SCALING OF CLIMATE-SMART AGRICULTURE VIA CLIMATE-SMART VILLAGES IN SOUTHEAST ASIA: INSIGHTS AND LESSONS FROM VIETNAM, LAOS, PHILIPPINES, CAMBODIA AND MYANMAR

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Working Paper No. 376

CGIAR Research Program on Climate Change

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Abstract

This strong correlation between agriculture and climate change has led to the emergence of climate-smart agriculture (CSA) that seeks to balance agricultural productivity within the bounds of our climate. The CSV approach is participatory research for development approach that serve as testing ground for best context-specific CSA technologies and practices. International organizations have identified scaling of agricultural innovations as a priority agenda. In 2015, CGIAR-CCAFS began expanding the CSV approach in Southeast Asia with the establishment of seven CSVs in the region. Through the efforts of various partners, these CSVs have grown to 90 CSVs. This paper is presented as synthesis of the diverse experiences of the CSVs in Southeast Asia. The authors have reviewed key publications generated since 2015 in order to draw highlights and key lessons on scaling CSA via the CSV approach. The pathways of scaling can be through knowledge transfer, policy incidence and commercialization. Scaling can also be technology-driven and institution-driven processes. In the experience of the CSVs in Southeast Asia, a combination of various approaches was implemented to achieve scaling of CSA via CSVs. The CSVs have leveraged knowledge transfer activities via farmer-farmer to engagements and roving workshops. The CSVs also maximized the opportunities in national policies where it can mainstream CSA and CSVs. Policies such as Vietnam's *Nong Thon Moi* national rural development program, Myanmar's Climate-Smart Agriculture Strategy and the Philippine Department of Agriculture systemwide program called Adaptation and Mitigation Initiative in Agriculture, are all significant policy drivers of scaling CSA via CSVs in these countries. Albeit, on its early stages, the CSV in the Philippines and the work of IIRR in Cambodia have also utilized an economic, market-driven approach to scaling specific CSA options for these communities.

Keywords

scaling; climate-smart agriculture; Climate-Smart Villages; CCAFS; Southeast Asia; agriculture development policy

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Acronyms

AMIA	Adaptation and Mitigation Initiative in Agriculture
BCCP	Biodiversity Corridor Conservation Project
CCAFS SEA	Climate Change, Agriculture and Food Security in Southeast Asia
CSA	Climate-smart agriculture
CSV	Climate-Smart Village
DAFO	District Agriculture and Forestry Office
MAF	Ministry of Agriculture and Fisheries (Laos)
MCSAS	Myanmar Climate-Smart Agriculture Strategy
NAFRI	National Agriculture and Forestry Research Institute
NTM	National Target Program on New Rural Development or Nong Thon Moi
PAFO	the Provincial Agriculture and Forestry Office

Introduction

The tropical region is most at risk of climate change-related events such as typhoons, heat and drought, saltwater intrusion, among others (FAO, 2018). Notably, developing nations in Southeast Asia (SEA) such as Myanmar (ranked no. 3), Philippines (no. 5), and Vietnam (no. 9) are among the most vulnerable countries in the world according to Global Climate Risk Index (Eckstein et al 2019). Developing countries are most vulnerable due to their limited resources in coping with the effects of climate change (OECD, 2003). It is also worth noting that 80% of the world's poor rely on agriculture (Castaneda et al, 2018).

According to the United Nation's 2030 Agenda on Sustainable Development, SDG 2 aims to eliminate hunger, achieve food security and nutrition, and promote sustainable agriculture. But without intervention, the world's agricultural production and food security are at risk. For example, global estimates on yield loss of rice without adaptation would be at 6% to 15% in the 2020s and 2080s, respectively. However, losses can be managed to around 3% to 6% when adaptation measures in nutrient management, irrigation, and crop calendar are implemented (Aggarwal et al, 2019).

This strong correlation between agriculture and climate change has led to the emergence of climate-smart agriculture (CSA) that seeks to balance agricultural productivity within the bounds of our climate. As defined by FAO at the Hague Conference on Agriculture, Food Security and Climate Change in 2010, CSA seeks to integrate three dimensions of sustainable development (economic, social and environmental) and is based around three main pillars—(a) sustainably increasing agricultural productivity and incomes, (b) adapting and building resilience to climate change, and (c) reducing and/or removing GHG emissions where possible. It has been designed to identify and operationalize sustainable agricultural development within the explicit boundaries of climate change (FAO 2013).

CSA acknowledges that there is an increasing risk of climate change and variability to agriculture as manifested by increasing frequency, intensity and uncertainties of climate-related seasonal and long-term environmental changes such as storms, precipitation, long dry seasons and shorter monsoons. As climate risks are not experienced the same across various agro-ecologies, CSA deemed it important to be location-specific, CSA needs to be embedded into the unique characteristics of the local context. CSA is not a "one size fits all" approach in making agriculture more climate-smart CSA in itself is highly diverse and context specific (Neufeldt et al, 2015).

CSA approaches at the community considering its location specificity can be a combination of improving farm management, crop varieties, livestock and fisheries implemented at various scales—from farms to landscapes. CSA puts a premium to landscape restoration, soil, water and agro-biodiversity conservation to create a more conducive and sustainable agro-ecology for more climate resilient farms. Finally, CSA also includes activities that strengthen service providers such as providers of capacity development and finance that will allow farmers to shift towards CSA. (CCAFS, FAO, 2014)

Several promising Climate-Smart Agriculture (CSA) technologies and practices have been developed by researchers throughout the years. The Consultative Group for International Agricultural Research (CGIAR) has been at the forefront of this in collaboration with national and international research institutions. However, proving them effective in pilot studies may not be enough to address the real-world climate crisis. Such interventions need to be scaled up to provide sustainable solutions to a broader population (Koerner et al, 2020c). CGIAR's Research Program on Climate Change, Agriculture, and Food Security (CCAFS) works with a diverse group of partners to address the challenges in agriculture and food security brought about by global warming. To achieve its goals, a strategy which has garnered momentum is the Climate-Smart Village (CSV) approach. It aims to generate evidence to bring tailor-made CSA interventions to target communities through participatory research and evaluation (Aggarwal et al, 2018). Since 2012, the CSV approach has been implemented in various parts of the globe including Africa, South Asia, and Latin America. In SEA, CCAFS has found success in scaling up CSA interventions via the CSV approach through government partnership.

The CSV approach is participatory research for development approach that serve as testing ground for best context-specific CSA technologies and practices. Farmers need to continuously assess technologies and adjust them as necessary according to changing conditions (IIRR, 2000). Therefore, these learning sites are essential to sustaining impact. CSV sites have been implemented globally since 2012 (Aggarwal et al 2018). An 8-step guide on setting up CSVs has also been developed (Sebastian et al, 2018). This 8-step guide is a general approach to CSV establishment tailored for the southeast Asian context. In some of the countries, this general guide was further modified to maximize the policy and program context in which the CSV can be anchored. CSVs have been mainstreamed into national programs in the Philippines (AMIA) and Vietnam (NTM), and in new donor-funded projects in Myanmar (IDRC), Laos (WFP), and Cambodia (ADB). Other partners such as ASEAN-CRN and SEARCA are also supporting scaling efforts of CSV.

However, Halbherr (2019) critiques the CSV's linear approach which focuses on AR4D research objectives rather than development goals, as project-driven development activities

have often been criticized (Gündel et al, 2001). Hartmann and Linn (2008) lamented the lack of documentation on failed efforts since much of the literature focused on examples of successful scaling up. Successful scaling efforts are realized through achieving milestones. However, focusing merely on number of users or beneficiaries will not be enough. The better indicator of success in scaling is to look at the outcomes and their impacts at various levels, in order to observe whether expected benefits have actually materialized or not, and also to draw lessons from inadvertent outcomes.

Various tools have been developed to facilitate institutions in their scaling efforts. Also, a set of principles on scaling have been commonly applied based on CCAFS's experience. However, the same demonstrates that scaling is complex since adoption does not depend on a single intervention and is influenced by several factors, therefore pre-defined pathways are not always applicable (Koerner et al, 2020b). Tailored evidence and learning are crucial to make scaling efforts more efficient (Koerner et al, 2020a).

In this paper, we present the contribution of CCAFS in bringing to scale CSA technologies and practices through mainstreaming of the CSV approach into both government, non-government and private sector engagement. We will also discuss the insights and lessons generated from the experience.

