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Pathways for scaling up CSA practices in Senegal: Findings from stakeholder consultation

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Introduction

The Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project is a three-year initiative funded by the World Bank and implemented in six (6) African countries: Ethiopia, Ghana, Kenya, Mali, Senegal and Zambia. In Senegal, the project's objective is to reach and impact over 300 000 farmers and value chain players with climate informed agro-advisories and new/improved climate smart-agriculture (CSA) packages and technologies by the end of 2023. Intervention pathways include outcomes on three levels: (1) enabling crop and livestock farming households to access Climate Information Services (CIS) and/or CSA technologies and practices; (2) reinforce the ability of value chain actors and influencers to offer climate-smart goods and services; (3) improving institutional performance to further benefit farming and (agro-) pastoralist households (Whitbread et al, 2023).

In Senegal, the project covers sites in three (3) regions (Louga, Kaffrine and Thiès), with further expansion to a fourth region in 2023 (Tambacounda). It focuses on five (5) priority value chains: millet, groundnut, cowpea, milk and beef. Preliminary studies highlight rising temperature, drought, dry spells and floodings as key climate risks and constraints faced by these value chains, exacerbated by an unfavourable business environment (lack of subsidies, weak processing industries, and poorly developed markets). CSA options were identified in a participatory manner based on criteria including climate-smart global health, social inclusion and gender.

Dissemination and promotion of CSA practices

- Through its climate information platforms, the project supports the dissemination of climate information to at least 274 677 producers through radio broadcasting programs in local language and voice messages (Wolof, Pulaar).
- Diffusion of CSA practices is made through technology parks which serve both for training, and as field school infrastructure and demonstration sites for trials, benefiting researchers, technicians, producers.
- The widespread dissemination of CSA technologies and practices and other innovations has reinforced access to improved seeds, and the promotion of CSA technologies within the integrated agriculture-livestock system improved formulation and rationing techniques, etc. and identified capacity building needs.
- Defining a suitable environment for scaling up should involve sharing of approaches for gender mainstreaming, rural entrepreneurship, monitoring and evaluation, learning and communication

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Additionally, quantitative baseline studies and perception analysis of the target populations reported low agricultural and livestock productivity in both dairy and meat production due to a number of constraints limiting the effectiveness of agricultural systems, markets, policies and institutions (Kumar et al., 2022).

Since June 2022, pilot activities, including CIS and demonstration sites were implemented through field schools and demonstration parks involving implementing partners, namely ISRA-CERAAS, ANCAR, JOKALANTE and URAC. These activities resulted in improved producers' knowledge and learning (Yessoufou et al, 2022). However, many opportunities are still unexplored at the level of agricultural systems, the market, policies and institutions to accelerate the rapid adoption of CSA solutions and sustainable production for smallholders. This paper presents avenues developed from stakeholder consultation for scaling options of CSA in Senegal along AICCRA impact pathways.

1. Actions to encourage the scalability of the innovations and interventions in AICCRA-Senegal

The efficacy of interventions to be scaled up have been supported through locally generated evidence, obtained either through pilots, demonstration or experimental projects, or through their initial introduction in a limited number of sites (e.g. Daga Birame, Thiel, Meouane). There has also been a lot of focus on institutional capacity building for sustainability, with three major components of innovations were supported: (1) technologies and products (e.g. AgdataHub, iSAT, seeds, etc.); (2) training and mentoring (e.g. climate risk training for professionals, awareness campaigns, business incubation in CSA); and (3) Community of Practices (orgware). The following key elements are being implemented to scale innovations:

a. Environment and action plans are promoted. Plans based on solid evidence developed by multiple partner institutions respond to the following key points: (i) addressing the high priority issues as highlighted by scoping studies (Kumar et al, 2022, Chan et al, 2022); (ii) cost-benefit analysis; (iii) ensuring the compatibility with existing values, standards and facilities (e.g. codesigning for adjustment to the national training curricula); (iv) demonstrate using small scale interventions for eventually scaling; and (v) developing consistent planning actions to deal with spontaneous scaling and scaling-up strategies, along with associated timeline.
b. Each intervention is planned with lens on sustainability and scaling. This requires: (i) making strategic choices to support vertical scaling (institutionalization) by targeting policy (e.g. gender action plan) or other systems changes that institutionalize innovation at the national- or subnational-level (e.g. the institutionalization of Agdata hub in partners' activities, private-public partnerships which that include research-extension-communication and financial instruments to support small enterprises, responding to climate change issues in their business model); (ii) making strategic choices to support horizontal scaling through replication in different geographic locations, agroecological zones or/and farming systems, (e.g. providing CIS to vulnerable livestock herders).

