contribute to develop more equitable strategies for gender-responsive delivery strategies. Understanding specific and unique constraints for men and women in different contexts is therefore important for crop breeders, extension officers and delivery managers to work more effectively with regards to impact on productivity, income, food and nutrition security.	Baseline of gender roles in seed multiplication and/or crop production and/or varietal selection available in two countries/crops	Complete		Mudege, N.; Torres, S.. 2017. Gender mainstreaming in root tuber and banana crops seed systems interventions: identification of lessons learnt and gaps. Lima (Peru). 35 p. RTB Working Paper. ISSN 2309-6586. no.2017-2. Tufan, H.A. et al, Lunt, T.et al, Okello, J.J et al Mudege, N.; Torres, S.. 2017. Gender mainstreaming in root tuber and banana crops seed systems interventions: identification of lessons learnt and gaps. Lima (Peru). 35 p. RTB Working Paper. ISSN 2309-6586. no.2017-2. Tufan, H.A.; Grando, S. and Meola, C. (Eds.). 2018. State of the Knowledge for Gender in Breeding: Case Studies for Practitioners. Lima (Peru). CGIAR Gender and Breeding Initiative. Working Paper. No. 3. Lunt, T., Ellis-Jones, J., Mekonnen, K., Schulz, S., Thorne, P., Schulte-Geldermann, E. and Sharma, K. 2018. Participatory community analysis: Identifying and addressing challenges to Ethiopian smallholder livelihoods. Development in Practice 28(2):208-226. Okello, J.J.; Lagerkvist, C.J.; Kakuhenzire, R.; Parker, M.; Schulte-Geldermann, E. 2018. Combining means-end chain analysis and goal-priming to analyze Tanzanian farmers' motivations to invest in quality seed of new potato varieties. British Food Journal. ISSN 0007-070X 120: 7. p.1430-1445	https://hdl.handle.net/10568/92819

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RTB	F2	Outcome 2.7: Regulatory frameworks for seed production and seed quality control (including QDS) under implementation in10 countries	The review and development of regulatory frameworks are conducted in collaboration with National Seeds Authorities and regulatory bodies. With the assistance of RTB centers, seed regulatory frameworks are being adjusted for RTB crops. The potato seed production regulation in Peru now includes a new seed category based on Quality Declared Seed. In Nigeria, a draft framework for certification by the National Agricultural Seeds Council (NASC) of cassava and yam seed produced by novel rapid multiplication methods was developed. In Tanzania, the Tanzania Official Seed Certification Institute (TOSCI) worked closely with IITA to develop and implement guidelines for the certification of cassava 'seed', which have been officially appended to the Seed Act. A 5-year action plan has been developed, so TOSCI can sustainably manage quality within the cassava seed system in Tanzania.	Analysis of regulatory frameworks for seed production and seed quality control (including QDS) documented in two countries	Complete		Work in collaboration with the Tanzania Official Seed Certification Institute to develop the 5-YEAR Action Plan for Cassava Seed Certification in Tanzania. (See Table on Policies) Contribution to the new regulation promoted by the National Seed Authority under the Ministry of Agriculture in Peru to produce potato seeds. (See Table on Policies) In Nigeria, new quality standards for certification of cassava and yam planting material multiplied through novel high-ratio propagation methods have been drafted in collaboration with National Agricultural Seeds Council and National Root Crops Research Institute	https://mel.cgiar.org/reporting/download/report_file_id/12701
RTB	F2	Outcome 2.8: Every year, 8,000 R&D stakeholders (50% female) trained through short term programs on designing and implementing smallholder-oriented breeding programs and sustainable seed systems	In flaghsip 2, projects and initiatives ongoing in 15 countries (Burundi, Cameroon, Ethiopia, Georgia, Ghana, India, Kenya, Malawi, Mozambique, Netherlands, Nigeria, Peru, Tajikistan, Tanzania, Uganda) reported the implementation of long and short term trainings. More than 10,000 trainees participated of which about 47% were women.	Twenty individuals (50% female) trained through long term programs (e.g. MSc and PhD students)	Complete		See Table 7 on Capacity development activities 14 male PhDs, 14 femaie PhDs, 13 PhDs (gender not mentioned) 18 male MScs, 8 female MScs, 27 MScs (gender not mentioned) 94 total	

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RTB	F3	Outcome 3.1: In areas affected by pests and diseases, RTB yield restored to previous infection conditions by at least 1,500,000 farmer HH, of which at least 25% are female headed households	RTB is supporting National Plant Protection Organizations and other stakeholders for the development and deployment of integrated strategies (collaboration with FP1 and FP2) for containment and management of the most harmful pests and diseases. This includes work on: resistant varieties, accessibility to clean seed, enhancement of seed regulatory frameworks, adapted management practices, technology transfer. Current interventions include: bacterial Banana Xanthomonas Wilt (BXW) management in Uganda, Rwanda, Democratic Republic of Congo; development of viral Banana Bunchy Top Disease (BBTD) management approaches in Nigeria, Democratic Republic of Congo, Togo and Benin; regional plan to contain the spread of viral Cassava Mosaic Disease (CMD) in South-East Asia and facilitate knowledge and technology transfer from Africa; Biological control of cassava mealybug in Thailand; decision support tools, resistant varieties and clean seed to reduce the impact of bacterial wilt and late blight on potato production in Andean countries and East Africa; enhanced control of Potato Cyst Nematode (PCN) spread in Kenya through improved seed certification schemas.	A bio-rational formulation (AdiosMacho) to control two potato tuber moth species will be registered and available for commercialization by chemical companies	Complete		In 2018, the Peruvian Ministry of Agriculture officially registered AdiosMacho-Po® and AdiosMacho-St® (PQUA 2002 and 2003 SENASA) based on their efficacy and environmental safety. This allows CIP and interested commercial partners to initiate product commercialization in Peru. Product registration has been also requested by potato programs in Bolivia and Ecuador.	
RTB	F3	Outcome 3.2: 1,800,000 ha of current RTB production area converted to sustainable cropping systems	RTB is developing and promoting soil fertility management practices, water-efficient irrigation practices, weed management strategies together with digital decision support tools that may enhance the access of small-holder farmers to technical advices and valuable crop management knowledge. Examples of the ongoing interventions are: African cassava agronomy initiative in Nigeria and Tanzania; Sustainable weed management technologies for cassava systems in Nigeria; Improved soil fertility management for sustainable intensification in potato-based systems in Ethiopia and Kenya; Taking integrated crop management to scale in highland banana systems in East Africa.	Site-specific decision support tools for crop and soil fertility management have been validated under diverse agro-ecologies with extension agents and farmers	Extended	Six decision support tools (DSTs) for cassava agronomy have been tested with NARS, extensionist and farmers in Nigeria and Tanzania. The results and the validation of the modules are expected in 2019.	Six decision support tools (DSTs) for cassava agronomy have been tested with NARS, extensionist and farmers in Nigeria and Tanzania. The results and the validation of the modules are expected in 2019. The DSTs are on 1) fertilizer blending to obtain soil specific blends; 2) site specific fertilizer recommendations; 3) best planting practices to reduce cost on tillage while optimizing plant density and weed control; 4) intercropping to allow farmers the best choice of cassava growth type, plant density and fertilizer application when intercropping with maize, 5) scheduled planting; and 6) high starch content to advise farmers	

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							on the best time from planting and harvesting and on specific fertilizer application.	
RTB	F3	Outcome 3.3: Capacity to deal with climate risks and extremes increased for at least 1,000,000 HH	Effects of Climate Change on pest and disease (P&D) dynamics and spread are being assessed and Pest Risk Assessment (PRA) being developed for specific P&D x country combinations. Information generated through these studies are being shared with National Plant Protection Organizations in target countries in Africa, Asia and Latin America to improve the preparedness of national programs to manage biotic threats. Here, a non-exhaustive list of PRAs conducted: Potato: Phthorimaea operculella, Tecia solanivora, Symmetrischema tangolias x Africa; Tuta absoluta x Kivu Region Sweetpotato: Cylas puncticollis, Cylas brunneus, Acraea acerata x Africa Cassava: Green mites x Africa Banana: Xanthomonas Wilt of Banana, Banana Bunchy Top Disease (BBTD) and Fusarium Tropical Race 4 (TR4) x East and Central Africa	PRAs for invasive diseases to improve the preparedness of national programs to manage biotic threats of RTBs in target countries of Africa, Asia and Latin America	Extended	The following pest and disease risk assessments have been realized in 2018. Results have not been published yet.	The following pest and disease risk assessments have been realized in 2018. Results have not been published yet: - PRA for the bud midge Prodiplosis longifila for SSA countries; - PRA for P. longifila focused in Andean region; - PRA for potato psyllid focused in Andean region; - Xanthomonas wilt of banana risk map for Africa. Aregbesola, O.Z., Legg, J.P., Sigsgaard, L. et al. Potential impact of climate change on whiteflies and implications for the spread of vectored viruses. J Pest Sci (2018).	https://doi.org/10.1007/s10340-018-1059-9
RTB	F3	Outcome 3.4: New technologies and practices have been equally adopted women and men farmers	Gender-sensitive assessment of interventions implemented for disseminating pest and disease (P&D) management practices have been realized in Bacterial Xanthomonas Wilt (BXW) affected areas (see annual milestone). Data collection has been completed in nine pilot sites in Central and West Africa to understand intra-household, inter-household and community dynamics related to banana farming in viral Banana Bunchy Top Disease (BBTD) affected regions and these may influence the adoption of inclusive and sustainable BBTD management strategies.	Gender-responsive approaches for piloting and scaling BXW management practices have been applied in 2 countries.	Complete		Gender-sensitive assessment of interventions implemented for disseminatng BXW management practices have been realized in Uganda (published) and Burundi (publication in 2019) and guidelines on gender-responsive banana research produced. Kikulwe, E.M.; Okurut, S.; Ajambo, S.; Gotor, E.; Ssali, R.T.; Kubiriba, J.; Karamura, E. (2018). Does gender matter in effective management of plant disease epidemics? Insights from a survey among rural banana farming households in Uganda. Journal of Development and Agricultural Economics 10(3) p. 87-	https://hdl.handle.net/10568/91294