Methodology

CCAFS started the concept of CSV in 2012 with the launch of CSV sites across Africa and South Asia (Aggarwal et al, 2018). CSVs primarily serve as a learning platform and field laboratory for testing CSA technologies and practices through PAR. In 2015, CCAFS began expanding the strategy to Southeast Asia with the establishment of seven CSVs in the region, namely: Guinayangan (Philippines); Ma, My Loi, and Tra Hat (Vietnam); Phailom and Ekxang (Laos); and Rohal Suong (Cambodia) (Sebastian et al, 2019). From the work of IIRR in the region, it further implemented the CSV approach in the region where it established four CSVs in Myanmar. IIRR also implemented at scale various CSAs in 2 large provinces of Koh Kong and Mondul Kiri in Cambodia. IIRR has leveraged its existing country programs in the region to scale CSVs and CSA.

CCAFS also developed a brief that systematized the key processes in establishing CSVs. (Sebastian, et al, 2019). The process takes on 8 steps as follows: determining the purpose and scope of CSV; identifying the climate risk in the target area/s; locating the CSV in a small

landscape; consulting the stakeholders; evaluating the CSA options; developing portfolio; scaling-up; and monitoring and evaluating uptake and outcome.

In this paper we analyzed the diverse experiences of the CSVs in southeast Asia. The authors have reviewed key publications generated since 2015 in order to draw highlights and key lessons on scaling CSA via the CSV approach. Table 1 presents the key documents included in this synthesis.

Table 1. References Included in the Synthesis

Country	Scaling Pathways	Lead Agencies	Reference Documents
Vietnam	Knowledge transfer, Policy integration	CIAT	Bui LV, Vu TB, Talsma T, Spillane C, Do TTH, Nguyen TC, Trieu HL, Galina B, Peter M, Nguyen TH. 2021. Scaling the Climate-Smart Village model in national-level programs: The recommendations for adoption in the implementation of the Nông Thôn Mới (Vietnam's National Target Program on New Rural Development) 2021-2030 Strategy. CCAFS Info Note. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). https://cgspace.cgiar.org/handle/10568/114949 Bui LV, Vu TB. 2020. A systematic review of Climate-Smart Agriculture (CSA) practices and recommendations for adoption in the implementation of *Nong Thon Moi* in the 2021-2030 Strategy. Science and Technology Journal of Agriculture and Rural Development. Special Issue of November 2020 "Climate Change and Sustainable Agricultural Development". 154-166. In Vietnamese. English available at: https://cgspace.cgiar.org/handle/10568/111530 Bui LV, Imbach P, Talsma T, Tran HT, Tran CT, Nguyen NL. 2020. Assessment of climate change impacts and issues to support the making of new Nông Thôn Mới (Vietnam's National Target Program on New Rural Development) criteria for the 2021-2030 Strategy. CCAFS Working Paper no. 328. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: https://hdl.handle.net/10568/110444
Laos	Knowledge transfer	IRRI	Wassmann R, Villanueva J, Khounthavong M, Okumu BO, Vo TBT, Sander BO. 2019. Adaptation, mitigation and food security: Multi-criteria ranking system for climate-smart agriculture technologies illustrated for rainfed rice in Laos. Global Food Security 23: 33-40. ISSN 2211-9124. DOI: https://doi.org/10.1016/j.gfs.2019.02.003. WFP, IIRR. 2020. Towards a climate-smart and community-driven school feeding program: WFP-IIRR Scoping Mission Report to WFP Project Sites in Phongsaly Province, Lao PDR.

			Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/111542
Philippines	Knowledge transfer, policy integration	IIRR	Koerner J, Bayot RS, Rosimo M, Vidallo R, Gonsalves J. 2019. Scaling the capacities to adapt to a changing climate: Experiences of the AMIA Climate Resilient Villages, Philippines. https://hdl.handle.net/10568/105717 Mendez KS, Vidallo RR, Rosimo M, Angeles DR, Bernardo EB, Gonsalves J. 2021. Learning Groups: refining technologies and social processes for climate resilient agriculture. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/114778
Cambodia	Market-based scaling	IIRR	IIRR, CEDAC. 2020. Small livestock: climate-smart, environmentally sound, economically empowering, gender-fair and transformative agricultural enterprises in Cambodia. A brief for decision makers. https://hdl.handle.net/10568/111538 IIRR, CEDAC. 2020. Resilience building against climate risks and impacts at community levels: A role for local financing mechanisms. A brief for decision makers. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/111540
Myanmar	Policy integration, knowledge transfer	IIRR	Htwe NM, The NEM, Naing NNZ, Hein Y. 2019. Documenting the application of the Myanmar Climate-Smart Agriculture Strategy. CCAFS Working Paper No. 292. https://hdl.handle.net/10568/106513 Barbon W, Myae D, Gonsalves J. 2021. Climate and nutrition-smart villages as platforms to address food insecurity in Myanmar, IDRC http://hdl.handle.net/10625/60655

Discussion

The AMIA Villages of the Philippines

In 2015, IIRR established the first CSV in the country in Guinayangan, Quezon. Various CSA interventions were evaluated via PAR. Farmer Learning Groups (FLG) were organized to facilitate farmer-to-farmer learning, where they participate in field testing of selected CSA options and regularly report to the group to discuss their experiences, and in turn are able to assist local extension workers in disseminating technologies and practices in their community. (Mendez, et al, 2021). IIRR also developed numerous information and education materials aimed at promoting the CSV approach and CSA options to a wider stakeholders in the Philippines and its country-level programs in Cambodia and Myanmar. (Gonsalves et. al 2020)

The Philippines adopted the CSV approach for its Adaptation and Mitigation Initiative in Agriculture (AMIA), the government's flagship program to integrate climate resilience into the agriculture sector. Drawing from the lessons of the Guinayangan CSV, the program initially identified 21 climate-vulnerable sites through modelling and participatory approaches, to serve as local platforms for action research and scaling of adaptation (Vidallo et al, 2019). As of 2021, 77 AMIA Villages at various stages of development have been established by DA-Climate Resilient Agriculture Office (DA-CRAO; formerly DA-SWCCO). The DA also committed to establish more AMIA Villages as a key strategy in building climate resilience in agriculture. (DA Communications Group, 2020)

AMIA's implementation has been described in detail by Vidallo et al (2019). Among the highlights were the CSA options tested (where native pig production has been widely adopted as an alternative livelihood, especially among women); mechanisms used to facilitate community adaptation (e.g., crop insurance, community seed bank, and community innovation fund); and climate risk management tools and advisory products (e.g., National Color-Coded Agricultural Guide Map, commodity-specific risk projections, 10-day weather and climate forecasts and advisories and region-wide CRVA outputs) developed with the AMIA program.

Despite widespread establishment across the country, AMIA Villages per se are still pilot villages, since they are essentially testing grounds with direct support from program and project implementors. CSA options are introduced and examined at the village scale to improve the resilience of farmers' livelihoods, focusing on the adoption of CSA options by individual farmer households. In order to achieve scale and sustainability, the DA is now

working to transform these AMIA Villages into Climate Resilient Agri-fisheries Technology-based Enterprises (AMIA-CREATE), which seeks to consolidate climate resilience production into a farmer-led enterprises at a much broader scale at the municipal, provincial, to regional levels. Engagement of the private sector is key to identifying a common product and market to develop. In 2020, DA partnered with IIRR to conduct a study to develop a sustainable agricultural enterprise in Guinayangan CSV as part of AMIA-CREATE expansion.

The *Nong Thon Moi* in Vietnam

The National Target Program on New Rural Development or *Nong Thon Moi* (NTM) in the 2010–2020 strategy has achieved great success, of which 57% out of nearly 9,000 rural communes have met the NTM standards (Central Steering Committee, 2020). However, it has not yet addressed the issue of climate change impacts in agricultural production in vulnerable rural areas (Bui et al., 2019).

The CSV model under the CCAFS program (2015-2018), which has been successfully tested in three major agroecological regions of Vietnam (northern, central, and southern) has potential to contribute to improving the Program in terms of enhancing capacities for climate adaptation and resilience in its 2021–2030 strategy.

From Ma CSV (agroecology 1) established by CCAFS in Yen Bai, the Vietnam National University of Agriculture has initiated development of CSVs in the two remaining agro-ecologies of the province through two research projects: VIBE 2018.05 project[1] (2019-2021) funded by the Irish Aid through the Embassy of Ireland and the NTM project[2] (2019-2021) funded by the Ministry of Agriculture and Rural Development (MARD). These projects jointly aim to: 1) conduct empirical research on CSV establishment in two out of three agro-ecologies of Yen Bai to create evidence for scaling; 2) mainstream CSV implementation into suitable NTM criteria for the 2021–2030 strategy to improve NTM's performance on climate adaptive and resilient rural communities; and 3) propose a multi-level, multi-stakeholder mechanism for best CSV implementation in the 2021–2030 strategy.