2. Major contributions of AICCRA Senegal to the scaling of CSA

2-1. Broadcasting and diffusing climate information

The application of CIS in farm decision making has been shown to be an effective approach in climate change adaptation and risk management (Partey et al, 2018, Zougmore et al, 2018). In Senegal during 2022, AICCRA partners broadcasted 18,994 climate information voice messages in local languages (Wolof and Pular) and reached 2720 farmers (of which 23% were women), using the iSAT system (Kebe et al, 2022).

Considering the exponential increase of new communication technologies in developing countries including Senegal, ICT has become a key tool in the dissemination of climate information

(Belloumi, 2014). Lessons learned from previous initiatives, (e.g. the USAID-funded CINSERE project) provide recommendations for delivery of CIS, including the involvement of private sectors in the chain of CIS production as well as its delivery (Ouedraogo et al, 2018).

Senegal's digital ecosystem is made up of private companies that develop applications offering digital solutions and there are several initiatives geared towards increasing agricultural productivity utilizing digital technology. For instance, FAO have supported ANCAR in the development of an e-advisory application through its Agricultural Services and Digital Inclusion in Africa (SAIDA) project which provides real-time information with the help of modern tools (FAO, 2022). AICCRA also partnered with a digital information provider and agri-tech startup JOKALANTE to disseminate climate information and agroadvisories. This partnership enhanced opportunities for farmers and producers to access information via interactive voice response systems (IVR) (Kebe et al, 2022, Carney, 2022).

Radio broadcasting also made it possible to reach a large number of beneficiaries with 274,677 producers (50% women) reached in collaboration with URAC (Yessoufou et al, 2022). Other indirect effects were increasing awareness of CSA practices through farmer field days and on farm trials where climate change adaptation technologies were demonstrated. This facilitated the spillover of AICCRA technologies beyond the initial intervention zones. Future efforts will aim to: 1) harmonise the approaches used by the project partners for the dissemination of radio messages (content of the messages, frequency and methods of sending the messages, etc.); 2) includes interactive radio programming where producers can call in to ask questions and share their experience; and 3) complement dissemination through web radio and other social media (e.g. TikTok).

2-2. Capacity building and knowledge sharing

The sustainability and scaling up of CSA technology and practices informed by climate information also relies on strengthening the capacity of implementing partners and project beneficiaries. The AICCRA project included a focus on capacity building, including training of trainers for 30 extension agents and 35 lead farmers in the dissemination of climate information. Field agents were trained in CSA innovation capacity and in monitoring and evaluation. A strong collaboration was set up in capacity building between CERAAS and ANCAR in strengthening agents on demonstration plot trials. Cross colloboration between intstitutions strengthens joint research and backstopping activities on gender and monitoring and evaluation studies.

AICCRA training modules for effective technology exchange and in climate risk management were developed to support the project actions and reinforce strategic partnerships between stakeholders. The AICCRA project managed to provide high quality training on climate risk management, improved varieties, production techniques, and improved milk and meat production practices. The trainers included public authorities, livestock services, private organizations in the agricultural sector, farmers' organizations, ISRA, rural radio, ANCAR, and universities, also providing collaboration opportunities between project partners. Youth entrepreneurship is further strengthened with training opportunities to equip women and young people with the means to improve their income and facilitate access the market.

2-3. Demonstration plots and innovation platforms

More than 20 technologies including improved cowpea (cvv. Leona, Thieye), millet (cvv. SL169, SL28, ICMH177111, SL423, TAAW) and grounddnuts (cvv/ 78-936, Taaru, Raw Gadue, 55-437, Jambar, Tosset, Fleur11, Kom kom); good agronomic practices invoving agroecology principles; options for animal rearing; and digital platforms for agroadvisory generation and dissemination were tested and promoted in the AICCRA project areas through demonstration field plots and the innovation platform of Kaffrine from CCAFS in AICCRA. CSA technologies were also disseminated in technology parks in Meouane, Thiel and Daga Biram, where

around 108 demonstration plots were implemented in 18 villages combining improved millet and groundnut cultivars with organic fertilization techniques. Additional demonstratoins included: agriculture-livestock integration, including crop rotation, composting and management, fodder production and preservation, dairy management and processing techniques.
Demonstration parks comprised of options for sustainable crop production, as well as post-harvest practices in farms. To reinforce data collection quality and support CSA packages, rain gauges were provided in 20 communities. It also served as local farm experimentation and practical learning for farmers, seed producers, technician and extension staff, which enhanced the capacity of existing local learning centers in Senegal but also established an innovative local knowledge bank for stakeholders.