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							98. ISSN: 2006-9774 Rietveld, A. & Farnworth, C.R. (2018). Towards gender-responsive banana research for development in the East-African Highlands. GENNOVATE resources for scientists and research teams. CDMX, Mexico: CIMMYT.	
RTB	F3	Outcome 3.5: 25 National and 5 regional plant protection agencies with strategies for containment and management under implementation	RTB program participants are actively collaborating with National Plant Protection Organizations and National Agricultural Research Systems in several countries in Africa, Asia and Latin America. Support for the development of Pest Risk Assessment, capacity development on effective surveillance approaches and tools and development of affordable and effective pest and disease (P&D) diagnostic tools are among the key activities realized. Examples of fruitful collaborations are: the development of a regional plan to limit the spread of viral Cassava Mosaic Disease (CMD) in South-East Asia in collaboration with national stakeholders in the region; the definition of technical recommendations for containment of Panama Disease (FocTR4) in Mozambique – Ministry of Agriculture and Food Security – Republic of Mozambique; the definition of technical guidelines to prevent the spread of potato cyst nematode in Kenya – Kenya Plant Health Inspectorate Service (KEPHIS).	Cost effective diagnostic tools and protocols developed for at least 3 key pests and diseases	Complete		(1) A new set of five PCR primers for the unambiguous detection and identification of Xanthomonas vasicola pv. musacearum (Xvm) was developed and results published (2) A double-antibody sandwich (DAS) ELISA test for cassava common mosaic disease (CCMD) has been developed and validated in Argentina. Development of a duplex-PCR for differential diagnosis of Xanthomonas phaseoli pv. manihotis and Xanthomonas cassavae in cassava (Manihot esculenta). Carolina Flores, et al.,Development of a duplex-PCR for differential diagnosis of Xanthomonas phaseoli pv. manihotis and Xanthomonas cassavae in cassava (Manihot esculenta), Physiological and Molecular Plant Pathology, Volume 105, 2019, Pages 34-46, ISSN 0885-5765. Published online 2018, Printed 2019. A new set of PCR primers, based on the comparative genome analysis of full genome sequences of Ralstonia solanacearum, that allows for the specific detection of Phylotype II isolates in Musa spp. was developed. Publication is under review. Tools for diagnostic and molecular typing of Xanthomonas phaseoli	https://doi.org/10.1016/j.heliyon.2018.e01080

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							pv. manihotis (Xpm), which is the causal agent of cassava bacterial blight, has been developed using the Multi-Locus Variable Number of Tandem Repeat Analysis (MLVA). Publication is under review. Tools for diagnostic and molecular typing of banana wilt caused by Xanthomonas vasicola pv. musacearum (Xvm) has been developed using the Multi-Locus Variable Number of Tandem Repeat Analysis (MLVA). Publication is under review. A new isothermal recombinase polymerase amplification (Exo RPA and Basic RPA) assay has been developed for the detection of BBTV.	
RTB	F3	Outcome 3.6: Growing number of extension services (governmental org., NGOs and private sector) providing advice on improved ICM and IPDM	Crop management and P&D management practices are developed in collaboration with national partners in the public sector, private sector and with non-governmental organizations. Capacities of partners are strengthened to enhance the uptake of the new technologies and practices and to facilitate their integration in their own extension programs. Examples are: 1) ICT-based decision support tools to scale agronomic technologies and practices for cassava production developed by IITA in collaboration with Federal University of Agriculture (Nigeria), National Root Crops Research Institute (Nigeria), University of Agriculture (Nigeria). 2) Management practice based on Single Diseased Stem Removal (SDSR) for quick and effective banana recovery in Xanthomonas wilt (XW) affected regions developed and disseminated in collaboration with Catholic Relief Service, Food and Agriculture Organization, Ministry of Agriculture, Fisheries and Livestock (Congo DRC), National Agricultural Research Organization (Uganda), Plateforme Diobass au Kivu (Congo DRC). For more examples see Table of Innovations.	National partners from seven countries across sub-Saharan Africa have increased their ability to perform pest risk assessments in the face of climate change and global movement of pests	Extended		Trainings and on-the-job technical assistance have been provided for the following pest x countries combinations of National partners. An evaluation of the results of these capacity development activities should be performed before updating the status of this milestone. Banana Xanthomonas Wilt: Uganda, Burundi, Rwanda, Congo DRC Banana Bunchy Top Disease: Benin, Burundi, Cameroon, DRC, Malawi, Nigeria, Togo and Rwanda Potato late blight: Ecuador, Kenya Cassava Mosaic Disease: Cambodia, Laos, Vietnam, Thailand	

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RTB	F4	Outcome 4.1: 700,000 households, 25% of which are female headed, have increased their income by 15-20% by increasing and diversifying RTB sales (food, feed, industrial raw material and seeds)	RTB promote the development of inclusive value chains. Using Participatory Market Chain Approach (PMCA) several interventions have been designed in Latin America, Africa and Asia. In 2016, the approach was revisited to make it more gender-sensitive. Value chain assessments are also realized to orient future investment (e.g. cassava value chain in Asia, sweetpotato value chain in Rwanda, banana value chain in Uganda). See also outcome 2.1 (RTB crops and seed value chains)	Improved cassava varieties evaluated assessing their processing suitability for transformation in traditional products (gari and fufu) and high-quality cassava flour and processors' preferences assessed in 3 countries.	Complete		Research results document processing suitability of traditional, improved and biofortified cassava varieties (Colombia, Democratic Republic of Congo, plus review of studies conducted in Africa, America and Asia). Results obtained in Benin and Cameroun will be published next year. Development of a Novel Integrated Approach to Monitor Processing of Cassava Roots into Gari: Macroscopic and Microscopic Scales Impact of Environment and Genotype-by-Environment Interaction on Functional Properties of Amylose-Free and Wildtype Cassava Starches Pro-vitamin A Carotenoids Stability and Bioaccessibility From Elite Selection of Biofortified Cassava Roots (Manihot esculanta, Crantz) Processed to Traditional Flours and Porridges Comparing characteristics of root, flour and starch of biofortified yellow-flesh and white-flesh cassava variants, and sustainability considerations: a review Carotenoids retention in biofortified yellow cassava processed with traditional African methods	https://doi.org/10.1007/s11947-018-2106-5
RTB	F4	Outcome 4.1: 700,000 households, 25% of which are female headed, have increased their income by 15-20% by increasing and diversifying RTB sales (food, feed,	RTB promote the development of inclusive value chains. Using Participatory Market Chain Approach (PMCA) several interventions have been designed in Latin America, Africa and Asia. In 2016, the approach was revisited to make it more gender-sensitive. Value chain assessments are also realized to orient future investment (e.g. cassava value chain in Asia, sweetpotato value chain in Rwanda, banana value chain in Uganda). See also outcome 2.1 (RTB crops and seed value chains)	Biochemical traits for consumer preference and micronutrient profiles for RTB defined	Extended	Several analysis have been conducted in 2018 and results in potato and yam have been published.	Several analysis have been conducted in 2018 and results in potato and yam have been published. Alamu, E.O., Adesokan, M. & Maziya-Dixon, B. (2019). Calibration development for nutritional evaluation of yam (Dioscorea sp.) using near infrared	https://hdl.handle.net/10568/99197

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		industrial raw material and seeds)					reflectance spectrophotometry (NIRS). Cogent Chemistry, 5(1565623), 1-13. Sosa, P.; Guild, G.; Burgos, G.; Bonierbale, M.; Felde, T.zum. 2018. Potential and application of X-ray fluorescence spectrometry to estimate iron and zinc concentration in potato tubers. Journal of Food Composition and Analysis. (USA). ISSN 0889-1575. 70:22-27	
RTB	F4	Outcome 4.2: 20,000 small scale processors, 30 % of which are female, reduced water- and energy- related production costs by 15-20% in cassava sector with growing spillover in other RTB crops	Closely linked with the previous outcome. RTB is contributing in developing and promoting processed food and industrial products (e.g. high-quality cassava flour, cassava dried starch, orange-fleshed sweetpotato purée for baked products) and in adding value to by-products (e.g. high-quality cassava peels and sweetpotato silage for animal feeding). Interventions are ongoing in Colombia, Ghana, Malawi, Nigeria, Tanzania and Uganda.	More efficient processing technologies, supply chain management models, and waste management options tested in at least 3 countries	Complete		A prototype for an energy-efficient small-scale flash dryer has been tested in Colombia, Ghana, Nigeria, Tanzania. Improved energy performance of small-scale pneumatic dryers used for processing cassava in Africa Capacity building on dimensioning, designing and operating small-scale pneumatic dryers Dissemination workshop on pneumatic flash dryer for drying of high quality cassava flour	https://mel.cgiar.org/reporting/download/report_file_id/12873
RTB	F4	Outcome 4.3: Post-harvest physical and quality losses reduced in at least 10 countries through better post-harvest management, improved storage, and utilization of waste across RTB crops	Three technologies and practices are under different level of piloting and scaling in Colombia, Nigeria and Uganda. See milestone status for more details.	Locally-adapted and user-demanded post-harvest, storage, and waste utilization technologies and management options developed and tested in 3 countries	Complete		Three technologies and practices are under different level of testing in Colombia, Nigeria and Uganda. Utilization of cassava peels for animal feed is ongoing in Nigeria. Actions have been implemented to support the development of the value chain. Utilization of sweetpotato vines silage in Uganda has already been tested for pigs. In 2018, in collaboration with dairy farms, its use has been tested with cows. Initial assessment of utilization of plantain peels and cassava peels as substrate for commercial production of mushrooms started in Colombia.	

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RTB	F4	Outcome 4.4: Diet quality indices increased by 20% for at least 2,000,000 farmer households and urban/rural consumers	RTB supports the integration of biofortification and use of biofortified crops (OFSP, yellow cassava, Vit-A rich bananas, Fe & Zn dense potatoes) in national and regional policies, strategies and plans in Africa and Asia. Program participants, also in collaboration with HarvestPlus, are implementing intervention (at different stages of development) in more than 15 countries to make biofortified crops and derived nutrient-rich food products more accessible to farmer households and consumers. It's worth to mention that CIP is leading the SWEETPOTATO FOR PROFIT AND HEALTH INITIATIVE a multi-partner, multi-donor initiative that seeks to reduce child malnutrition and improve smallholder incomes in 10 million African families by 2020 through the effective production and expanded use of sweetpotato.	Techniques for inclusion of sweetpotato as an ingredient in commercially processed baked products (bread, cakes, other local wheat-based products) documented and training material for small scale processors of commercially viable OFSP based products produced	Extended	Training materials being prepared	Research in Rwanda demonstrated that OFSP purée can be an economically viable, vit.A enhancing ingredient in commercial baked products. A study on the level of compliance to good manufacturing practices and food safety standards in Kenya showed that special attention to hygiene, microbial quality, and safety of OFSP purée is needed. **Derick, N.M.; Muzhingi, T.; George, O.A. 2018.** Good manufacturing practices and microbial contamination sources in orange fleshed sweet potato puree processing plant in Kenya. International Journal of Food Science. ISSN 2356-7015. 2018(ID 4093161):11 p.	https://hdl.handle.net/10568/92955
RTB	F4	Outcome 4.5: At least 35% increase in number of women and youth beneficiaries in at least 200,000 HH who perceive to have better control over assets and resources	This is linked with Outcomes 4.1 and 4.3. To promote more gender-equitable control of productive assets and resources, RTB adopts gender-sensitive approaches 1) for assessing RTB value chains and 2) for designing inclusive value chain development interventions. Through the RTB Foods project, gender relevant traits of food products are being assessed to support the development of new varieties that meet women's needs in terms of processing quality. This is sought to enhance efficiency of transformation processes and enhance economic returns.	Approaches for developing more gender inclusive RTB value chains documented and translated in training materials and decision-support tools.	Complete		Reports and journal articles assessing inclusive value chain interventions have been published, inluding assessment of Participatory Market Chain Analysis in Uganda. Kikulwe, E.M.; Okurut, S.; Ajambo, S.; Nowakunda, K.; Stoian, D.; Naziri, D. Postharvest Losses and their Determinants: A Challenge to Creating a Sustainable Cooking Banana Value Chain in Uganda. Sustainability 2018, 10, 2381. Kharlyndoh, A.; Anantharaman, M.; Shanpru, E.; Naziri, D. 2018. Cassava production marketing and utilization in Meghalaya, India: results of a value chain assessment. Food Resilience through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific (FoodSTART+). International Potato Center (CIP). Laguna, Philippines. 90 p. Naziri, D.; Mayanja, S.;	https://hdl.handle.net/10568/97466