[1] NUI Galway – Vietnam National University of Agriculture (VNUA) Vietnam Ireland Bilateral Education Exchange (VIBE) Programme on Climate Resilient Agriculture & Environmentally Sustainable Landscapes

[2] Scaling climate-smart villages in Yen Bai province to promote implementation of climate-smart agriculture and One Commune One Product (OCOP) initiative of the National Target Program on New Rural Development in the 2021-2025 period

Bui et al. (2020) analyzed the opportunity of mainstreaming climate change adaptation issues in achieving the titles of *advanced* NTM and *demonstration* NTM. The implementation of CSA T&Ps within a CSV environment (Bui and Vu, 2020) would be essential for climate-vulnerable rural communities to enhance adaptive capacities and resilience as core conditions for achieving the two NTM titles, applicable to communes that have achieved the NTM title. A multi-level cooperation scheme (Bui 2021; Bui et al., 2021) has been proposed to leverage interactive coordination and cooperation of different administrative government levels in implementation of the *advanced* NTM and *demonstration* NTM titles across the country (Figure 1).

In this scheme, the *bottom-up* and *top-down* approaches need to be synchronized. At the grassroots level, the evaluation of available resources, needs for change and investment priorities is aggregated from all villages and reported to commune, then to district, up to province. Provinces, prioritized for enhancing climate adaptation and resilience, develop and submit synthesis reports to MARD for national evaluation and budget prioritization for implementation of the *advanced* NTM and *demonstration* NTM titles.

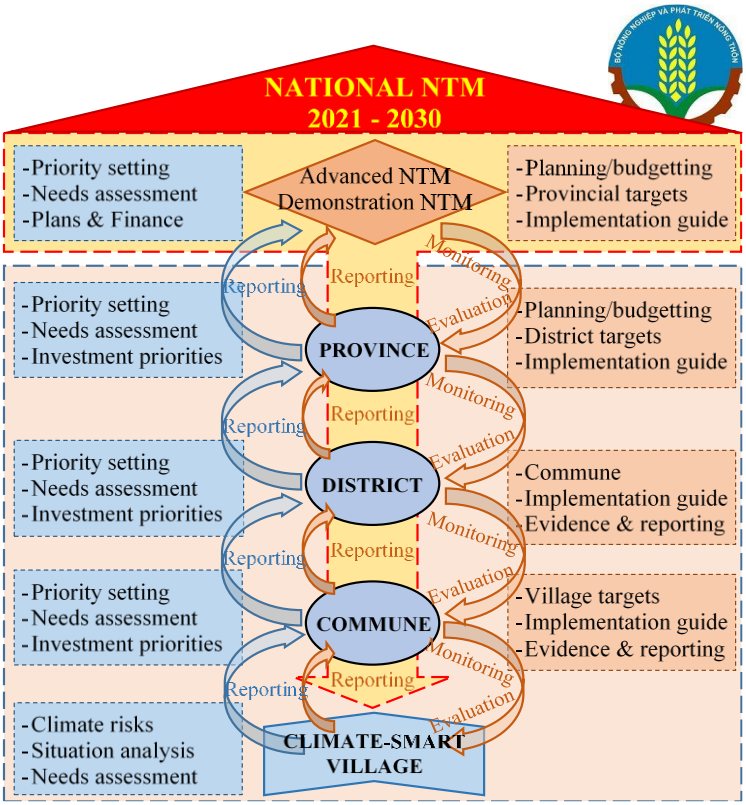

Figure 1. Multi-level coordination and cooperation framework for CSV implementation within the NTM 2021-2030 Strategy (Bui Le Vinh, 2021)

Whereas, the national NTM program needs to review and approve climate change adaptation indicators for achieving the two NTM titles for NTM accomplished communes in

areas of high climate risks. The six-step CSV implementation process and its components should be approved and developed into detailed implementation guidelines that can be flexibly applied in different locations with climate vulnerabilities. Based on the national plan for 2021-2030, the NTM program assigns specific targets to provinces with distinct climate risks. The provinces assign targets and tasks to districts, then to communes, down to villages. To achieve the targets and expected outcomes and impacts, the national NTM program needs to develop a set of multi-level guidelines for monitoring and evaluating performances of all implementation levels from central to grassroots levels. These guidelines should allow a flexible application at context-specific locations provided that the bottom-up reporting to higher management levels can still meet minimal requirements for synthesis reports. ME reports will be reviewed whether communes have proven their enhanced climate adaptive capacities and resilience before NTM titles are awarded.

Community-based Seed system in Laos

The National Adaptation Programme of Action (NAPA) and National Strategy on Climate Change of Lao PDR allowed for entry points for activities dealing with climate change. Activities were implemented in partnership with the National Agriculture and Forestry Research Institute (NAFRI), the Provincial Agriculture and Forestry Office (PAFO), District Agriculture and Forestry Office (DAFO) and Cuso International.

The Savannakhet provincial government partnered with IRRI, and MAF-NAFRI in identifying opportunities for developing Community-Based Seed System (CBSS), which has been well-received by the community. The CBSS was piloted in Phailom CSV in Savannakhet. In Phailom CSV in Southern Laos, rainfed rice covers more than 90% of the farmland. At a glance, it is evident that access to water is a priority to enhance cropping system and overall farming productivity. At this point, however, the plans for new irrigation schemes are rather vague, so that CSA has to focus on other strategies to increase production. On top of the endemic problem of water scarcity, the local weather patterns become increasingly erratic and unpredictable due to climate change. Especially the shorter duration and delayed start of the wet seasons exert consequential impacts in the dynamics of farming communities undermining food security and livelihoods.

The scaling pathway pursued for the Phailom takes into account that the land use systems are characterized by very low-inputs. Given the prevalent water scarcity, application rates of fertilizers and pesticides are very low at best. In turn, there are only few entry points to improve crop management and improved seed systems stands out almost as a default strategy that can be applied across scales.

Seed is a critical input in crop production and its quality determines agricultural production in this CSV. While the use of informally produced seed is generally of lower quality than certified seeds, there is also a large variation by farmer-produced seeds as a function of the insufficient purification from weed seeds and storage conditions. Thus, the centerpiece of the CSV Phailom was the establishment of a community-based seed system (CBSS) through the following components:

- A community seed bank serving as storage place
- A comprehensive training program (Farmers' Field Schools) and training material for farmers and extension staff
- Awareness raising through seed fairs

The training courses and material are intended to provide skills to local community seed producer group of farmers. Thus, community will have an inbuilt team of skilled individuals with the capacity to produce good quality rice seeds thus enhance community's seed security, improve incomes and livelihoods. The training curriculum is also complemented by the principles of good crop management, namely field preparation, weed management, nutrient management, pest/disease management, and post-harvest practices.

The seed fairs have been organized as a forum for farmers and other stakeholders to interact, share experiences and buy, sell or exchange rice seeds and learn from each other. The key features in the seed fair included display of seeds by farmers as well an open forum for discussion in which farmers, researchers and extension agents shared various issues related to rice seed production. The discussions focused on suitability of the seed varieties in light of climate change experienced in the region and specific challenges relating to rice seed in the Climate-Smart Village. Developing capacity of farmers on quality seed production is an important aspect of adaptation under changing climate. At the same time, extension workers play an important role in providing services to farmers on timely basis to manage quality seed production in clusters of neighbouring villages.

A promising knowledge product from the CSV undertaking in Laos is the multi-criteria ranking system, designed by Wassmann et al (2018) to provide an objective assessment of the effectiveness of an intervention. The ranking explains how a particular CSA practice was utilized effectively and how this usefulness was perceived by participants through research-based assessment. The method was initially demonstrated in rice-based CSA T&Ps, but may be used in others as well.

In 2020, IIRR together with World Food Program in Laos started an initiative to establish 5 CSVs in northern Laos. This effort is to contribute to WFPs strategic objectives stipulated in its Country Strategic Plan. These strategic objectives are: (a) school Children in remote rural areas have sustainable access to food by 2021; and (b) vulnerable households in climate sensitive districts are more resilient to seasonal and long-term shocks and stresses. IIRR provided technical assistance to WFPs country team and local partners to integrate climate resilient gardening initiatives to be integrated in the current school meal program of WFP and in promoting climate-smart agriculture to increased climate resilience in its agriculture productivity programs in the community. (IIRR, WFP, 2020). This initiative is an example of scaling CSVs and CSA technologies and practices within large-scale development programs of agencies such as WFP.

CSVs and the Myanmar Climate-Smart Agriculture Strategy

In 2015, CCFAS supported the formulation of the Myanmar Climate-Smart Agriculture Strategy. CSVs play an important role in the scaling up and out of climate-smart agriculture. CSVs act as hubs for climate-smart agriculture practices as well as demonstration of location/context-specific adaptation measures. As a policy document, it promotes agricultural investments in climate change adaptation and offers guidance in international climate negotiations (Htwe et al, 2019). With MCSAS, the Government's strategy in agricultural development moved from commodity-based to an agroecosystem-based, systems approach.