2-4. The gender inclusion perspective: A model for generating future business and improving women's access to resources

Futhermore, the strategy for scaling up AICCRA technologies and practices should take into account gender issues, especially when it comes to agricultural inputs (Songwe et al., 2022), for instance in property rights over seeds. Meanwhile, many practical cases are showing that access to technologies is unequal and women remain more disadvantaged than men.

Previous studies show that radio contents and timing can be designed to better target the gender aspects (Yessoufou et al, 2022). The major constraint encountered regarding the gender dimension is land access and this can be resolved through community ownership of land, access to land through women producers' associations, establishment of a management system within the household through crop rotation where women can finance land for the production of cashcrops (peanuts for example).

Women face particular challenges in the agricultural sector, being more vulnerable to the effect of climate change but also in having less access to information and financing. Considering these challenges, the AICCRA project implemented a gender smart accelerator challenge to promote entrepreneurship with a strong gender component and aimed at providing a business readiness program to the selected companies. Selected candidates (20 selected out of 240 applications) received comprehensive training on business and investment as well on CSA and CIS approaches. The final event consisted of a pitch day where they presented their companies and business models to investors. Six winners were identified on the basis of the sustainability of their model, their investment perspective, their environmental impacts and their gender and social inclusion plan. Although this approach proved effective, much remains to be done for promoting entrepreneurship and economic empowerment (Vallejo & Wehn, 2016). Limitation in accessing credit by women is illustrated by the strong correlation between gender gaps in agricultural productivity and gender entrepreneurship in Senegal (World Bank, 2023).

2-5. Partnerships for scaling up

The coherence of implementation of project actions in different areas relies on the synergies between different key institutions in achieving the desired impact. ANACIM (meteorological service), ISRA-CERAAS (research), JOKALANTE (agritech), ANCAR (extension system) and URAC (media) worked together to develop integrated CIS and CSA technologies and processes. As well, WIC Senegal supported the business readiness program and AECF supported the grant and the investment program. By linking activities of the different partners and through strong collaboration the resilence of farmers to climate and economic risks can be reinforced (Minh et al., 2020). CNCR offers opportunities through its 32 members structures to disseminate interventions over the entire country. Implementation of activities would have to involve leaders of producers' organizations, local elected officials and other stakeholders of the project. This synergy of actors will build on three major points: influencing policies, strengthening the capacities of institutions and adapting sustainable social and institutional changes.

3. Looking forward

The project has a process to document the process and impacts of the described interventions and scaling processes. There are also campaigns to build broad awareness across the project.

Beyond the structural dimensions of formulating the impact path of the project, important constraints are to be underlined, in particular, the lack of sufficient field teams for the effective monitoring of project activities. This lack of field agents impacts the monitoring of producers for compliance with protocols in certain localities of the project and this negatively influences the results of pilot activities. Networking with SDDR teams can complement the staffing gap in the project interventions.

Table 1 presents an outline of stakeholder participation in their roles for the scaling up strategy. Innovation platforms could be used as a means to facilitate the scaling up of project technologies. If this platform proves to be an effective way to make the technologies known and adopted by a large number of beneficiaries and non-beneficiaries of the project, it could be duplicated in the other areas of intervention.

Moreover, quantitative studies and the analysis of the perceptions of producers on the CSA practices and technologies of the project serve as the reference base for measuring the impacts of the project. These results serve to minimize adoption costs and resist the pressure to rapidly scale up the intervention when its effectiveness and feasibility are not fully established.

Participants of scaling strategy workshop at Saly, 28 Feb-March,1 2023

Table 1: Concerted actions, roles and responsibilities of project partners and other stakeholders