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							Ssemwanga, J.; Donovan, J. 2017. Approaches and tools for inclusive value chain development: lessons from Uganda for improved impact. Enterprise Development and Microfinance. ISSN 1755-1978. 28(4):323-341. Bocher, T.; Low, J.W.; Sindi, K.; Rajendran, S. 2017. Gender-sensitive value chain intervention improved profit efficiency among orange-fleshed sweetpotato producers in Rwanda. Open Agriculture. (Poland). ISSN 2391-9531. 2(1):386-393. Mendez del Villar, P., Adaye, A., Tran, T., Allagba, K., Bancal, V. 2017. Analyse de la chaîne de Manioc en Côte d'Ivoire. Rapport pour l'Union Européenne, DG-DEVCO. Value Chain. Analysis for Development Project (VCA4D CTR 2016/375-804), 157p + annexes Aung, M. 2018. Root and tuber crops: Untapped potential for food and nutrition security and rural livelihood development in Myanmar. Results of a scoping study. Food Resilience through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific (FoodSTART+). International Potato Center. 78 p.	

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RTB	F4	Outcome 4.6: Food-based nutrition programs/ initiatives promoting RTB crops under implementation in at least 10 countries	Linked with Outcome 4.4 Large initiatives such as SWEETPOTATO FOR PROFIT AND HEALTH INITIATIVE, Building Nutritious Food Baskets, FoodStart+, amongst others, are examples of the support provided in designing and implementing nutrition-sensitive agriculture and food systems interventions. RTB is playing an important role in providing scientific evidence of the crucial role of RTB crops in the diets of least development countries in sub-Saharan Africa, Asia and Latin America. The program and its program participants also intervene in the design, piloting and scale of these interventions. For example, in Uganda, school educational materials on OFSP were developed, and through active engagement with teachers and curriculum developers, the Ministry of Education and Sports approved the implementation of the curriculum. Books and support materials were produced. From a pilot of 56 schools, the program was expanded to 550 schools, with a target to reach 23,000 schools.	Protocols for nutrient and microbiological analysis applied to commercial sweetpotato products validated	Extended		Protocols developed and still under testing	
RTB	F4	Outcome 4.7: 60 development-focused organizations, including women's networks and alliances, having increased their capacity for innovation (e.g. enhanced human capital and improved collaboration network in relevant domains) to scale up fuller utilization of RTB	RTB is actively collaborating with more than 300 partners every year. Long-term and short-term trainings for different audiences (See Table 7) are regularly organized with the aim of enhancing trainees and organizations capacities to participate in innovation and scaling process and/or to effectively uptake and adapt new technologies. Furthermore, innovation and scaling are main topics addressed in Flagship project 5. FP5 supports, including through capacity development activities, other Flagships in strengthening partners' capacities for innovation. Six scaling projects have already been launched (15+ partners involved) and other ongoing projects have also been supported.	Capacity development activities and advocacy strategies implemented in Tanzania and Nigeria to include biofortification and use of biofortified crops in gender and youth sensitive policy documents (policies, strategies and plans) and into funded programs and projects.	Complete		Mulongo, G.; Maru, J.; Munyua, H.; Kasuga, R.; Olapeju, P.; Wende, M.; Rubyogo, J.C.; Gethi, J. 2018. The Building Nutritious Food Baskets Project 'Insights from the Field'. International Potato Center (CIP), Lima, Peru. 48 p.	https://hdl.handle.net/10568/98539

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RTB	F5	Outcome 5.1: Income increased by 20% for at least 550,000 HH	In order to increase household income, sustainable intensification options are being assessed with farmers. Household typologies and mutli-objective optimization processes were used to target and support smallholder farmers in identifying sustainable intensification options to reduce pest and disease pressure on RTB crops. Technologies developed in Flagships 2, 3 and 4 are used to enhance the basket of options for sustainable intensification and are being supported by bilateral initiatives such as the One-Acre Fund, Consortium for improving agriculturebased livelihoohds in Central Africa (CIALCA), Citizen Science and Information and Communication Technologies (ICT), and IFAD funded initiatives in Latin America.	Tools for assessing sustainability of SDI options along five dimensions (productivity, human health, social, economic and environmental) refined and tested in Uganda.	Complete		A multi-objective Pareto based optimisation process was designed and used to support smallholder farmers SDI undar banana Xantomonas wilt (BXW) pressure in Uganda. Jager, T. I. . (2018). Diverging perspectives on diversification: A multi-objective Pareto-based optimisation for smallholder farmers under banana Xanthomonas wilt (BXW) pressure in Uganda.	http://edepot.wur.nl/466127
RTB	F5	Outcome 5.1: Income increased by 20% for at least 550,000 HH	In order to increase household income, sustainable intensification options are being assessed with farmers. Household typologies and mutli-objective optimization processes were used to target and support smallholder farmers in identifying sustainable intensification options to reduce pest and disease pressure on RTB crops. Technologies developed in Flagships 2, 3 and 4 are used to enhance the basket of options for sustainable intensification and are being supported by bilateral initiatives such as the One-Acre Fund, Consortium for improving agriculturebased livelihoohds in Central Africa (CIALCA), Citizen Science and Information and Communication Technologies (ICT), and IFAD funded initiatives in Latin America.	Tailoring of sustainable intensification intervention based on farm typologies tested in at least one country.	Complete		Household typologies were used to target and promote sustainable uptake of BXW control practices among banana farming households in Uganda. Kikulwe, E.M., Kyanjo, J.L., Kubiriba, J., Gotor, E., Karamura, E. 2018. Utilization of household typologies for effective targeting, promotion and sustained uptake of BXW control practices among banana farming households in Uganda. Lima (Peru). CGIAR Research Program on Roots, Tubers and Bananas (RTB). RTB Working Paper. (under review)	

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RTB	F5	Outcome 5.2: Whole-farm productivity increased by 25% for at least 1,000,000 HH	Sustainable Diversification and Intensification (SDI) options were identified and analyzed with farmers and farmer communities in Uganda and Ethiopia to increase farm productivity. Findings show that in Central Africa the adoption of SDI technologies reduce the probability of being poor by 13%. A large share of this reduction (32%) can be attributed to improved crop varieties, 28% to post harvest technologies and 26% to crop and natural resource management. As research results emerge, other SDI alternatives will be analyzed with farmer communities and partner institutions.	Sustainable Diversification and Intensification (SDI) options identified with farmers and farm communities and expected effects on whole-farm productivity assessed in at least 2 countries	Complete		Sustainable Diversification and Intensification (SDI) options were identified and analyzed with farmers and farmer communities in Uganda and Ethiopia Jager, T. I. . (2018). Diverging perspectives on diversification: A multi-objective Pareto-based optimisation for smallholder farmers under banana Xanthomonas wilt (BXW) pressure in Uganda. Wossen, T., Gatiso, T.T. & Kassie, M. (2018). Estimating returns to fertilizer adoption with unobserved heterogeneity: evidence from Ethiopia. Food and Energy Security, 1-9. Ainembabazi, J.H., Abdoulaye, T., Feleke, S., Alene, A., Dontsop-Nguezet, P.M., Ndayisaba, P.C., ... & Manyong, V. (2018). Who benefits from which agricultural research-for-development technologies? Evidence from farm household poverty analysis in Central Africa. World Development, 108, 28-46. Alene, A., Abdoulaye, T., Rusike, J., Labarta, R., Creamer, B., del Río, M., ... & Becerra, L.A. (2018). Identifying crop research priorities based on potential economic and poverty reduction impacts: the case of cassava in Africa, Asia, and Latin America. PloS ONE, 13(8):e0201803, 1-18	http://edepot.wur.nl/466127

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RTB	F5	Outcome 5.3: Diet quality indices increased by 20% for at least 300,000 farmer households	RTB supports the integration of biofortification and use of biofortified crops (OFSP, yellow cassava, Vit-A rich bananas, Fe & Zn dense potatoes) in national and regional policies, strategies and plans in Africa and Asia. Program participants, also in collaboration with HarvestPlus, are implementing intervention (at different stages of development) in more than 15 countries to make biofortified crops and derived nutrient-rich food products more accessible to farmer households and consumers. Studies on the analysis of sustainable intensification strategies based on nutrition had positive reception from farmers and are being piloted as part of the SDI options.	Options for whole-diets improvements in RTB-related farming systems identified and assessed in 2 countries	Complete		Raneri, J. and Vogliano C. (2018). Using Nutrition as Entry Point to Identify Crops for Sustainable Intensification Strategies: A Solomon Islands Case Study. Bioversity International, Rome. Kennedy, Gina; Raneri, Jessica E.; Stoian, Dietmar; Attwood, Simon; Burgos, Gabriela; Ceballos, Hernán; Ekesa, Beatrice; Johnson, Vincent; Low, Jan W.; Talsma, Elise F. (2018). **Roots, Tubers and Bananas Contributions to Food Security Article**. Reference Module in Food Science, 1-26.	https://hdl.handle.net/10568/97427
RTB	F5	Outcome 5.6: At least 35% increase in number of female and young beneficiaries of at least 200,000 HH perceive to have better control over assets and resources	To better integrate the gender and youth dimensions in multiple RTB initiatives, capacity building was provided to researchers. Tools and method for gender responsive breeding, seed systems development, innovation design and deliver were developed and/or adjusted. Gender analysis is a core component in the assessment RTB value chains and intervention design. New innovations and scaling processes promoted by the new round of three scaling fund projects include a gender component to enhance gender equitable access to the innovation packages and their potential benefits.	Gender and youth dimensions better integrated in at least three scaling initiatives developed by RTB and partners.	Complete		Using the experience and material developed in collaboration with the "Gender Researchers Equipped for Agricultural Transformation" Program, RTB researchers provided capacity building to teams engaged with the CIALCA project in Africa. In parallel capacity building was provided to support the analysis of gender relevant data in different scaling projects implemented by CIP in Africa. Capacity building tools were developed to support gender responsive processes in the FoodSTART+ project and with partner institutions.	https://www.cialca.org/news/how-can-you-integrate-gender-and-nutrition-in-your-research/