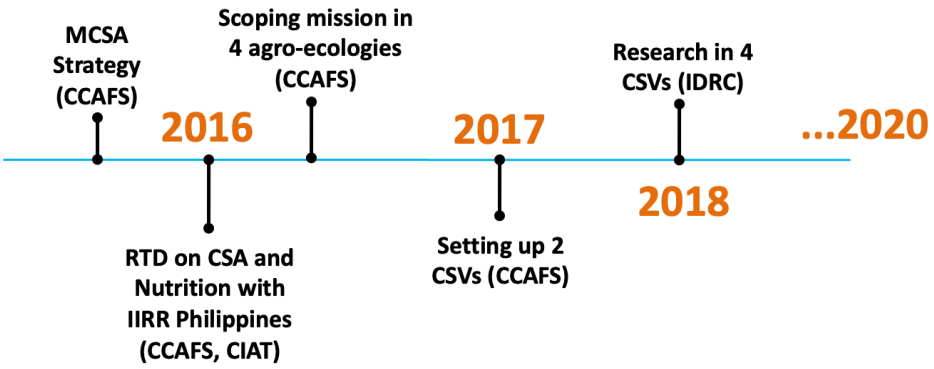

Figure 2. Timeline of the Myanmar CSVs

In 2016, through the support of CCAFS and CIAT, IIRR and its network of Myanmar NGO partners organized a round table discussion to consult the major government and donor agencies in the country to gauge the relevance of the CSVs in the development context of Myanmar. There was expressed interest among key stakeholders from the government and

international NGOs in the country given that the CSVs are identified as a major strategy under the 2015 MCSAS.

In the same year, CCAFS supported IIRR to conduct a scoping study in Myanmar's 4 agro-ecologies to better understand the on the ground context as well as the local development sector. The mission was able to identify key local NGO players and government agencies that play a strategic role in the establishment of the Myanmar CSVs. The scoping mission identified 4 potential sites for the CSVs including local NGO partners who will be leading the implementation on the field. The mission also noted and build initial engagement with the Yezin Agriculture University, the Department of Agriculture Research of the Ministry of Agriculture, Livestock and Irrigation and the Food Security Working Group, the largest NGO alliance promoting agriculture and food security agenda in the country. (Barbon et. Al, 2016)

Building on the recommendations of the scoping mission, CCAFS took it further by providing seed funding in 2017 to IIRR to establish 2 CSVs in the identified 4 agro-ecologies in Myanmar. These CSVs are Htee Pu CSV in the central dry zone and Ma Sein CSV in the Myanmar delta. IIRR conducted climate risk and vulnerability assessments and livelihood analysis to identify potential CSA options for these 2 CSVs. IIRR then leveraged this seed funding from CCAFS to access a research grant from the International Development Research Center (IDRC)- Canada to support action research in 4 CSVs in Myanmar in 2018. Four CSVs: Ma Sein (delta), Htee Pu (dry zone), Taungkhamau (uplands), and Saktha (hilly) were established to represent the country's four distinct agroecological zones. This action research until the middle of 2021.

Baseline research was conducted using participatory approaches to produce primers which were then used as information and education materials for local communities (Gonsalves et al, 2018). CSA options tested were participatory varietal selection (PVS) of legumes, household container gardening, small livestock raising, among others. IIRR conducted these activities to foster cooperation with its partners and to spur awareness and interest among smallholder farmers about climate change and CSA options. (Barbon et al, 2021a) IIRR believes that farmer-to-farmer knowledge-sharing from PAR and observation trials is key to adoption and out-scaling. The 3-year action research resulted to the systematization of the process of establishing CSVs in Myanmar, IIRR referred to as "socio-technical" methodologies and tools. The research also generated preliminary evidence of the contribution of climate-smart agriculture practices to household food security, diet diversification and poverty reduction. A number research papers were submitted to peer reviewed journals. (Barbon et, al, 2021b)

Although CSVs have taken a foothold in Myanmar with these developments, a few challenges remain. MCSAS has its own limitations (Htwe et al, 2019), namely: 1) the general lack of information on implementation, monitoring and evaluation, and long-term investments; 2) its narrow focus on climate change adaptation and mitigation; and 3) issues on accessibility and communication to improve the awareness of the Strategy in rural communities. In addition, Myanmar's agricultural extension system needs to be improved. Oo (2016) identified three main issues regarding the country's extension work: 1) the perception of Agricultural Extension as a profession; 2) the need for Human Resource development; and 3) its weak extension delivery methods.

Htwe et al (2019) suggested solutions for MCSAS to be further enhanced by developing sustainable and specific action plans in line with Agriculture Development Strategy (ADS); inclusion of other related issues to climate change and agriculture; exploring public-private collaborations; publishing outreach materials in both English and Myanmar language; and addressing the limited budget on extension activities. Also, the extension system can be improved by providing extension professionals with adequate methods of transport and communication, better incentives, and capacity-building on current extension approaches (Oo, 2016).

In addition, involving the private sector in scaling out of CSA may be explored. Private agricultural companies have extensive reach and constant presence in Myanmar, interacting with farmers on-the-ground. To further enhance reach, online information and communication tools such as the Greenway app may also be used to disseminate knowledge products written in both English and local languages. The app may also serve as a platform to consolidate fragmented information or as storage of knowledge products.

Mainstreaming CSA in the Biodiversity Corridor Conservation in Cambodia

Cambodia's Biodiversity Conservation Corridors (BCC) Project was intended to nurture climate resilient, sustainable, forest ecosystems which provide income and employment to project households in the biodiversity corridors of Cambodia. As many as 22 communes located across 10 districts with 14000 households in two provinces Mondul Kiri and Koh Kong were targeted. An estimated 2,600 households were to benefit from the Project with climate-resilient and diversified livelihood assets and/or income generating opportunities. IIRR and Cambodian Centre for Study and Development in Agriculture (CEDAC) were selected to conduct capacity-building and establish associated site-specific action research and demonstration sites, for drought and salinity resistant crops and water

conservation, family nutrition, establishment of village-based financing mechanism and marketing of agricultural products. The combination of these approaches was designed to increase income and build resilience to climate change. Special efforts were made to undertake action research to demonstrate and test climate change adaptation and mitigation approaches which offer opportunities to advance the economic empowerment of rural women.

The provision of financial protection against the impacts of climate-related shocks was undertaken through village development funds and savings groups (VDFSG) established across the province. It helped rural communities to better safeguard income and productive assets from climate shocks without resorting to costly coping strategies (such as selling assets) which compromise long-term resilience. As of July 2020, VDFSGs have 1,830 members in total, of which 66% are women. Among women members, 68% have availed of loans. Total savings capital stands at more than USD 608,000 from about USD 103,000 in 2016. The initiative has supported demonstration farms of native chicken (48 households in Koh Kong, 41 in Mondul Kiri), semi-commercial homesteads with fruit trees using CSA approaches (428 in Koh Kong, 344 in Mondul Kiri), and home gardens with drip irrigation supporting market-oriented vegetable production (47 in Koh Kong, 34 in Mondul Kiri).

The BCC Project has supported a native chicken initiative, viewed as climate-resilient income generation project aimed at empowering the vulnerable. It has emerged as a CSA option particularly relevant to women, with two-thirds of the initiatives being women-led, often leading the efforts across the value chain. Growth was demonstrated over the period providing better links with markets. Adoption reached over 25 villages where clusters have emerged. The growth generated interest among various stakeholders up to the provincial level, who provided the animal health care services. The focus has been on local food systems creating new producer-consumer linkages within and between communes which were the primary scaling platforms. (IIRR, CEDAC, 2020)

Knowledge diffusion is primarily achieved through local champions and farmer-to-farmer learning. Capacity development and a funding mechanism; provided by the IIRR and CEDAC, and ADB, respectively; helped spur the adoption of CSA options. By ensuring that village loan mechanisms made savings (by individuals) a prerequisite to borrowing, better community accountability was ensured offering better prospects for continuity into the future.

Revisiting the idea of scaling

According to IIRR (2000), scaling is the process of delivering of quality benefits to a larger population and wider geographical area with emphasis on speed, equitability, and sustainability. The World Bank (2003) later offered a simplified definition, that scaling is about efficiency and coverage in delivering impact from small to large scale.

International organizations have identified scaling of agricultural innovations as a priority agenda (read World Bank et al, 2016; Koerner et al, 2020c; ACIAR, 2018; Lubotzki, 2018) towards realizing SDG 2030 (Koerner et al, 2018). Scaling up of interventions may pose a challenge since what works for a subset may not necessarily work for the whole (Sartas et al, 2020). Experts have recognized that new approaches are required to achieve sustainable impact at a large scale (Woltering, 2018; Lubotzki, 2018). The scaling-up process may be divided into four stages: development; controlled testing; real-world trial; and dissemination (Barker et al, 2016; Indig et al, 2018). However, the process is complex, and Woltering et al (2019) pointed out two major problems in achieving scale: 1) pilot projects done in controlled environments do not necessarily reflect the reality at scale; and 2) the narrow focus on technical replication and numbers of end-user beneficiaries can be misleading.