Technologies & innovation	Actions to be taken as part of the scaling strategy	Implementation Partner	Other key partners	Intended outcomes Indiators the actions	Monitoring indicators
Climate services	Capacity building and animation of actors	ANACIM	ANCAR, SDDR, JOKALANTE, ISRA, MLOUMA, URAC, FO	- Good Target Identification - Module validation - Holding of training sessions & animation	- Number of actors - Training module - Number of sessions
	Reorganize and operationalize GTPs	ANACIM	GTP Members	- Diagnostic study of GTP functionality - Dissemination to members - Empowering GTPs - Development of the annual GTP calendar	- Diagnostic report - Validated template and calendar - Number of meetings per period and shared newsletters
	Agreements with community radios	URAC	ANACIM	Identification of the radio stations in intervention areas - Agreement on conventions - Agreement on content and style of delivery	- Signing of agreements - Number of agreements signed - Number of partner radio stations
	Development of Communication Content	ANACIM, ANCAR	SDDR, ISRA key producers, FO, relay, badjiane gokh, religious leaders, customary chiefs	- Identifying content axes - Definition of communication strategy	- Records
	Dissemination of information	URAC, JOKALANTE, MLOUMA	SDDR, ANCAR, ISRA key producers, FO, relay, badjiane gokh, religious leaders, customary chiefs	- Understanding the key information - Synergy of actions between stakeholders	- Number of producers - Number of advisories
	Reduce constraints: risk analysis, data scaling, data preparation, forecast preparation in new areas -	ANACIM	ANCAR, JOKALANTE, URAC, GTPs	- Product adoption in project areas before outdoor scaling	- Number of users - Number of listeners - Number of messages sent
	Translation of climate information	ANACIM	JOKALANTE	- Translated climate information is available	- Number of messages translated into local languages
	Climate information transfer	JOKALANTE ANCAR	CNCR, URAC, GTP, TV, ACF	- Translated climate information is transferred to users	- Number of users affected
	Information production (forecast)	ANACIM		- The forecast is available	- Number of newsletters produced
Improved varieties and good practices (millet, groundnut, cowpea)	Pre-basic production of target varieties	ISRA	DISEM	- Availability of early generation seeds - Resources mobilized	- Quantity produced - Number of varieties available
	Production of certified seed of the targeted varieties	Farmers organisations	SDDR, DRDR, DISEM, ANCAR	- Seed multiplication - Means of control	- Quantity produced - Number of varieties available - Number of beneficiary organizations and producers
	Disseminating good practices	ANCAR	Producers, community radios, ANACIM, ISRA	- Existence of media - Expression of need - Stakeholders buy-in - Adapted best practices	- Number of producers trained; - Number of media available
	Improve enabling environment: Advocate with ISRA for the	RESO	ISRA, Seed operators, DISEM,	- Pre-base available on time, - Availability of fertilizers	- Quantity of early generation seed produced,

	production of early generation seeds/Supporting DISEM for seed control/Training of technicians and growers for seed multiplication/ Enhance the CSA innovation platforms		URAC, JOKALANTE, ANCAR	and plant protection products, - Demand for seeds to trigger production - Demand also for pre-basics - Removing human and infrastructural resource constraints to improve the availability of pre-basic at ISRA	- Quantity of certified seeds produced - Number of trained actors using good practices in seed production
	Expression of needs of seed producers	ANCAR, DISEM	FOs (approved producers)	- Producers' needs are known	Quantity of seed requested
	Seed production and packaging	ISRA	FO (Licensed Producers)	-Early generation seeds are available	Quantity of pre-basic seed available
	Facilitating access to seeds for producers	ISRA-CERAAS	OPF	- Cheaper certified seed is available for PO members	- Number of members with access to seeds; - Quantity of seeds distributed
Good milk and meat production practices (milking, shelter, animal feed)	Improve nutrition and water resources	Breeders	Municipalities, Breeding service, , ISRA, ANCAR, Water and forests, CSE	- Crop residues recovered. - Community awareness	- Amount of fodder produced - Number of water points created - Number of breeders identified and included
	Improve animal health (Disease identification training, participation in vaccination campaigns, training on prevention and isolation methods)	Livestock Service	Breeders, AVSF, veterinary clinics, ANACIM	- Availability of veto products	- Number of producers trained
	Promote animal housing	Breeders	Livestock service, ANCAR, AVSF	- Targeted breeds (climate-adapted) identified - Feed availability	-Livestock quantity -Development of stables -Number of carcasses
	Production of quality fodder (Formulation of adequate rations)	ISRA, ITA	ANCAR, SRELPA Mini-dairy, LDB	- Functionality of pastoral hydraulic structures - Seed availability and fodder reserve - Control of animal health	- Quantity of fodder produced - Quantity of milk collected -Average daily earnings
	Fodder production (dual-use varieties, fodder crop)	ISRA-CERAAS	FO, SRELPA, CSE	Quality fodder is available	Quantity of fodder (in ton) produced
	Ration formulation for livestock	ISRA-CERAAS	SRELPA	Rations for livestock are available	Types of rations formulated
	Livestock management (milking wharf, hygiene, and health) and genetic improvement	ISRA-CERAAS	SRELPA		Quantity of quality milk and meat produced
	Collection, processing and packaging of dairy products	ISRA-CERAAS	Farmer organisation	Dairy products are available	Type and quantity of dairy product processed
Training modules for project actors	Develop and implement modules on "using climate data"	ANACIM	ANCAR, SDDR, JOKALANTE, ISRA, MLOUMA, URAC, FO	- Good identification of trainees - Module validation Holding of training sessions & animation	- Number of actors - Training module Number of sessions
	Increase the processing capacity of milk-derived products	Breeders	Livestock service, ANCAR, AVSF	- Availability of processing and conservation equipment	-Quantity of milk-derived products
	Develop and implement modules on "*Concept and practices of agro-climatic innovation and resilience*"	Universities	ANCAR, ANACIM, MLOUMA JOKALANTE ISRA	-The needs of the actors are well identified -The construction of the module is well prepared	- Number of Training Modules - Number of training sessions organized - Number of participants
	Develop and implement modules on "*Group*				