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RTB	F5	Outcome 5.7: RTB delivery flagships and at least 55 research and development partner organizations with more gender-responsive planning and implementation processes, reflected in at least 5 additional collaborative arrangements with public sector and civil society organizations supporting gender transformation	RTB has allocated earmarked funding to support gender integration into delivery Flagships. Gender-responsive breeding is being addressed through methods and tools that help breeders identify and target gender disaggregated segments of the population and assess the traits being incorporated into new breeding products. Tools and method to enhance gender equitable seed system development are currently being piloted in different regions. More than 20 R&D partner organizations participated in the development of gender-responsive tools and methods and are committed to their use with their own partners. Participatory videos are used in local policy spheres to engage more public sector actors and civil society.	Policy dialogue promoted through video viewing events where policy makers are invited to ensure that young men and women's voices are heard when policies that affect them are being discussed.	Complete		A guide for facilitators for gender-responsive participatory videos was published and guided interventions and video recordings by farmers to esure that young men and women's voices are heard by policy makers at the local level. A sequence of viedos were made by young men and women to share with policy makers their perceptions, needs and the challenges they face. Kawarazuka, N.; Kharlyngdoh, A.; Marbaniang, E.; Syndor, A. 2017. Gender-responsive participatory videos: a guide for facilitators. Food resilience through root and tuber crops in upland and coastal communities of the Asia-Pacific (FoodSTART+). International Potato Center. 4 p.	https://www.youtube.com/watch?v=KNIKgqudXeQ
RTB	F5	Outcome 5.8: At least 66 cases where RTB crops/technologies are newly included in policies or programs executed by government agencies, NGOs, and/or private sector	Inclusion of RTB innovations in policies and programs from the public sector, NGOs and the private sector is being promoted. Examples of innovations are: new RTB varieties with nutrition potential, resistance to new and emerging pests and diseases, potential to climate change adaptation; crop management practices; post-harvest /processing technologies. Additionally, institutional (e.g. partnership models) and market innovations (e.g. gender-sensitive participatory market chain approach) are also being used beyond RTB interventions.	ICT tools to support decision making on disease prevention and management tested in at least two countries	Complete		Extensive analysis was conducted to understand the potential contribution of ICT tools for disease prevention and management. Based on this information a prototype ICT tool was designed to support disease diagnosis and management, while two others (NURU and PestDisplace) were developed and tested in different regions. McCampbell, M., Schut, M., Van den Bergh, I., van Schagen, B., Vanlauwe, B., Blomme, G., ... & Leeuwis, C. (2018). Xanthomonas Wilt of Banana (BXW) in Central Africa: Opportunities, challenges, and pathways for citizen science and ICT-based control and prevention strategies. NJAS-Wageningen Journal of Life Sciences, 1-12. Munthali, N., Leeuwis, C., van Paassen, A., Lie, R., Asare, R., van Lammeren, R. & Schut, M. (2018).	https://www.sciencedirect.com/science/article/pii/S1573521418301659

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							Innovation intermediation in a digital age: comparing public and private new-ICT platforms for agricultural extension in Ghana. NJAS-Wageningen Journal of Life Sciences. 1-13. Leeuwis,C., Cieslik, K.J., Aarts, M.N.C., Dewulf, A.R.P., Ludwig, F., Werners, S.E., Struik, P.C. (2018) Reflections on the potential of virtual citizen science platforms to address collective action challenges: Lessons and implications for future research. NJAS-Wageningen Journal of Life Sciences. 86-87.	
RTB	F5	Outcome 5.9: At least 1,500 research/development staff in RTB and in mixed-type partner organizations across prime target countries with strengthened research and innovation capacities including gender-responsive and transformative research	Please refer to Table 7: Participants in CapDev activities	Ten individuals (50% female) trained through long term programs (e.g. MSc and PhD students)	Complete		See Table 7 on Capacity development activities	
RTB	F5	Outcome 5.10: At least 5 partnerships and scaling models tested in a minimum of 5 target countries and adjusted to be fit for purpose	Partnerships and scaling models are being developed to enhance innovation processes for RTB crops. Models developed and tested in Rwanda, Burundi and Congo include: the new documentation and learning system for multi-stakeholder platforms in agricultural research for development (LESARD); social network analysis and Exponential Random Graph Modelling (ERGM) to optimize interventions in multi-stakeholder platforms; development of multi-stakeholder innovation networks. Models are currently being used to enhance the operation of bilateral projects operating in broader geographies including CIALCA, IFAD initiatives in Latin America, Citizen Science and ICT.	At least three case studies on the use of innovation platforms for the design and implementation of scaling process documented in 3 target countries	Complete		Several case studies on the use of innovation platforms were documented and analyzed in different countries Sartas M, Schut M, Hermans F, Asten Pv, Leeuwis C (2018) Effects of multi-stakeholder platforms on multi-stakeholder innovation networks: Implications for research for development interventions targeting innovations at scale. PLOS ONE 13(6): e0197993 Sartas, M. (2018) Do multi-stakeholder platforms work?:	https://doi.org/10.1371/journal.pone.0197993

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							contributions of multi stakeholder platforms to the performance of research for development interventions. Wageningen, WUR. Yami, M., van Asten, P., Hauser, M., Schut, M. & Pali, P. (2018). Participation without negotiating: influence of stakeholder power imbalances and engagement models on agricultural policy development in Uganda. Rural Sociology, 1-26. Schut, Marc, Kamanda, Josey, Gramzow, Andreas, Dubois, Thomas, Stoian, Dietmar, Andersson, Jens A., Dror, Iddo, Sartas, Murat, Mur, Remco, Kassam, Shinan, Brouwer, Herman, Devaux, André, Velasco, Claudio, Flor, Rica Joy, Gummert, Martin, Buizer, Djuna, Mcdougall, Cynthia, Davis, Kristin, Tui, Sabine Homann-Kee, Lundy, Mark. (2018). Innovation Platforms in agricultural research for development: Ex-ante Appraisal of the Purposes and Conditions Under Which Innovation Platforms can Contribute to Agricultural Development Outcomes. Experimental Agriculture, 1–22 p. Lamers, D., Schut, M., Klerkx, L. & van Asten, P. (2017) Compositional dynamics of multilevel innovation platforms in agricultural research for development. Science and Public Policy, 1-14	

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RTB	F5	Outcome 5.10: At least 5 partnerships and scaling models tested in a minimum of 5 target countries and adjusted to be fit for purpose	Partnerships and scaling models are being developed to enhance innovation processes for RTB crops. Models developed and tested in Rwanda, Burundi and Congo include: the new documentation and learning system for multi-stakeholder platforms in agricultural research for development (LESARD); social network analysis and Exponential Random Graph Modelling (ERGM) to optimize interventions in multi-stakeholder platforms; development of multi-stakeholder innovation networks. Models are currently being used to enhance the operation of bilateral projects operating in broader geographies including CIALCA, IFAD initiatives in Latin America, Citizen Science and ICT.	At least three ex-post impact assessment studies published.	Complete		Different studies trace the introduction of new technologies for RTB crops and show the interactions of CG centers with multiple partners and actors to enhance dissemination and uptake. Cases include the dissemination of cassava varieties in Cameroon and Nigeria, potato varieties in Southeast and South Asia, sweetpotato varieties in Ethiopia, and management of plant disease epidemics for banana in Uganda. Bissan, F. (2018). EVALUATION DE L'IMPACT DE LA RECHERCHE : Le cas de la diffusion des variétés améliorées de manioc de l'IITA dans l'Est Cameroun. MOQUAS, – SupAgro Institut des Régions Chaudes, Cameroon. Gatto, M.; Hareau, G.; Pradel, W.; Suarez, V.; Qin, J. 2018. Release and adoption of improved potato varieties in Southeast and South Asia. International Potato Center (CIP) Lima, Peru. ISBN 978-92-9060-501-0. 42p. Social Sciences Working Paper No. 2018-2 Assfaw Wossen, T., Alene, A., Abdoulaye, T., Feleke, S., Rabbi, I.Y. & Manyong, V. (2018). Poverty reduction effects of agricultural technology adoption: the case of improved cassava varieties in Nigeria. Journal of Agricultural Economics, 1-16. Ainembabazi, J.H., Abdoulaye, T., Feleke, S., Alene, A., Dontsop-Nguezet, P.M., Ndayisaba, P.C., ... & Manyong, V. (2018). Who benefits from which agricultural research-for-development technologies? Evidence from farm household poverty analysis in	https://hdl.handle.net/10568/97694

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							Central Africa. World Development, 108, 28-46. Kikulwe, E.M.; Okurut, S.; Ajambo, S.; Gotor, E.; Ssali, R.T.; Kubiriba, J.; Karamura, E. (2018). Does gender matter in effective management of plant disease epidemics? Insights from a survey among rural banana farming households in Uganda. Journal of Development and Agricultural Economics 10(3) p. 87-98. ISSN: 2006-9774.; Kosmowski, F.; Aragaw, A.; Kilian, A.; Ambel, A.; Ilukor, J.; Yigezu, B.; Stevenson, J. 2018. Varietal identification in household surveys: results from three household-based methods against the benchmark of DNA fingerprinting in southern Ethiopia. Experimental Agriculture. ISSN 0014-4797. Published online 20 February 2018.	
WHEAT	F1	FP1 Outcome: 1.8 National and regional policy makers improved policy-making and increased investment based on evidence CC Increase capacity of beneficiaries to adopt research outputs	Highlights foresight/targeting studies to inform policy: -wheat blast ex ante analysis S Asia: call for action identifying extent of threat -abiotic stresses (drought) and climate change implications for wheat in Mexico and Ethiopia -monitoring & targeting waterlogging implications Bangladesh -wheat disease monitoring and implications -including modern and mobile tools/surveillance -review of potential of crop modelling in crop research -synergies between WHEAT foresight/targeting and CRP PIM and Big Data	2018 - Targeting incorporates competition for land and spatial dimensions of soil & water degradation	Complete		Published 5 papers 2018 -CC Mexico wheat AFM -spatiotemporal dynamics Bangladesh RSASE -Ethiopia IJCCSM doi.org blast ex ante -South Asia PLOS1 modelling -Agronomy	https://wheat.org/pakistan-wheat-seed-makeover-more-productive-resilient-varieties-for-thousands-of-farmers/