At grassroots levels, initiatives may spread naturally from peer to peer. Spontaneous diffusion can occur whenever there is a basic need for change (IIRR, 2000; Gündel et al, 2001b). On the other hand, a "context roof", such as existing institutional or socioeconomic settings, among others, may constraint scaling efforts to reach its highest potential (IIRR, 2000). In most cases however, scaling obstacles result from factors other than the actual technologies being tested.

An identified solution in a specific situation may not work in another (Koerner et al, 2020b). The adoption of an intervention is influenced by environmental and socio-economic uncertainties in real-world scenarios (Hajjar et al, 2019). For instance, institutional issues which normally dictate access to resources are beyond the farmer’s control (Mohan, 2001). A target area’s cultural, historical, and political settings may also vary especially on a national scale (Koerner et al, 2020c). Therefore, activities for scaling of CSA interventions must be implemented in a landscape systems approach, while taking into account inadvertent outcomes resulting from their implementation (Neufeldt et al, 2015; Koerner et al, 2020c). The importance of the CSV approach becomes apparent in this context, since it serves as a community-specific learning platform and testing ground for CSA while considering specific environmental, institutional, and socioeconomic concerns (Sebastian et al, 2019).

A simple count of household adoption at the end of a project is unreliable. For an intervention to be successful, the targets should be able to self-support and continue to evolve solutions even after funding has ceased (Woltering et al, 2019). Sustainability – defined as the ability of a system to continue over time without reliance to external support – and systems change are critical to successful scaling. Sustainability of the impact should be the focus, rather than the project's outputs. The key is to bring these to a scale where investors, donors, or potential partners would gain interest in investing into such activities (Koerner et al, 2020c). Local communities are encouraged to autonomously support themselves, whereas farmers must be treated as active participants and not merely recipients of aid (Malik, 2002). Monitoring and evaluation should also be dynamic and be able to operate with flexibility (Halbherr, 2019).

Aside from the process of scaling up, there is also the concept of dimensions in scaling up (IIRR, 2000, Frake and Messina, 2018; Gündel et al, 2001a; Neufeldt et al, 2015). Horizontal and vertical scaling up were differentiated as being geographical and institutional in nature, respectively. However, both dimensions of scaling up also generate positive feedback with one another, since interventions with widespread adoption create interest at higher institutional levels, whereas those which are integrated at higher levels have a better chance of widespread adoption. In addition, approaches to adaptation have been summarized by previous authors (see Halbherr, 2019; Hartmann and Linn, 2008) where limitations of both the centralized, hierarchical (top-down) and decentralized, individualistic (bottom-up) approaches have been identified. In order to address them, a relational (holistic) approach is needed that combines technological innovations with community engagement, addressing non-farm factors of vulnerability while also taking into account the needs of multiple stakeholders.

Wigboldus, et al, 2016 provided two general approaches to scaling. The first approach is the "push approach", other authors referred to as innovation driven scaling. It assumes that the proposed solution, this case climate-smart agriculture, has value to the target users and this value is enough basis to result to large-scale adoption of the solution. The obvious challenge immediately is that it misses the external dimensions that influence the how farmers assign value to a solution. The second approach is the "pull approach", other authors refer to as institution-driven. This approach puts more emphasis on creating the external enabling conditions for large-scale adoption of the solution. For example, putting premium prices for products produced through CSA, or putting incentives for early adopters such as tax exemptions. The idea is that the favorable enabling conditions will "pull" farmers to adopt the solution.

Three scaling up pathways have been proposed by Gurung et al (2016). There are comparable to those scaling outcomes classified by Bauman and Nutbeam (2013). However, note that these are also not mutually exclusive since an intervention may take multiple pathways to achieve impact at scale.

Knowledge-transfer pathway

The model requires an extension network to relay and exchange knowledge to adopt an intervention. Therefore, building inter-personal relationships are essential (IIRR, 2000). Koerner et al (2020b) also emphasized the importance of partners with the same vision and scaling mindset. The CSVs in Southeast Asia have implemented various approaches to scaling via a knowledge-transfer pathway. These are roving workshops and farmer to farmer extension such as farmer learning groups and farmer field days.

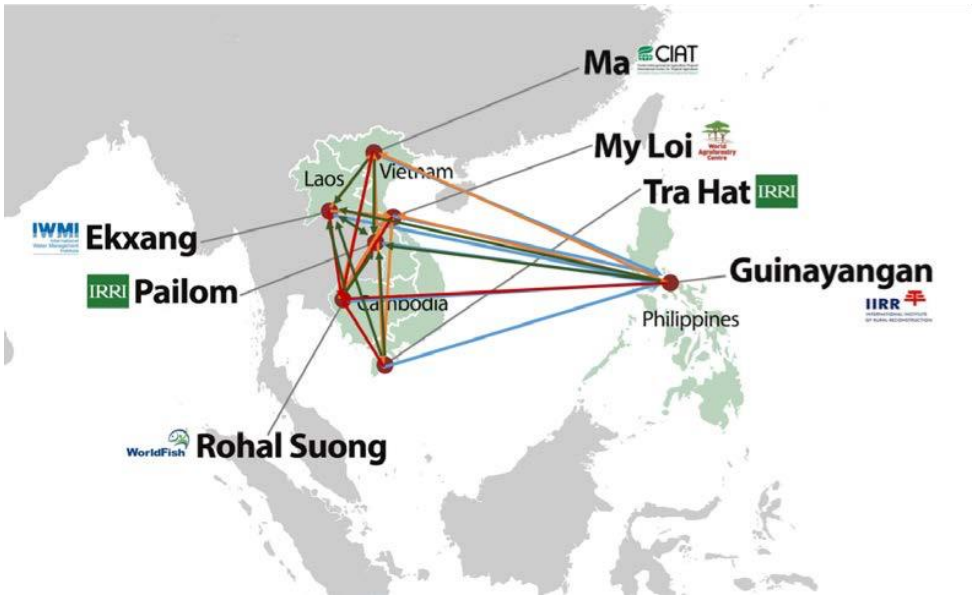

Figure 3. The Climate-Smart Villages in Southeast Asia where the roving workshops were organized (*Source: Trung et. Al, 2019)*

In 2015, CCAFS began exploring the roving workshop approach to foster a network of users in promoting CSVs (Figure 3). A roving workshop is a platform where the CSV farmers can learn from experts or from their peers through open, on-the-field training and field visits (Trung et al, 2019). It may be seen as a potential source of champions of the CSV approach, since the open-learning environment encourages building relationships with potential implementors, investors, partners, and advocates.

Guinayangan CSV hosted the first roving workshop in the Philippines. The local government of Guinayangan, Quezon has been actively supporting the CSV approach in promoting CSA, and have incorporated them in their local development plans. Thereafter, Vietnam,

Cambodia, and Laos have also hosted such events to highlight their CSVs and establish farmer networks involved in CSA. Since then, a total of 135 individuals have participated including local officials, staff from government and non-government organizations, extension workers, researchers, farmers, among others.

Farmers and community members acquire knowledge at two levels. One is an individual acquiring and increasing knowledge by doing it, the adage of learning by doing. The other way that farmers acquire knowledge is through their networks or groups—learning from others. Informal group learning is very evident in smaller groups or less organized communities. (Cho et al. 2018). This where Farmer Learning Groups (FLGs) that IIRR established in the Guinyangan CSV come to play. A learning group is an appropriate platform that will allow them to design a need-based strategy. Prior to adoption, a technology must be tested by small group of people through participatory action research. (Mendez, et. al, 2021)

In the Myanmar CSVs, IIRR has facilitated farmer learning sessions and farmer field days to nurture that informal exchange of knowledge among farming. During the field day, farmers visited to the school gardens, home gardens, crop performance trials and small livestock. Farmers are also given the opportunity to provide ideas, questions as well as share their future plans. The Farmer Learning Sessions are small group meetings facilitated by IIRR field researchers or with the assistance of local government specialists or extensionists. (Barbon et al, 2021) The aim of these farmer field days and learning sessions is to provide a venue for farmers gaining confidence to share their knowledge and build local farmer specialists that will serve as key “knowledge node” in the informal network of farmers within the community.

In the CSVs in Laos, IRRI conducted training programs for local farmers organized as community seed producers’ groups. IRRI also organized farmer field schools to further enhance on-site the knowledge and skills required for effective community seed production and seed banking. Finally seed fairs were organized for farmers, other stakeholders and potential next users to interact, share and trade rice seeds from the community seed banks. These seed fairs served as venues for farmers to learn about various seed varieties and their performance to specific challenges posed by climate change.