	Dynamics and Agro-Climate Leadership"			-Training sessions are well planned, implemented and evaluated	- Number of women who participated
	Develop and implement modules (building block) on "*agro-climate-smart practices*" from the Capitalization of actions and project implementation.	Project Management	University ANACIM ANCAR ISRA	The results of the mid-term evaluation available Performance of the capitalization process: *core competencies, effective participation and contribution of other actors*	- Number of Training Modules - Number of Training Modules inserted in training curricula
	Training producers on use of climate information and Crop insurance)	Universities and all technical structures and FO	Producers and technicians	Availability of training Request for training expressed	- Number of training courses completed] - Number of producers trained
	Understanding Climate prediction	ANACIM	JOKALANTE	Training modules and trainers exist	-Number of training courses completed
	Training on good cultural practices	ANCAR-RESOPP	DISEM, CNCR, JOKALANTE	Training modules and trainers exist	-Number of people trained
	Training on seed legislation	DISEM	ANCAR-ISRA	Training modules and trainers exist	-Number of training courses completed
	Training on dairy herd management and forage production	ISRA-CERAAS	SRELPA, ANCAR	Training modules and trainers exist	-Number of training courses completed
	Training on processing, hygiene (ITA) and preservation of products	ITA	FO, ANCAR	Training modules and trainers exist	-Number of training courses completed

CONCLUSION AND RECOMMENDATIONS

A common understanding of scaling up and defining the roles and responsibilities of partners in disseminating the project's CSA technologies and practices is a key factor for the achievements of AICCRA project. Recent progress made by project partner in implementing activities confirm that important steps has been done to increase productivity of crops and livestock and farmers resilience to climate change. In view of the promising results from the pilot activities and the constraints to good agricultural and livestock productivity, identified in the baseline studies and preference analysis, an effective and sustainable scaling up strategy of CSA practices will significantly increase productivity and generate greater impact in the intervention areas through available, affordable and accessible quality inputs and also a modern responsive communication approach.

Outlines of roles and responsibilities address access to seeds, strengthening synergies between stakeholders for the sustainability of project actions, integrating gender and social inclusion issues and defining monitoring and evaluation indicators.

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Acronyms

ACF	Action Contre la Faim
AICCRA	The CGIAR Climate Research Impact in Africa
ANACIM	Agence nationale de l'aviation civile et de la météorologie
ANCAR	Agence Nationale de Conseil Agricole et Rural
AVSF	Agronomes et Vétérinaires Sans Frontières
CNCR	Conseil national de concertation et de coopération des ruraux du Sénégal
CIS	Climate Information service
CSA	Climate Smart Agriculture
CSE	Centre de Suivi Ecologique
DISEM	Division des Semences

FO	Farmer organisations
GTP	Groupe de travail pluridisciplinaire
iSAT	Intelligent System Advisory Tool
IVR	Interactive Voice Response
ISRA-CERAAS	Centre Régional d'Excellence sur les céréales sèches et cultures associées de l'Institut Sénégalais de Recherches Agricole
ITA	'Institut de Technologie Alimentaire
LDB	Laiterie du Berger
RESO	Observatoire de population, santé et environnement du Sénégal
RESOPP	Réseau des Organisations Paysannes et Pastorales
SDDR	Services Départementaux de développement Rural
SRELPA	Service Régional de l'Elevage et des Productions Animales

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