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WHEAT	F1	FP1 Outcome: 1.10 Farmers have greater awareness and access to, and increased adoption and adaptation of improved technologies CC Increase capacity of beneficiaries to adopt research outputs	Highlights studies to enhance adoption/impact and gender/social-inclusiveness: -DNA fingerprinting at national scale in Ethiopia underscores significant for adoption/impact of WHEAT. -WHEAT Impact assessment strategy developed and pragmatically and strategically operationalized; with various 2018 adoptions studies on sustainable intensification innovations. -reviews of remote sensing opportunities for monitoring adoption dynamics -WHEAT supported gender cross-CRP flagship project (GENNOVATE) brought to completion, with release special issue (Agri-Gender-JGAFS3(1)) and resource materials. -BMZ gender project generated numerous knowledge products & resource materials in 2018 ahead of its closure in 2019. -gender research and mainstreaming position created and recruited in S Asia - incl linkage with CCAFS.	2018 - Adoption and impact studies on technologies- rolling plan based on progress of technologies along the theory of change	Complete		Published 16 papers 2018 8 adoption/impact papers -Ethiopia -2x Pakistan -3x India -Bangladesh -Syria - gender papers	https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/water-use-efficiency
WHEAT	F1	FP1 Outcome: 1.10 Farmers have greater awareness and access to, and increased adoption and adaptation of improved technologies CC Increase capacity of beneficiaries to adopt research outputs	Highlights studies to enhance adoption/impact and gender/social-inclusiveness: -DNA fingerprinting at national scale in Ethiopia underscores significant for adoption/impact of WHEAT. -WHEAT Impact assessment strategy developed and pragmatically and strategically operationalized; with various 2018 adoptions studies on sustainable intensification innovations. -reviews of remote sensing opportunities for monitoring adoption dynamics -WHEAT supported gender cross-CRP flagship project (GENNOVATE) brought to completion, with release special issue (Agri-Gender-JGAFS3(1)) and resource materials. -BMZ gender project generated numerous knowledge products & resource materials in 2018 ahead of its closure in 2019. -gender research and mainstreaming position created and recruited in S Asia - incl linkage with CCAFS.	2018 - Adoption and impact studies on technologies- rolling plan based on progress of technologies along the theory of change	Complete		6x GENNOVATE special issue JGAFS ; Women ag labour Morocco DiP ; and review gendered ag Pakistan WSIF I6	https://acaciaafrica.org/marple-diagnostics-a-pioneering-step-in-ethiopian-wheat-rust-management/#;

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WHEAT	F1	FP1 Outcome: 1.9 Last mile provider (extension partners, farmers organizations, community-based organizations, private sector) increased access and promotion of technologies to farmers CC Increase capacity of beneficiaries to adopt research outputs	Highlights markets/value chain studies to enhance last mile linkages: - Wheat consumption/production dynamics and opportunities in Bangladesh: studies show changes in wheat consumption and implications for wheat production and varieties. - Wheat value chain development in Africa: Progress in implementing varietal and innovation testing and value chain studies. - Nutritional opportunities WHEAT-AFS: Analysis in various countries using secondary data incl evolving diets and food security implications. Visiting fellow identified but only available in 2019 Q4. Nutrition and food systems task force initiated at CIMMYT in 2019 building on earlier preparatory work in 2018 (science week; Nutrition Learning Initiative).	2018 - Rapid value chain assessments with proper gender lens conducted to identify opportunities and bottlenecks in WHEAT	Complete		Published 7 journal papers in 2018. - 3x W-AFS in Bangladesh: JIFAM, BFJ, EJDR. -Agricultural information/knowledge networks India -JAEE Cereal consumption/marketing responses/cereal prices -JADEE review gender-equitable value chain development guides -DiP -WTP GM crops Pakistan. GMCF	https://doi.org/10.1080/08974438.2017.1402727;
WHEAT	F2	FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products Adoption of CGIAR materials with enhanced genetic gains	Novel germplasm is being developed and made available to researchers in the form of pre-bred lines, trait-specific source lines and bank accessions. Numerous tools are being developed to manage and utilize data, including software for data analysis and inclusion in breeding selection pipelines. FP2 also identifies haplotypes and markers associated with performance under drought, heat and various biotic stresses (disease tolerances). Several methodologies developed by CIMMYT to measure spike photosynthesis have been validated and shared with users who may apply them in breeding programs. Many capacity development activities enhance the use of FP2 products by researchers worldwide.	2018 - More partners use International Wheat Yield Partnership (IWYP) platform for precision phenotyping	Complete		8 PhD students from Mexico, Univ. of Nottingham, Tunisia and Univ. of Barcelona, spent a long term at the IWYP hub, conducting thesis research. Sixteen (Australian (5), United Kingdom (6), China (2), USA (2) and Israeli (1)) scientists participated in research at the IWYP hub.	https://iwyp.org/wp-content/uploads/sites/34/2018/11/IWYP-Annual-Report-2017-18.pdf (page 18 provides partial information)
WHEAT	F2	FP2 Outcome: 2.5 Breeders develop improved varieties more efficiently through greater access and use of documented germplasm and tools Adoption of CGIAR materials with enhanced genetic gains	Pre-bred materials distributed internationally included 25 new lines of the 6th WYCYT which were grown during the 2017/2018 wheat cycle by 85 collaborators in 39 countries. Other documented germplasm was distributed via ad-hoc seed shipments to WHEAT colleagues and partners. Several methodologies developed by CIMMYT to measure spike photosynthesis have been validated and shared with users who may apply them in breeding programs.	2018 - Greater number of breeder-ready markers/high value haplotypes (compared to 2016) for prioritized traits identified and validated (under FP2) and deployed in CGIAR breeding programs	Complete		Marker for high biomass and radiation use efficiency identified from an association mapping panel developed at CIMMYT. Singh (2018, Nature Scientific Reports 8:12527) reported favorable haplotypes for grain yield under heat stress, and for yellow rust resistance, contributed by exotic germplasm bank accessions to offspring of crosses with elite lines.	https://www.nature.com/articles/s41598-018-30667-4

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WHEAT	F2	FP2 Outcome: 2.5 Breeders develop improved varieties more efficiently through greater access and use of documented germplasm and tools Adoption of CGIAR materials with enhanced genetic gains	Pre-bred materials distributed internationally included 25 new lines of the 6th WYCYT which were grown during the 2017/2018 wheat cycle by 85 collaborators in 39 countries. Other documented germplasm was distributed via ad-hoc seed shipments to WHEAT colleagues and partners. Several methodologies developed by CIMMYT to measure spike photosynthesis have been validated and shared with users who may apply them in breeding programs.	2018 - New alleles for heat and drought, other climate change-related traits identified and moved into breeding pipeline	Complete		Several exotic lines in elite background were distributed to WHEAT breeders to serve as sources of drought or heat tolerance, disease resistance, high harvest index, and novel sources for yield adaptive traits. This was achieved via international nurseries and ad-hoc seed shipments to breeders. Seed is available from here:	https://www.cimmyt.org/resources/seed-request/
WHEAT	F3	FP3 Outcome: 3.2 Partner breeding teams increased multidisciplinary and multi-institutional collaboration CC Enhanced institutional capacity of partner research organizations	Multisite analysis of cooperators' data shows: a # of new lines in International Yield Trials had >5% superior grain yields. Reflects continuous genetic gain in grain yield in combination with other necessary traits and high chance that new, more productive varieties will continue to be released by NARS. Major publication on Moroccan seed system (policy influencing), continuous progress in Rwanda, Zambia (IFAD project), Ethiopia (DGGW).	2018 - sustainable seed system optimized in 2-3 countries (pilots, with scaling-out potential)	Extended	3. Partnership	There has been a delay in the tracking of percentage replacement rates due to conflicting priorities and overstretching of limited resources.	
WHEAT	F3	FP3 Outcome: 3.2 Partner breeding teams increased multidisciplinary and multi-institutional collaboration CC Enhanced institutional capacity of partner research organizations	Multisite analysis of cooperators' data shows: a # of new lines in International Yield Trials had >5% superior grain yields. Reflects continuous genetic gain in grain yield in combination with other necessary traits and high chance that new, more productive varieties will continue to be released by NARS. Major publication on Moroccan seed system (policy influencing), continuous progress in Rwanda, Zambia (IFAD project), Ethiopia (DGGW).	2018 - New alleles for heat and drought, other climate change-related traits identified and moved into breeding pipeline	Complete		Multisite analysis of cooperators' data shows: a # of new lines in International Yield Trials had >5% superior grain yields. Reflects continuous genetic gain in grain yield in combination with other necessary traits and high chance that new, more productive varieties will continue to be released by NARS.	http://repo.mel.cgiar.org/handle/20.500.11766/8505
WHEAT	F3	FP3 Outcome: 3.3 Partner breeding teams improved breeding processes by adopting new technologies, methodologies, approaches and genetic resources Adoption of CGIAR materials with enhanced genetic gains	>45,000 spring wheat breeding lines genotyped during past five years. Replicate grain yield data available under favorable environment, and for a subset of >4000 lines grain yield under a range of environments, disease resistance, agronomic and quality traits available. Meta-GWAS studies reveal several trait-marker associations and chromosomal regions associated with grain yield and other traits.	2018 - Improved knowledge of genetic basis of climate change adaptation on global scale thru combination of GS, platforms, unified databases	Complete		Data uploaded and accessible	https://data.cimmyt.org/dataset.xhtml?persistentId=hdl:11529/10695

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WHEAT	F3	FP3 Outcome: 3.6 National regulators of crop variety release improved enabling environment to speeding-up release of improved varieties Reduced smallholders production risk	Progress in Ethiopia, Kenya. 15 spring, 12 durum wheat originating directly from CIMMYT and 8 winter wheat varieties derived from the International Winter Wheat Improvement Program (IWWIP) released in 12 countries.	2018 - National regulators of variety release and seed supply provide enabling environment to speed up release of improved varieties and farmers' access to quality seed, in 2-3 target countries	Complete		Variety registration list; India permits pre-release seed multiplication	
WHEAT	F3	FP3 Outcome: 3.7 Extension partners (universities, national/state/provincial governments) increased Access and promotion of adoption of improved varieties to farmers, and increased investment in emerging private sector circumstances Reduced smallholders production risk	Several value chain- and adoption dynamics-related findings published (South Asia). For example a study of farm household consumption behaviour in Bangladesh found that market volatility may discourage farm households to market their cereals more due to uncertain future. A study of the information and knowledge network in BIhar, India, showed that government institutions are well networked among themselves but have limited interactions with non-government sources. Farmers have strong linkages with few network actors, who are important nodes in the social knowledge network.	2018 - improved, documented understanding of specific wheat seed systems (farmer's seed commercial behavior, seed demand and marketing, economics of seed production) / 2-3 NARES identified performance gaps, capacity development needs, to identify, realize relevant cap dev interventions at appropriate levels	Extended	4. Internal resources	NARS cap dev needs assessment delayed due to delays in study completion and high demand on limited resources.	https://www.emeraldinsight.com/doi/abs/10.1108/JADEE-09-2017-0088
WHEAT	F3	FP3 Outcome: 3.8 Farmer organizations increased access and promotion of adoption of improved varieties to farmers CC Technologies that reduce women`s labor and energy expenditure adopted	Major (compilation) publication, Cereal Foods World; major conferences focused on Latin America held; Novel approach to identify marker-trait associations related to baking/milling quality traits within a breeding program	2018 - Improve consumer acceptability of high flour extraction rate and whole grain flour	Extended	2. Financial	CIMMYT resources to engage with partners to monitor impact on consumer behavior. Extended as more time is needed to achieve this milestone, despite strong progress made thus far.	https://www.awlafellowships.org/