In addition to organizing learning events to facilitate the transfer and spread of knowledge, the CSVs in Philippines and Myanmar have also included a community innovation fund as a financing mechanism to support farmers try out new technologies and practices. The Fund also created a critical mass of farmers practicing CSA which served as the momentum to

start the scaling process. The target communities in Cambodia utilized a slightly different approach to local financing through the village development fund and savings groups IIRR organized. The VDFSGs provided the needed capital to community members want to engage in enterprises around specific CSA practices such as native chicken production and off-season vegetable production. Enterprises that address climate vulnerability, build assets for a green economy and local food system are increasingly appealing to consumers even in rural areas. (IIRR, CEDAC, 2020)

Policy integration pathway

A review done by Gündel et al (2001) on scaling-up natural resource management found engagement in policy dialogue to be a key strategy. With this model, interventions are integrated or "mainstreamed" into institutional frameworks (Schipper, 2007). Incorporation into government policies is not the end-goal but ultimate outcome is to build the adaptive capacity of communities – defined as the ability to anticipate and respond to future risks to limit its potential adverse effects. Development organizations generate robust evidence from pilot projects to leverage them to the government for scaling up.

Worsham et al (2018) suggests that partnering with the government may be advantageous since it provides assets to further reach its citizens, long-term authority on resource, and knowledge of the target's needs in context of the community. In turn, partner research and developmental organizations provide essential inputs including innovations, technical expertise, data and policy analysis, evidence, among others. However, political stability is essential above all to any development work, especially in fragile states. Several authors have discussed effective ways on how to leverage development programs with the government (read Bui, 2021; Cooley and Howard, 2019; Nayar et al 2016; Woltering et al, 2019; Worsham et al 2018).

Several tools to assess scalability have been summarized by Cooley and Howard (2019): Agricultural Scalability Assessment Tool (ASAT); "Scalability Scan" by CYMMIT and SNV; "Scaling Readiness" by Wageningen University; and "Operational Framework for Scaling Up Results" by IFAD and Brookings Institution. Other tools include Business Plan Development (WorldFish), The Adoption & Diffusion Outcome Prediction Tool ADOPT (CSIRO/ACIAR). These tools allow for systematic evaluation of potential advantages and challenges which may be encountered during the scaling up process at the earliest stage. Scaling readiness is a function of innovation readiness (proven capacity to perform its intended function or to achieve impact) and innovation use (number of directly-linked vs autonomous users of the innovation). Sartas et al (2020) further explained that an innovation may not be ready to

scale when it is used only by people directly linked to or incentivized by the intervention, regardless of the number of users. Therefore, an innovation being adopted independently is crucial to assessing sustainability. As indicated in Bui (2021), nationwide policy-based adoption needs to be sustained through a 'multi-level cooperation scheme', from national to local, applying the top-down and bottom-up approaches harmoniously in implementation.

Governments in SEA have specified their priorities in their respective plans and policy documents on addressing climate change:

- The Philippines' National Climate Change Action Plan (NCCAP) hopes to achieve its ultimate outcome of enhanced adaptive capacity of communities, with food security as one of its strategic priorities (Climate Change Commission, 2019).
- Myanmar Climate-smart Agriculture Strategy (MCSAS) was developed to serve as a roadmap for national action and guide for international donors and development partners (MOAI, 2015).
- Vietnam's National Target Program on New Rural Development (Nong Thon Moi) recognizes the need to include climate resilience to accomplish comprehensive rural development (Central Steering Committee, 2020).
- The National Adaptation Programme of Action (NAPA) (GOL, 2009) and National Strategy on Climate Change of Lao PDR (GOL, 2010) both offer adaptation and mitigation options ranging from site-specific to country-wide context.

Informed decision-making requires robust evidence. Without it, one might run the risk of premature scaling (Aggarwal et al, 2018; Hartmann and Linn, 2008). Government institutions are inherently risk-averse due to multiple priorities, budget constraints, and accountability in case of misuse of funds. For scaling to be more efficient, tailored evidence may be required for differing roles, stages, and purposes. (Koerner et al, 2020a). Methods to produce robust evidence has been demonstrated throughout the experience. For instance, research outputs on risk and vulnerability produced by the AMIA program provided necessary information for planning interventions with local stakeholders (Vidallo et al, 2019). In Vietnam, CSVs were established per agroecological zone to develop a complete package of evidence for implementation (Bui, 2021). Ferrer et al (2018) also developed a framework to assess and prioritize climate-smart strategies, and to identify their entry points using a set of indicators from case studies of CSVs in Laos, Cambodia, and Vietnam. Another promising method is the multi-criteria ranking system developed by Wassman et al (2019), to evaluate the effectiveness of a particular intervention.

The CSV approach has been successfully integrated into national programs in SEA. In the Philippines, its Department of Agriculture's System-Wide Climate Change Office (DA-SWCCO) implemented the AMIA Program to establish 21 CSVs across the country drawing from lessons learned in Guinayangan CSV. It also provided its local government with evidence supporting CSA initiatives in its 2017-2022 Comprehensive Development Plan (CDP) targets in agriculture. On the other hand, Vietnam's country-specific targets for CSA were developed and integrated in NTM based on the experiences from Ma CSV, whereas selected interventions were also included to local community plans. Additionally, four CSVs were established in Myanmar in line with the country's Climate-smart Agriculture Strategy (MCSAS) (Htwe et al, 2019). To date, the number of CSVs across SEA has increased to at least 90, 77 established by AMIA in the Philippines from an initial of seven sites in 2015.

Market-based scaling pathway

Using Wigboldus, 2016 categories of scaling approach, the commercialization pathway is mainly a "pull approach" to scaling. The commercialization pathway uses economic-based incentives and market-driven approaches to "pull" farmers into adopting CSA. For example, in the Philippines, contract growing is a common example where private companies are engaged (Digal, 2007). Provision of crop insurance and loans also allow the farmers to be better equipped to adopt innovations (Bui and Vu, 2020; Reyes et al, 2015) as there is a promise of markets for their products. Commercialization also engages an un-conventional stakeholder in agriculture development programs—the private sector where they can support in 2 ways. One is by providing economic incentives for CSA adoption via profitable enterprises and second, private sector can also provide financial investments to develop a more robust and valuable CSA technologies.

The work of IIRR in Cambodia on promoting native chicken production via enterprise development is a good example of economic, market-driven approaches to scale up a specific CSA. Small to medium scale, small livestock systems not only have a small carbon footprint, but they also support local food systems. Short market chains (most buyers are local, i.e., within the commune) provide better links between producers, local retailers and consumers. (IIRR, CEDAC, 2020). While this is true, commercialization approaches also need to be bridled to ensure that it does not create negative impacts to the production system. In the Cambodia native chicken project, IIRR intentionally "spread out" the support and promotion of the CSA to ensure that carrying capacity of the agro-ecology is not overexploited. Environmental impacts can occur, for example, if too many chicken enterprises are located within a particular village. Having them spread out not only reduces the risk of price failure but also reduces disease risk and contamination of the environment

with animal waste, etc. Relying on naturally sourced feed, with a reduced reliance on external commercial feeds, also ensures a smaller carbon footprint (a green enterprise). Spatial concentration of enterprises must environmentally impact considerations. (IIRR, CEDAC, 2020).

In the Philippines, the Department of Agriculture have started the implementation of the next phase of its AMIA villages by implementing the Climate Resilient Agri-Fisheries Technology-based Enterprises referred now as AMIA-CREATE. This program seeks to strengthen the adaptive capacity of the communities while creating sustainable and profitable community-based enterprises that will facilitate job generation and strong partnerships among the stakeholders and contribute to the over-all economic growth of the locality. (IIRR, 2021 unpublished). IIRR continued to work with DA-AMIA in implementing the CREATE program in the CSV in Guinyangan. Together with local experts, IIRR developed and implemented a process for a Participatory Agri-fishery Commodity Assessment and Value Chain Analysis aimed at assessing the commercial viability agri-fisheries products in Guinyangan as well as finding the opportunities to integrate climate resilient technologies and practices within the identified value chains. (IIRR, 2021, unpublished).

Conclusion and recommendation

The ultimate goal of scaling is to build the adaptive capacity and resilience of rural communities by providing the vulnerable population with access to resources in adopting appropriate CSA interventions. Development initiatives may take multiple pathways to scale up. The government, private sector, and development organizations have their own strengths and roles to bring sustainable impact to the most vulnerable. The government has the mechanisms to scale out a project, but avoids risks due to limited resources spread across a wide range of priorities. On the other hand, the private sector is profit-driven by nature but it may be constrained by bureaucratic processes during expansion. Strategic partnerships will be essential in moving forward. Also, efficient methods of information management and exchange via online platforms (e.g., apps, social media, webinars) may be worth exploring, especially in coping with the current pandemic. Evidence of its benefits to farming communities may encourage the government to engage the private sector in developing network coverage in rural areas. It may also be of interest to study how different types of governments or ideologies (e.g., democratic vs. socialist republic) respond to such interventions in the future.

Situations where an intervention may be subjected to can be dynamic. Depending on the context, appropriate scaling pathways may be employed at different stages of a project's life cycle. For example, during the early stage, knowledge sharing may be effective in scaling-out CSA technologies and practices. Then, mature interventions may be mainstreamed into government policies once robust evidence is available. Finally, market-based strategies may be developed to sustain the impacts at scale.

DA's expansion of the AMIA program, AMIA-CREATE, aims to transform communities by establishing their agribusiness sector. CCAFS is also leveraging for adoption of CSA and CSVs into Phase 2 of NTM (2021-2030) which will also involve development of value chains. Also, the Government of Laos in partnership with the Asian Development Bank (ADB) is supporting an ongoing effort to create market linkage through export of rice from CSVs. Since its economy primarily relies on agriculture, the partnership aims to develop commercialized, sustainable, and climate-resilient value-chains in the country.

Roving workshops may be an effective strategy in promoting and scaling the CSV approach, which has garnered increased interest among partners and donors. In 2019, the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the ASEAN Climate Resilience Network (ASEAN CRN) have also engaged in scaling CSV in Southeast Asia. However, organizing events involving face-to-face meetings and travel may be a challenge in the midst of the COVID-19 pandemic.

References

ACIAR. 2018. Annual Operational Plan 2018-19. Australian Centre for International Agricultural Research. Canberra ACT 2601, Australia. ISBN 978-1-925746-16-7.

Aggarwal PK, Jarvis A, Campbell BM, Zougmoré RB, Khatri-Chhetri A, Vermeulen SJ, Loboguerrero A, Sebastian LS, Kinyangi J, Bonilla-Findji O, Radeny M, Recha J, Martinez-Baron D, Ramirez-Villegas J, Huyer S, Thornton P, Wollenberg E, Hansen J, Alvarez-Toro P, Aguilar-Ariza A, Arango-Londoño D, Patiño-Bravo V, Rivera O, Ouedraogo M, Tan Yen B. 2018. The Climate-Smart Village approach: framework of an integrative strategy for scaling up adaptation options in agriculture. Ecology and Society 23 (1):14. https://doi.org/10.5751/ES-09844-230114

Aggarwal PK, Vyas S, Thornton P, Campbell BM. 2019. How much does climate change add to the challenge of feeding the planet this century? Environ. Res. Lett. 14 (2019) 043001. https://doi.org/ 10.1088/1748-9326/aafa3e

Barbon, W.J , Chan Myae, Rene Vidallo, Phyu Sin Thant, Emily Monville-Oro, Julian Gonsalves , 2021(a). Applying Participatory Action Research in Community-Based Adaptation among small holders in Myanmar, Frontiers in Climate, Journal of Climate Risk Management https://www.frontiersin.org/articles/10.3389/fclim.2021.734053/abstract

Barbon W, Myae D, Gonsalves J. 2021(b). Final Technical Report Climate and nutrition-smart villages as platforms to address food insecurity in Myanmar, International Development Research Center-Canada. http://hdl.handle.net/10625/60655

Barker PM, Reid A, Schall MW. 2016. A framework for scaling up health interventions: lessons from large-scale improvement initiatives in Africa. Implement Sci 11(1):1.

Bauman A, Nutbeam D. 2013. Evaluation in a nutshell: a practical guide to the evaluation of health promotion programs. McGraw Hill.

Bui LV, Nguyen HN, Nguyen TH, Vu TB. 2019. Scaling Climate-Smart Villages in Yen Bai province to promote implementation of climate-smart agriculture and One Commune One Product (OCOP) initiative of the National Target Program on New Rural Development. Full proposal approved by the Science and Technology Program for *Nong Thon Moi* development 2016-2020. Contract code 30/HĐ-KHCN-NTM. 104 pp.

Bui LV, Vu TB. 2020. A systematic review of Climate-Smart Agriculture (CSA) practices and recommendations for adoption in the implementation of *Nong Thon Moi* in the 2021-2030 Strategy. Science and Technology Journal of Agriculture and Rural Development. Special Issue of November 2020 “Climate Change and Sustainable Agricultural Development”. 154-166. In Vietnamese. English available at: https://cgspace.cgiar.org/handle/10568/111530

Bui LV, Imbach P, Talsma T, Tran HT, Tran CT, Nguyen NL. 2020. Assessment of climate change impacts and issues to support the making of new Nông Thôn Mới (Vietnam's National Target Program on New Rural Development) criteria for the 2021-2030 Strategy. CCAFS Working Paper no. 328. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: https://hdl.handle.net/10568/110444

Bui LV. 2021. A systematic review of Climate-Smart Village (CSV) and recommendations for adoption in the implementation of *Nong Thon Moi* towards climate resilience in the 2021-2030 Strategy. Science and Technology Journal of Agriculture and Rural Development. Accepted for publication in March 2021. In Vietnamese. https://hdl.handle.net/10568/114257

Bui LV, Vu TB, Talsma T, Spillane C, Do TTH, Nguyen TC, Trieu HL, Galina B, Peter M, Nguyen TH. 2021. Scaling the Climate-Smart Village model in national-level programs: The recommendations for adoption in the implementation of the Nông Thôn Mới (Vietnam's National Target Program on New Rural Development) 2021-2030 Strategy. CCAFS Info Note. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). https://cgspace.cgiar.org/handle/10568/114949

Castaneda RA, Doan DDT, Newhouse DL, Nguyen MC, Uematsu H, Azevedo, JP. 2018. A new profile of the global poor. World Development, 101: 250-267. (https://www.sciencedirect.com/science/article/pii/S0305750X17302735).

Central Steering Committee for national target programs during 2016-2020. 2020. Review report on the ten-year implementation of the National Target Program on New Rural Development in the 2010-2020 strategy. (1st report draft).

Cho, I.; Park, J.; Heo, E. Measuring Knowledge Diffusion in Water Resources Research and Development: The Case of Korea. *Sustainability* 2018, *10*, 2944. https://doi.org/10.3390/su10082944

Climate Change Commission. 2019. Executive Brief: The Philippine National Climate Change Action Plan, Monitoring and Evaluation Report 2011-2016. Manila, Philippines.

Cooley L, Howard J. 2019. Scale Up Sourcebook. Purdue University Press. ISBN, 1557539049, 9781557539045.

Department of Agriculture (DA) Communications Group. 2020. DA pushes for climate-resilient agri-fishery sector. Website of the Department of Agriculture. https://www.da.gov.ph/da-pushes-for-climate-resilient-agri-fishery-sector/

Digal LN. 2007. Agricultural Contracts in Mindanao: The Case of Banana and Pineapple. Discussion Paper Series No. 2007-24. Philippine Institute for Development Studies. Makati City, Philippines. https://pidswebs.pids.gov.ph/ris/dps/pidsdps0724.pdf

Eckstein D, Hutfils ML, Winges M. 2019. Global Climate Risk Index 2019. Briefing Paper. Germanwatch. Bonn, Germany.

FAO, 2018. The State of Agricultural Commodity Markets 2018. Agricultural trade, climate change and food security. Food and Agriculture Organization of the United Nations. Rome, Italy.

Ferrer AJG, Yen BT, Kura Y, Minh ND, Pavelic P, Amjath-Babu TS, Sebastian LS. 2018. Analyzing farm household strategies for food security and climate resilience: The case of Climate-Smart Villages of Southeast Asia. CCAFS Working Paper no. 248. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Frake AN, Messina JP. 2018. Toward a Common Ontology of Scaling Up in Development. Sustainability 10:835. DOI: https://doi.org/10.3390/su10030835

GOL. 2009. National Adaptation Programme of Action to Climate Change. Government of Lao PDR, Vientiane Capital, Lao PDR.

GOL 2010. Strategy on Climate Change of the Lao PDR. Government of Lao PDR, Vientiane Capital, Lao PDR.

Gonsalves J, Barbon WJ, Myae C, Latt YM. 2018. Regenerating drylands in response to a changing climate. Myanmar Climate-Smart Villages Primer: Nyaung Oo CSV. Yangon, Myanmar: International Institute of Rural Reconstruction.