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WHEAT	F3	FP3 Outcome: 3.12 Non-and-subsistence farmers adopted improved varieties Reduce pre- and post-harvest losses, including those caused by climate change	International Trials and Nurseries distributed to over 100 countries. Multisite analysis of cooperators' data shows: a # of new lines in International Yield Trials had >5% superior grain yields. Reflects continuous genetic gain in grain yield.	2018 - greater farmer adoption of released varieties (based on CGIAR research) in specific WHEAT target countries, compared to 1994-2014 average	Complete		Variety adoption studies in Afghanistan and Ethiopia using fingerprinting technique	https://repository.cimmyt.org/handle/10883/19532
WHEAT	F4	FP4 Outcome: 4.4 NARS increased use of participatory approach in system research CC Enhanced institutional capacity of partner research organizations	Made progress on approaches to prioritize R4D invests (global), climate smart agriculture practices, targeting and adoption dynamics and service provider business model scaling (South Asia). It does include as well capacity building in farming systems approaches with a focus upon a participatory aproach to research.	2018 - Multi-criteria assessments taking into account environmental and social acceptability aspects, based on standardized protocols for multi-criteria assessments of advanced crop management packages (not individual technologies)	Complete		Peer reviewed publications and project reports under sections 1.2.2 & 1.3.4. Training material available upon request and soon being upload in CIMMYT capdev website	https://www.emeraldinsight.com/doi/abs/10.1108/IJCCSM-02-2017-0025
WHEAT	F4	FP4 Outcome: 4.8 Actors in SI increased consideration and integration of gender and social inclusion into policies, processes and practices. CC Technologies that reduce women`s labor and energy expenditure adopted	Progress based on GENNOVATE WHEAT report/comparative studies/17 tools & CIMMYT 2017-2018 roll-out of gender mainstreaming training. The report offers a range of the gender dimensions of local agricultural innovation processes in the context of wheat-based farming systems and livelihoods. The analysis is based on 43 village case studies from eight countries set in diverse wheat regions of the Global South, and which were commissioned by the WHEAT CRP	2018 - Multi-criteria assessments taking into account environmental and social acceptability aspects, based on standardized protocols for multi-criteria assessments of advanced crop management packages (not individual technologies)	Complete		GENNOVATE publications, CIMMYT Gender Capacity Strengthening Program Roll Out Report, CSISA, MasAgro Productor/Trigo annual reports, FP1/FP4 collaborations	https://gennovate.org/wp-content/uploads/2018/10/CRP-WHEAT-Gennovate-Report.pdf%20
WHEAT	F4	FP4 Outcome: 4.8 Actors in SI increased consideration and integration of gender and social inclusion into policies, processes and practices. CC Technologies that reduce women`s labor and energy	Progress based on GENNOVATE WHEAT report/comparative studies/17 tools & CIMMYT 2017-2018 roll-out of gender mainstreaming training; increasing adoption of SI strategies and technologies is an ongoing challenge, and therefore status marked as extended for 2018.	2018 - increased adoption of combinations of SI strategies, technologies in specific target geographies compared to 2016	Extended	6. External environment (political, economic, legal, market)	ex ante and ex post adoption/outcomes pub/reports for IGP overall, Bihar, Bangladesh (CSISA-MI), MasAgro Productor/Trigo; publications on assessment frameworks, SI outcome indicators. Major scaling achievements of rice crop residue management in NW IGP through adoption of Happy seeder. More than 700,000ha adoption reported	

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		expenditure adopted					hopefully leading to reduce air pollution;	
WHEAT	F4	FP4 Outcome: 4.9 Smallholder farmers increased their capacity to adopt and adapt SI practices and products (associated with crosscutting sub-IDO). Increased access to productive assets, including natural resources	Improved or updated technologies, technology combinations, better understanding of farmer adoption dynamics and train-the-trainer/service provider, PPP/extension approaches. Lessons learned from farmer decision making support scaling.	2018 - optimisation of cropping systems support adaptation to climate change validated in specific WHEAT target geographies	Complete		Tracking of farmer access to agro-climate information services, initial and sustained adoption (or disadoption) of Conservation Agriculture for Sustainable Intensification (CASI) / CSA practices, via bilateral project progress reports, peer-reviewed publications.	https://doi.org/10.1111/1477-8947.12152
WHEAT	F4	FP4 Outcome: 4.6 Private sector (and public sector) increased provision of services to smallholder farmers to increase their ability to adopt SI practices and products CC Increase capacity of beneficiaries to adopt research outputs	New, ongoing PPP partnerships sourcing/contract farming, mechanization & remote sensing service-providers and seed multiplication (FP3.8). New project funder by private miller in Morocco to improve grain quantity and quality through better N management	2018 - better understand scaling up processes in multi-actor innovation networks, to ensure sustainability of institutional mechanisms, structures	Complete		Project reports CSISA-MI, MasAgro/PPP, Scaling pilots (FP4.4.), multi-CRP Scaling Conference documentation and Scaling expert networks.	https://masagro.mx/es/2012-06-21-17-47-58/documentos/doc_download/45-resumen-de-metas-y-actividades-masagro-2018
WHEAT	F4	FP4 Outcome: 4.10 Smallholder farmers adopted and adapted SI practices and products Closed yield gaps through improved agronomic and animal husbandry practices	More W1&2 invested in adoption/impact studies by FP1/FP4. Better understanding of farmer adoption dynamics and train-the-trainer/service provider, PPP/extension approaches. Lessons learned from farmer decision making support piloting.	2018 - Improve consumer acceptability of high flour extraction rate and whole grain flour	Cancelled	Not a correct milestone for FP4	This milestone refers to FP3.7	

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WHEAT	F4	FP4 Outcome: 4.10 Smallholder farmers adopted and adapted SI practices and products Closed yield gaps through improved agronomic and animal husbandry practices	More W1&2 invested in adoption/impact studies by FP1/FP4. Better understanding of farmer adoption dynamics and train-the-trainer/service provider, PPP/extension approaches. Lessons learned from farmer decision making support piloting.	2018 - Smart mechanization lessons learned routinely applied in other FP4 projects	Extended	2. Financial	Cross-project learning /CoP workshop documentation, bilateral project reports, peer-reviewed publications. Challenges: No critical mass in some regions, low donor interest	
WLE	F1	1.1 Better informed landscape restoration policies, approaches and interventions.	RDL focused efforts in 6 countries: Ethiopia, Ghana, Kenya, Tanzania, Colombia and Peru on: 1) recommendations for land restoration developed in collaboration with local stakeholders; 2) Mapping land degradation projects at national level and developing rapid indicators for determining soil health in agricultural lands; 3) a synthesis of land restoration successes and failures, and identification of barriers and pathways to adoption; and 4) providing knowledge on land restoration options to policy makers and stakeholders interested in land restoration investments.	2018 - Synthesis report of factors affecting success and failure of restoration initiatives (enabling factors and incentive schemes) leading to recommendations for the design of new restoration initiatives.	Complete		Ethiopia: Synthesis results on restoration presented to various Ethiopian stakeholders. Ministries have received it favorably. **Presentation and manuscript available.** Kenya: Working paper on farmers' decision-making on soil rehabilitation options and pathways to adoption completed (forthcoming). **Blog**.	http://gismap.ciat.cgiar.org/WLEOutput/files/Land_restoration_presentation_to_MOFECC.pdf
WLE	F1	1.1 Better informed landscape restoration policies, approaches and interventions.	RDL focused efforts in 6 countries: Ethiopia, Ghana, Kenya, Tanzania, Colombia and Peru on: 1) recommendations for land restoration developed in collaboration with local stakeholders; 2) Mapping land degradation projects at national level and developing rapid indicators for determining soil health in agricultural lands; 3) a synthesis of land restoration successes and failures, and identification of barriers and pathways to adoption; and 4) providing knowledge on land restoration options to policy makers and stakeholders interested in land restoration investments.	2018 - Innovative investment packages and restoration pilots that implement incentives and enabling conditions for the adoption of sustainable and equitable restoration interventions in progress in 3 countries.	Extended	1. Research/science	A document explaining WLE/RDL's value proposition for sustainable financing of landscape restoration will be presented to CPIC (Coalition for Private Investment in Conservation) in 2019. CPIC is a non-profit coalition of member organizations (potential investors and donors). CIAT has applied for CPIC membership (waiting for approval).	

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WLE	F1	1.1 Better informed landscape restoration policies, approaches and interventions.	RDL focused efforts in 6 countries: Ethiopia, Ghana, Kenya, Tanzania, Colombia and Peru on: 1) recommendations for land restoration developed in collaboration with local stakeholders; 2) Mapping land degradation projects at national level and developing rapid indicators for determining soil health in agricultural lands; 3) a synthesis of land restoration successes and failures, and identification of barriers and pathways to adoption; and 4) providing knowledge on land restoration options to policy makers and stakeholders interested in land restoration investments.	2017 EXTENDED - Private sector companies or foundations active in land restoration request WLE support for developing an investment-ready business portfolio.	Extended	4. Internal resources	Technically complete but we still plan to evaluate and disseminate results. Colombian farmers implementing sustainable intensification and landscape restoration participated in a pilot simulating the application of an agri-environmental financial incentive by Financing Fund for the Agricultural Sector in Colombia (FINAGRO). Twitter **Link 1; Twitter Link 2.**	https://twitter.com/maromero_CIAT/status/1045765755487350784
WLE	F1	1.2 Policies, strategies, and interventions investing in practices that rehabilitate or protect soil fertility and soil carbon.	WLE supported co-design and pilot-testing land use practices to enable farmers to improve their capacity to mitigate and adapt to climate change in Amazonian degraded lands (Colombia and Peru). Land degradation and soil carbon models and assessments were completed in two African countries; the results should benefit national and county level planning and decision making. WLE advanced understanding on gender in land restoration initiatives.	2018 - Knowledge products (reviews, tools, methods, maps, statistics, and other noteworthy research outputs) on soil carbon sequestration in East Africa are presented/discussed with key stakeholders at two international conferences.	Complete		Global Landscapes Forum (GLF) gender event; facilitated **sessions; gender brief.** GLF-Nairobi: improving land governance in Africa (**video**) WLE-CCAFS/4-p1000-Southern African Confederation of Agricultural Unions side event at United Nations Framework Convention on Climate Change COP24; presented on re-carbonizing the Earth's soil. Scaling up soil carbon enhancement contributing to mitigate climate change preentation African Forest Landscape Restoration Initiative meetings; presented **soil carbon enhancement**	https://events.globallandscapesforum.org/agenda/nairobi-2018/day-1-wednesday-29-august-2018/parallel-sessions-2/4-parallel-discussion-forums/discussion-forum-9-cifor-on-gender/

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WLE	F1	1.2 Policies, strategies, and interventions investing in practices that rehabilitate or protect soil fertility and soil carbon.	WLE supported co-design and pilot-testing land use practices to enable farmers to improve their capacity to mitigate and adapt to climate change in Amazonian degraded lands (Colombia and Peru). Land degradation and soil carbon models and assessments were completed in two African countries; the results should benefit national and county level planning and decision making. WLE advanced understanding on gender in land restoration initiatives.	2018 - At least two Kenyan county governments include methodological guide and farm-level decision support systems on estimating and measuring soil carbon and fertility at various scales into their soil and landscape restoration planning and monitoring.	Extended	Research/science	Soil carbon and fertility assessments completed. Outreach activities with county governments will be held in 2019.	

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WLE	F1	1.2 Policies, strategies, and interventions investing in practices that rehabilitate or protect soil fertility and soil carbon.	WLE supported co-design and pilot-testing land use practices to enable farmers to improve their capacity to mitigate and adapt to climate change in Amazonian degraded lands (Colombia and Peru). Land degradation and soil carbon models and assessments were completed in two African countries; the results should benefit national and county level planning and decision making. WLE advanced understanding on gender in land restoration initiatives.	2017 EXTENDED - Kenyan county governments of Kakamega, Siaya and Bungoma consider including methodological guide on estimating and measuring soil carbon at various scales into their soil and landscape restoration planning and monitoring.	Complete		Land degradation hotspots and policy options assessed combining modeling, participatory stakeholder consultations and field validation - **Policy brief**. This county policy brief is complemented by a **detailed report.**	https://cgspace.cgiar.org/handle/10568/99511

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WLE	F1	1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks.	WLE/ICRAF introduced a new decision analysis framework for ex ante evaluation to support improved planning and efficient monitoring of land restoration initiatives. WLE/ICRAF use this framework to illustrate how the 110+ countries signatories of the United Nations Convention to Combat Desertification (UNCCD)'s Land Degradation Neutrality Target Setting Programme could use it. Piloting of the framework in a restoration project in Ethiopia was also initiated. Training and advisory services were provided to multiple stakeholders in applying low cost soil-plant health measurements in nine countries. WLE has trained over 1000 people from 17 countries. More African and Asian countries plan to adopt the technology.	2018 - Decision Analysis Framework for Planning and Performance Measurement of Land Restoration Initiatives applied to UNCCD Land Degradation Neutrality case study and one land restoration project and improved based on feedback from stakeholders.	Complete		The Decision Analysis Framework for Planning and Performance Measurement of Land Restoration Initiative: article is in review (abstract **here**) includes recommendations for UNCCD's Land Degradation Neutrality framework and Target Setting Programme. Workshop to develop a decision analysis case with WeForest, Ethiopia (report **here**). Further outputs available **here**	https://www.dropbox.com/s/19p4nvu7yzagigr/Decision analysis planning framework.docx?dl=0
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WLE	F1	1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks.	WLE/ICRAF introduced a new decision analysis framework for ex ante evaluation to support improved planning and efficient monitoring of land restoration initiatives. WLE/ICRAF use this framework to illustrate how the 110+ countries signatories of the United Nations Convention to Combat Desertification (UNCCD)'s Land Degradation Neutrality Target Setting Programme could use it. Piloting of the framework in a restoration project in Ethiopia was also initiated. Training and advisory services were provided to multiple stakeholders in applying low cost soil-plant health measurements in nine countries. WLE has trained over 1000 people from 17 countries. More African and Asian countries plan to adopt the technology.	2017 EXTENDED - Framework paper presenting a new analytical approach for planning and performance management of land restoration initiatives integrating feedback from testing with development partners.	Extended	Internal resources not available	Malawi land use changes report, 2019 **Design of independent evaluation of interventions in Malawi**. Decision analysis framework (abstract **here**). Outputs **here**, and **here**. Land health work **here**. Technical report on soil carbon management practices is due in 2019.	Design of independent evaluation of interventions in Malawi

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WLE	F2	2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options	Practical tools can be used to inform water and land management solutions and investments. The Gender in Irrigation Learning Tool (GILIT, 2017) was piloted for watershed investments in India; now demanded by users in Mozambique, Central American and West Africa. A tool promoting small scale irrigation technologies was developed and applied by the Innovation Lab for Small-Scale Irrigation, working with private sector partners. Gender analyses were communicated through presentations to policymakers and investments at 3 events.	2018 - Phase 1 and 2 gender tools refined to enable application by policy and investment actors in 2 countries, and the implications of Phase 1 and Phase 2 gender analyses communicated through presentations to policymakers and investors at 3 events.	Complete		GILIT applied to understand gender norms and relations in large scale watershed projects in central-north India (**Link**). Insights on how to deliver more equitable farmer led irrigation published in **high impact paper**. **Gender guidance tool** when promoting small scale irrigation technologies.	GILIT
WLE	F2	2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options	There is a need for identifying options to enhance the quality and quantity of investments in small scale water and land management. In 2018 WLE identified, refined and shared several investment options with public and private sector institutions and influenced investment policies in one country.	2018 - At least 3 LWS (Flagship 2 Land and Water Solutions for Sustainable Intensification) investment options/ business models refined and shared with public and private sector institutions in 2 countries.	Complete		**Business model for solar irrigation development in Ethiopia** published. **Suitability mapping framework for solar photovoltaic pumps**, sub-Saharan Africa. Policy dialogues: **2018 Africa Green Revolution Forum**. **International Forum on Solar Technologies for Small-scale Agriculture and Water Management**. Published **Microfinance for rural smallholder irrigation**. Policy influence: **Ethiopian**	http://www.iwmi.cgiar.org/Publications/IWMI_Research_Reports/PDF/pub172/rr172.pdf

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							delegation hosted by ICRISAT India.	
WLE	F2	2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options	Attractive business models can enhance the quality and quantity of investments in better agricultural land and water management solutions. WLE has developed and shared widely potential business models for investments in solar irrigation in Africa and India.	2017 EXTENDED - Phase 1 business models reviewed (and as appropriate adapted/ adopted) public/private sector agencies in 6 countries.	Complete		Milestone accomplished in Madagascar, Mali, Niger, Rwanda, Tanzania and Ethiopia. Three business models published in 2017-2018: **Ethiopia: A catalog of management options for ecosystem restoration (Mekuria et al. 2017)** Ethiopia and Ghana: solar pump based irrigation (**Otoo et al. 2018**). Shared business models at several events including:	https://cgspace.cgiar.org/handle/10568/81251
WLE	F2	2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options	WLE is working with several countries to identify policies that will enhance adoption of effective water and land management, and strengthen development programs with the same aim. Ethiopia has incorporated policy recommendations and the governments of Uttar Pradesh (India) and Ghana have requested scaling up of pilots and additional support.	2017 EXTENDED - Phase 1 recommendations on ALWM (Agricultural Land and Water Management) interventions evident in policy, investment and/or development programs in 3 countries: Ethiopia, Ghana and India.	Complete		Recommendations incorporated into policy and development programs e.g. irrigation equipment tax exemption, soil fertility maps (Ethiopia). Government of Uttar Pradesh (India) requested scaling up integrated agricultural water management pilots. Ghana requests further support on conservation agriculture. Danish pump company considering market expansion. **Reported at workshop**	https://www.icrisat.org/moving-away-from-silos-working-towards-synthesis-of-learnings/

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WLE	F2	2.2. Improved management of new and revitalized medium to large scale irrigation schemes	Across four countries and dozens of irrigation schemes, the use of simple tools (soil moisture, soil nutrient concentration) supports water and labor savings, yield increases and economic benefit to farmers, whilst contributing towards water productivity gains. These pilots are being scaled with partners in Zimbabwe and Uzbekistan. Tools such as the Online Irrigation Benchmarking System OIBS and System Asset Management have been developed, with data sets; to be released in 2019. Knowledge products on training and capacity development with gender conscious approaches in water user associations in Tajikistan led to recommendations to USAID for targeting training of female farmers.	2018 - Two African medium or large-sized irrigation schemes monitoring irrigation performance and showing increases in farmer incomes, gender equity and ecosystem services delivery.	Complete		Paper assessing adoption of water saving technologies (Egypt) (**Link**); Tunisia study-sustainable water management techniques (**Link**).	http://repo.mel.cgiar.org/handle/20.500.11766/9277
WLE	F2	2.2. Improved management of new and revitalized medium to large scale irrigation schemes	Across four countries and dozens of irrigation schemes, the use of simple tools (soil moisture, soil nutrient concentration) supports water and labor savings, yield increases and economic benefit to farmers, whilst contributing towards water productivity gains. These pilots are being scaled with partners in Zimbabwe and Uzbekistan. Tools such as the Online Irrigation Benchmarking System OIBS and System Asset Management have been developed, with data sets; to be released in 2019. Knowledge products on training and capacity development with gender conscious approaches in water user associations in Tajikistan led to recommendations to USAID for targeting training of female farmers.	2018 - Synthesized knowledge around technical, management and policy ''levers of change'' used in triggering new opportunities for scaling of at least 5 farm/field level innovations in irrigated systems in 2 countries.	Complete		For India, Sri Lanka, Myanmar, the online irrigation benchmarking tools and System asset management tool (SAMS) and data sets have been developed; release is expected in 2019. **Impact assessments of training water user associations in Tajikistan** show improved performance and equity of irrigation services between large and small farms, **Agrilinks**.	https://www.worldscientific.com/doi/abs/10.1142/S2382624X18500078

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WLE	F2	2.2. Improved management of new and revitalized medium to large scale irrigation schemes	Across four countries and dozens of irrigation schemes, the use of simple tools (soil moisture, soil nutrient concentration) supports water and labor savings, yield increases and economic benefit to farmers, whilst contributing towards water productivity gains. These pilots are being scaled with partners in Zimbabwe and Uzbekistan.	2017 EXTENDED - Identify how problematic large and medium scale irrigation schemes (LSIS) in 3 countries (India, Ethiopia, Egypt) can be improved by benchmarking tools, PPP (public-private partnership) arrangements and supporting capacity building needs in private and public irrigation sector.	Extended	Partnership - not able to deliver on time	Partners and projects were not in place for delivery. The Flagship portfolio now holds several projects suitable for this analysis. Additional input for 2019 delivery may include ICARDA Egypt and IFPRI Ethiopia assessment of national irrigation schemes.	
WLE	F3	3.1. Increased capacity and evidence for male and female stakeholders and policy makers to implement urban and peri-urban agriculture (UPA) related policies and farming system innovations	WLE/FAO/RUAF Foundation developed a toolkit outlining the City-Region Food Systems (CRFS) approach for cross-sector and cross-boundary analysis. Seven cities conducted a CRFS assessment (Colombo, Lusaka, Kitwe, Medelin, Utrecht, Quito, Toronto). Three are new: Quito, Antananarivo and Nairobi.	2018 - 2 additional cities adopt a monitoring system for UPA/City Region Food Systems (CRFS) related innovations.	Complete		**Participating cities for North-South learning:** **Toolkit with WLE acknowledgement** RUAF, FAO and WLE discussed as direct follow-up a new phase focusing on climate change and city region food systems, led by FAO. A new project co-funded by Germany and WLE will support this effort in 5+ cities from 2019.	Milan Urban Food Policy Pact (