Gonsalves J, Dominguez D, Soria G, Vidallo R, Bayot R, Barbon W, Soksophors Y, Bernardo EB, Amutan C. 2020. Information resources for action researchers/practitioners in Climate Resilient Agriculture. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/107971

Gurung A, Basnet BB, Paudel B, Chaudhary P, Bhatta K. 2016. Scaling up pathways for champion Climate-Smart Agriculture technologies and practices in Nepal. Local Initiatives for Biodiversity, Research and Development (LI-BIRD), and CGIAR Research Program on Climate Change Agriculture and Food Security (CCAFS).

Gündel S, Hancock J, Anderson S. 2001a. A project design framework for scaling up NRM research. LEISA 17 (3) 11-12. https://edepot.wur.nl/83364

Gündel S, Hancock J, Anderson, S. 2001b. Scaling-up Strategies for Research in Natural Resources Management: A Comparative Review. Chatham, UK: Natural Resources Institute.

Hajjar R, Newton P, Adshead D, Bogaerts M, Maguire-Rajpaul VA, Pinto LFG, McDermott CL, Milder JC, Wollenberg E, Agrawal A. 2019. Scaling up sustainability in commodity agriculture: Transferability of governance mechanisms across the coffee and cattle sectors in Brazil. Journal of Cleaner Production 206: 124-132

Halbherr, L. 2019. Building and mainstreaming resilience for smallholder farming communities in Vietnam. MS Thesis. Wageningen University. Wageningen, The Netherlands.

Hartmann and Linn 2008. Scaling up. A framework and lessons for development from literature and practice. Wolfensohn Center for Development Working Paper No. 5. Brookings Institution. Washington DC, USA.

Htwe NM, The NEM, Naing NNZ, Hein Y. 2019. Documenting the application of the Myanmar Climate-Smart Agriculture Strategy. CCAFS Working Paper No. 292. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

IIRR. 2000. Going to scale: Can We Bring More Benefits to More People More Quickly? Conference Report. 10-14 April 2000. International Institute of Rural Reconstruction. Silang, Cavite, Philippines.

IIRR, CEDAC. 2020. Small livestock: climate-smart, environmentally sound, economically empowering, gender-fair and transformative agricultural enterprises in Cambodia. A brief for decision makers. https://hdl.handle.net/10568/111538

IIRR, CEDAC. 2020. Resilience building against climate risks and impacts at community levels: A role for local financing mechanisms. A brief for decision makers. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/111540

IIRR, 2021. Participatory Agri-fishery Commodity Assessment and Value Chain Analysis in Guinayangan, Quezon Province, International Institute of Rural Reconstruction, Silang, Philippines (unpublished)

Indig D, Lee K, Grunseit A, Milat A, Bauman A. 2018. Pathways for scaling up public health interventions. BMC Public Health 18:68. DOI 10.1186/s12889-017-4572-5

Koerner J, Dinesh D, Firmian I, Corner-Dolloff C. 2020a. Accelerating innovation development and scaling processes for agricultural transformation. Insights from the Side Event on Scaling, 5th Global Science Conference on CSA, 2019. CCAFS Info Note. Wageningen, Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Koerner J, Dinesh D, Loboguerrero A, Campbell B. 2020b. Lessons learnt from CCAFS - 10 years scaling climate-smart agriculture: Insights from the review of CCAFS scaling

activities, 2019. CCAFS Info Note. Wageningen, Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Koerner J, Dinesh D, Nagano A. 2020c. Designing knowledge-matching facilities for scaling climate-smart agriculture: A proposal for accelerating food systems' transformation in a changing climate. CCAFS Info Note. Wageningen, Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Koerner J, Woltering L, Uhlenbrock S, Ohmstedt U, Zeiske F, Sartas M, Theissen A. 2018. The why, what, who and how of scaling agricultural innovations: Key messages from the CCAFS SEA and cross-CRP Scaling Conference, Hanoi 2018. CCAFS Info note. Wageningen, Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Koerner J, Bayot RS, Rosimo M, Vidallo R, Gonsalves J. 2019. Scaling the capacities to adapt to a changing climate: Experiences of the AMIA Climate Resilient Villages, Philippines. https://hdl.handle.net/10568/105717

Lubotzki, C. 2018. Why Scaling is important in German support to Agricultural Research for Development. Conference on Scaling. 29 November 2018. Hanoi, Vietnam: CCAFS CGIAR.

Malik, K. 2002. Capacity and Development, In Capacity for Development: New Solutions to Old Problems. Sakiko Fukada-Parr, et. al. (Eds.), 24-42. London: Earthscan Publishers.

Mendez KS, Vidallo RR, Rosimo M, Angeles DR, Bernardo EB, Gonsalves J. 2021. Learning Groups: refining technologies and social processes for climate resilient agriculture. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/114778

Mohan G. 2001. Participatory development. In: Desai, Vandana and Potter, Rob eds. The Arnold companion to development studies. London, UK: Hodder, pp. 49–54.

Nayar R, Asif Saleh A, Minj A. 2016. Scaling Up Innovations with Government: How to overcome the barriers that large institutions like the government put in the way of scaling up innovations. Stanford Social Innovation Review. Leland Stanford Jr. University.

Neufeldt H, Negra C, Hancock J, Foster K, Nayak D, Singh P. 2015. Scaling up climate-smart agriculture: Lessons learned from South Asia and pathways for success. ICRAF Working Paper No. 209. Nairobi, World Agroforestry Centre. DOI: http://dx.doi.org/10.5716/WP15720.PDF

OECD. 2003. Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation. Organisation for Economic Co-operation and Development. Paris, France.

Oo SP. 2016. Agricultural Extension Work and Extension Methods in Myanmar: Evolution and Tasks Ahead. Technical Report. YAU-JICA TCP Discussion Paper No.1. Yezin Agricultural University.

Reyes CM, Mina CD, Gloria RAB, Mercado SJP. 2015. Review of design and implementation of the agricultural insurance programs of the Philippine Crop Insurance Corporation (PCIC). Discussion Paper Series No. 2015-07. Philippine Institute for Development Studies. Makati City, Philippines. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1507_rev2.pdf

Sartas M, Schuta M, Proiettic C, Thielec G, Leeuwisa C. 2020. Scaling Readiness: Science and practice of an approach to enhance impact of research for development. Agricultural Systems 183:102874. DOI: https://doi.org/10.1016/j.agsy.2020.102874

Schipper ELF. 2007. Climate change adaptation and development: Exploring the linkages. Tyndall Centre Working Paper no. 107. Norwich, UK: Tyndall Centre for Climate Change Research.

Sebastian L, Gonsalves J, Bernardo EB. 2018. 8 Guide steps for setting up a Climate-Smart Village (CSV). Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Trung ND, Villanueva J, Khounthavong M, Eam D. 2019. Evaluation of Climate-Smart Village roving workshop as a farmer-to-farmer learning platform. CCAFS Working Paper No. 257. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

UN. 2015. Transforming Our World: The 2030 Agenda for Sustainable Development. United Nations. New York, USA.

Vidallo R, Bayot R, Rosimo M, Monville-Oro E, Gonsalves J, Ilaga A, Sebastian L, Manalo U, Baltazar P. 2019. The AMIA Experience: Supporting local actions for Climate Resilient Agriculture. CCAFS Info Note. Wageningen, Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

WFP, IIRR. 2020. Towards a climate-smart and community-driven school feeding program: WFP-IIRR Scoping Mission Report to WFP Project Sites in Phongsaly Province, Lao PDR. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/111542

Wassmann R, Villanueva J, Khounthavong M, Okumu BO, Vo TBT, Sander BO. 2019. Adaptation, mitigation and food security: Multi-criteria ranking system for climate-smart agriculture technologies illustrated for rainfed rice in Laos. Global Food Security 23: 33-40. ISSN 2211-9124. DOI: https://doi.org/10.1016/j.gfs.2019.02.003.

Wigboldus S, with Brouwers J (2016). Using a Theory of Scaling to guide decision making. Towards a structured approach to support responsible scaling of innovations in the context of agrifood systems. Wageningen University and Research, Wageningen. Using a

Theory of www.theoryofchange.nl/resource/using-theory-scaling-guide-decision-making

Woltering L, Fehlenberg K, Gerard B, Ubels J, Cooley L. 2019. Scaling – from "reaching many" to sustainable systems change at scale: A critical shift in mindset. Agricultural Systems 176: 102652.

World Bank. 2003. Scaling-Up the Impact of Good Practices in Rural Development: A Working Paper to Support Implementation of the World Bank's Rural Development Strategy. Washington, DC: World Bank Group. World Bank, IFC, MIGA. 2016. World Bank Group Climate Change Action Plan 2016-2020 (English). Washington, D.C.: World Bank Group.

Worsham E, Langsam K, Martin E. 2018. Scaling Pathways. Leveraging Partnerships for Scaled Impact. Innovation Investment Alliance, Skoll Foundation, and CASE at Duke University.

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