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WLE	F3	3.1. Increased capacity and evidence for male and female stakeholders and policy makers to implement urban and peri-urban agriculture (UPA) related policies and farming system innovations	WLE, RUAF with CIAT, FAO, IWMI and the CITYFOOD network co-led by Local Governments for Sustainability engaged local and regional governments on training, policy guidance and technical exchange to build capacity to implement the **Milan Urban Food Policy Pact (MUFPP)**. 16 new cities joined **CITYFOOD network** to adopt MUFPP. In Quito, RUAF support resulted in a municipal urban food charter. FAO and RUAF presented the Urban Food Monitoring Framework at the **4th MUFPP Mayors Summit.**	2018 - 5 cities implement Milan Urban Food Policy Pact with WLE facilitation.	Complete		Mayor summit WLE/FAO-RUAF session (1 of 17 videos) **and presentation.** 14 cities are engaged in **MUFPP indicator work**. **Quito, urban food charter.**	https://www.youtube.com/watch?v=rTmbXaWiq0c
WLE	F3	3.1. Increased capacity and evidence for male and female stakeholders and policy makers to implement urban and peri-urban agriculture (UPA) related policies and farming system innovations	WLE, RUAF with CIAT, FAO, IWMI and the CITYFOOD network co-led by Local Governments for Sustainability engaged local and regional governments on training, policy guidance and technical exchange to build capacity to implement the **Milan Urban Food Policy Pact (MUFPP)**. 16 new cities joined **CITYFOOD network** to adopt MUFPP. In Quito, RUAF support resulted in a municipal urban food charter. FAO and RUAF presented the Urban Food Monitoring Framework at the **4th MUFPP Mayors Summit.**	2018 - Reports providing in-depth and focused food and farming system analysis in a minimum of 7 cities.	Complete		Reports completed on Tamale, Ouagadougou, Colombo, Kitwe, Utrecht, Toronto, Medellin, Quito and more. For FAO- led city reports, see **here** and for Ghana and Burkina Faso see **here**. See also article **here**.	http://www.fao.org/in-action/food-for-cities-programme/partners/en

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WLE	F3	3.2 Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Waste-based soil rehabilitation field trials continued with public private partnerships (PPP) on waste-based fish production established in Ghana. The RRR business model catalogue on gender and energy recovery from waste was published. And the Fecal Sludge Management MOOC (Massive Open Online Courses) milestone adjusted to providing free online curriculum. Worked with 19 universities for curriculum adaptation and implementation. Supported the sanitation improvement program, Sri Lanka. And became a member of two task forces: the South Asia Hub Consortium for City-wide Inclusive Sanitation (CWIS) and Fecal Sludge Management (FSM); Indian National Fecal Sludge and Septage Management Alliance. Continued to advise Sri Lanka on organic compost production. FAO handbook wastewater irrigation management was published.	2018 - Private Sector Facilitates field trials for waste-based soil rehabilitation established in Sri Lanka, informing 18,000 ha under coconut, tea and rubber.	Extended	Research/science	WLE/IWMI research with Horana Plantations PLC in Sri Lanka. **Publication forthcoming.** WLE/IWMI collaborating with Coconut Research Institute of Sri Lanka on fertilization advisory services for about 400,000 ha (approx. 100,000 ha smallholder production).	
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WLE	F4	4.1. Risks associated with water variability mitigated	Analysis of business case options for Index-based flood insurance (IBFI) has been completed, providing insights on approaches for funding IBFI schemes. The report will be published in 2019. Drought and flood early warning tools developed and disseminated for use in India and Sri Lanka. Uptake of drought tools has been particularly successful. Analysis of equity issues associated with Index Based Flood Insurance (IBFI) trials conducted in India and Bangladesh is completed. Forthcoming reports make recommendations on how to better include vulnerable groups in the schemes. Both Indian government and insurance companies are indicating interest to further scale-up.	2018 - Index Based Flood Insurance business model published.	Extended	Research/science	Report on a business model for index- based flood insurance under review (forthcoming 2019).	

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WLE	F4	4.1. Risks associated with water variability mitigated	Analysis of business case options for Index-based flood insurance (IBFI) has been completed, providing insights on approaches for funding IBFI schemes. The report will be published in 2019. Drought and flood early warning tools developed and disseminated for use in India and Sri Lanka. Uptake of drought tools has been particularly successful. Analysis of equity issues associated with Index Based Flood Insurance (IBFI) trials conducted in India and Bangladesh is completed. Forthcoming reports make recommendations on how to better include vulnerable groups in the schemes. Both Indian government and insurance companies are indicating interest to further scale-up.	2017 EXTENDED - Flood insurance theoretical and institutional framework and tools (with insights for more equitable risk sharing for women) delivered to government partners and insurance companies (co-developed with CCAFS).	Complete		Two trials on Index Based Flood Insurance (IBFI) **completed in India**. Report and two technical briefs for India and Bangladesh forthcoming 2019. Both governments and insurance companies interested in scaling up, including use of WLE-developed technology in the Bihar Crop Assistance Scheme for rapid payout.	http://www.iwmi.cgiar.org/2019/02/fine-tuning-flood-risk-management/

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WLE	F4	4.2. Uptake of solutions and investment options better able to address tradeoffs across competing water-energy-food needs	Work on conjunctive water management in the Ramotswa and Tuli Karoo transboundary aquifer systems in the Limpopo Basin, is incorporated into the activities of a new trans-national Groundwater committee through progress reporting at committee meetings, provision of project data into the Limpopo Watercourse Commission and Southern African Development Community frameworks, and project concept formulation. Flagship 4 made a significant contribution to the ongoing global dialogue on nature based solutions and the role of natural infrastructure in sustainable development, through involvement in various processes and forums. Increased awareness of opportunities for groundwater use and Managed Aquifer Recharge in selected countries.	2018 - Groundwater information for Africa is used by 2 governments in their planning processes.	Complete		**Ramotswa Information Management System** producing important **insights** on transboundary aquifer shared by Botswana and South Africa; **roadmap** developed in 2016 has been transformed into a **Joint Strategic Action Plan** awaiting ratification. Both governments are proposing a large-scale program on aquifer remediation and have provided letters endorsing the project.	https://apps.geodan.nl/igrac/ggis-viewer/viewer/ramotswa/public/default
WLE	F4	4.2. Uptake of solutions and investment options better able to address tradeoffs across competing water-energy-food needs	Work on conjunctive water management in the Ramotswa and Tuli Karoo transboundary aquifer systems in the Limpopo Basin, is incorporated into the activities of a new trans-national Groundwater committee through progress reporting at committee meetings, provision of project data into the Limpopo Watercourse Commission and Southern African Development Community frameworks, and project concept formulation. Flagship 4 made a significant contribution to the ongoing global dialogue on nature based solutions and the role of natural infrastructure in sustainable development, through involvement in various processes and forums. Increased awareness of opportunities for groundwater use and Managed Aquifer Recharge in selected countries.	2018 - 2 or more tools for addressing tradeoffs across the water-energy-food nexus published.	Complete		Workshop reports; nexus tools to address water-energy-food nexus tradeoffs for **Niger River Basi**n, **Vietnam**; and a **practical application** in the Niger River Basin. **Toolkit** on nexus approaches for Eastern Nile Region. **Integrated framework** of models for social, economic and institutional developments in Omo and Zambezi basins complete, pending publication. This is currently under review by the European Union --we are waiting for permission to publish	https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018EF000923

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WLE	F4	4.2. Uptake of solutions and investment options better able to address tradeoffs across competing water-energy-food needs	Work on conjunctive water management in the Ramotswa and Tuli Karoo transboundary aquifer systems in the Limpopo Basin, is incorporated into the activities of a new trans-national Groundwater committee through progress reporting at committee meetings, provision of project data into the Limpopo Watercourse Commission and Southern African Development Community frameworks, and project concept formulation. Flagship 4 made a significant contribution to the ongoing global dialogue on nature based solutions and the role of natural infrastructure in sustainable development, through involvement in various processes and forums. Increased awareness of opportunities for groundwater use and Managed Aquifer Recharge in selected countries.	2017 EXTENDED - Information on risks and opportunities associated with groundwater use applied and taken up with key Government partners in India and elsewhere.	Complete		**Hydro-geological map** and dataset provided to Department of Water Resources, Lao PDR. Vietnam Managed Aquifer Recharge (MAR) video presented on **morning news in April 2018.** MAR in **UN World Water Development Report 2018** ; UN **Chronicle story mentions MAR**. India: **capacity building** handover of trial site to government and commitment to scaling out in Uttar Pradesh.	https://www.mdpi.com/2306-5338/5/1/2

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WLE	F5	5.1: Decision makers are better able to access relevant evidence, tools and expertise to design and manage natural resource management (NRM) and agriculture programs that deliver more effectively against multiple SDG targets across scales	Good progress developing approaches to support decision making in landscape management contexts, including literature review on knowledge brokering and ecosystem service assessments (forthcoming 2019). Knowledge brokering framework will be iteratively improved during the project. Survey designed for government and NGO stakeholders at national and landscape scale to build a picture of their current use of evidence to inform decision making (will be rolled out in 2019). IWMI has started to review tools and management approaches developed by previous WLE projects that can be applied to natural resource management (NRM) Program and policy design, informed by interviews with decision makers in Ethiopia	2018 - Publication of an approach and framework for supporting decision makers to manage better trade-offs arising at scale from field level farming activities.	Complete		Framework developed linking evidence products for decision support; to be iteratively improved. Knowledge brokering literature in the context of natural resource management reviewed, summarized (forthcoming 2019) (WLE/Bioversity). Review completed on opportunities to interact with ongoing NRM policies and programs in East Africa (WLE/IFPRI).	
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WLE	F5	5.2: NRM and agricultural development programs that apply WLE approaches and use tools are more cost-effective and avoid negative trade-offs between SDGs across scales	Workshop in Desa Forest, Northern Ethiopia, to initiate decision analysis process. Outputs will be used to calibrate Bayesian modelling and screen other suitable WLE decision support tools, and approaches. Workshop with RTB colleagues to scope a second case study in Uganda. Target landscape identified (Isingiro District), proposal developed, and a list of stakeholders compiled. Due to the tightness of funding in Flagship 5, we decided to reduce from three case studies to two. This will provide greater resources for proof of concept in Ethiopia and Uganda.	2018 - Work plans finalized for 3 new partnerships in three different farming systems (RTB, RICE, FTA).	Changed	Financial	Ethiopia: Workplan developed, workshop held with **WEFOREST** to populate decision models. Uganda: Study site identified. Plans developed with CGIAR Research Program on Roots, Tubers and Bananas (RTB). Stakeholder workshop planned mid-2019. Rice: Case study cancelled, resources redistributed to the Ethiopia and Uganda cases for 2019.	https://www.weforest.org/