



Consortium for Scaling-up Climate Smart Agriculture in South Asia (C-SUCSeS)

Capacity Building Workshop

on

Introduction to Climate Smart Technologies and their Prioritization

July 5-6, 2022 | Virtual

Organized by:



In collaboration with:



Introduction:

Consortium for Scaling-up Climate Smart Agriculture in South Asia (C-SUCSeS) is a four-year joint initiative between the South Asian Association for Regional Cooperation (SAARC) Agriculture Centre (SAC), the International Food Policy Research Institute (IFPRI), and the International Fund for Agricultural Development (IFAD). The programme fosters partnership and cooperation between the SAARC, National Agricultural Research and Extension Systems (NARES), IFPRI, and SAARC governments on the Climate-Smart Agriculture (CSA) agenda. It is intended to support agricultural research's roles to generate and facilitate delivery of technological solutions to smallholders, with a specific priority on the intensification and resilience of smallholder agriculture, contributing inter alia to increasing water management efficiency; and promoting innovative, pro-poor approaches and technologies with demonstrated scaling-up potential; strengthen partners' institutional and policy capacities; enhance policy engagement, and generate and share knowledge. The program promotes bottom-up applied research with the active participation of smallholder farmers based on the experience of other participatory research experiences in the region, including the climate-smart village concept. The implementation of the project includes the development of an inventory of CSA technologies, participatory research, CSA technologies assessment, policy analysis, identifying institutional constraints in scaling up CSA technologies, networking, and knowledge management. Since this project is based on the CSA, it is of the essence for all the stakeholders to have a clear understanding of the concept, definition, classification, and technicalities related to CSA for the effective implementation of the project activities. This rationale and the recommendation of the Project Consultation Meeting in Kathmandu, Nepal led to the idea of organizing a capacity-building workshop on CSA and its prioritization.

During the Kathmandu meeting, it was found that there was an issue of having a common understanding of the definition, purpose, principles, and classification of CSA among National Focal Points and other participants. Therefore, all the member countries agreed to a formal capacity-building workshop on CSA. Furthermore, most of the partners also agreed that the prioritization or classification of CSA technologies must be a meticulous scientific logic. Subsequently, this capacity-building workshop is a complimentary program to the meeting in Kathmandu, Nepal. Therefore, this capacity-building workshop aims to take forward the issues

that lagged during the project consultation workshop and to achieve a clear concept of definition and prioritization of CSA in a methodological way. The key objectives and potential outcomes of this capacity-building workshop are described below.

Objectives:

- 1) To have a clear understanding of the definition, principles, and classification of Climate Smart Agriculture technologies.
- 2) To prioritize the CSA technologies based on the scientific evidence and by using the World Bank CSA technology Index

Outcomes:

- 1) All the participants acquired a clear concept of the definition, principles, and classifications of the CSA
- 2) Prioritized scalable and promising CSA technologies for the respective countries to embark on participatory research

A list of the participants and the agenda of the workshop are attached at the end of this report. The day-wise events for the workshop are described below.

Day-1 July 5 | 2022

The beginning of this virtual capacity-building workshop commenced with the welcome remarks by Dr. Md. Baktear Hossain (Director, SAC, Bangladesh). The welcome remarks were followed by an introductory speech by Dr. Mamata Pradhan (Research Coordinator, IFPRI-SAR, India). The main event started with the presentation on clarity on the definition of CSA, how do we label technology as climate-smart technology? and, principles based on which technology is classified as CSA, jointly by Shreya Kapoor (Research Analyst, IFPRI-SAR, India), and Dr. Narendra Kumar Tyagi (Independent Consultant and Researcher, India).

In his welcome remarks, **Dr. Md. Baktear Hossain** extended his warm greetings to all distinguished participants of the “Capacity Building Workshop on Introduction to Climate Smart Technologies and their Prioritization”. He briefly talked about the prospects and targets of the Consortium for Scaling-up Climate Smart Agriculture in South Asia project, and its importance to tackle the climate change effect in the South Asia region. He also shed some light on the context

and potentiality of the capacity-building workshop. Dr. Hossain said it is crucial to have a common understanding of CSA among all member states. Further, he stressed that this workshop would deepen the understanding of CSA and help to prioritize CSA technologies to take up participatory research in the respective Member States. He expressed that, the capacity building will have a significant impact on the prioritization of CSA technologies scientifically and lead to the validation through participatory research in respective member states and the development of CSA strategies, policy papers, and regional corporation strategies for South Asia.

In the end, he praised all participants for showing a keen interest in this training and expressed his gratitude to IFPRI for arranging this significant training program in association with the SAC. To conclude, he acknowledged the assistance of the Ministries of the respective SAARC Member States in implementing the project and wished for a successful capacity-building workshop.

Dr. Mamata Pradhan decoratively illustrated the background and objectives of the training program. She stated that the process of prioritization was started during the Consultation Meeting in Kathmandu, Nepal. This Capacity Building Training is mainly to take the process forward with more rigorous scientific methods. During the Meeting in Kathmandu, Nepal, there was some lack of clarity on the definition of CSA, the motivation of the CSA, and how we label the technology as a climate-smart technology or not? What is the basis to classify the technologies as CSA? What are the principles of CSA? The member countries agreed that this prioritization or classification of CSA technologies must be a rigorous scientific logic, and this should not be on some practical knowledge or conceptual. During the consultation meeting in Kathmandu, prioritization exercises were done, and some indicators were set to do the job. Additionally, what kind of possible CSA technologies would be chosen to scale up, concerning the context of the country and suitability of the region. For instance, in the case of Bangladesh, the technologies prioritized were Combine harvester, Improved seed varieties, Mulching, Rainwater harvesting, and Zero tillage; in the case of India prioritized technologies were Broad Bed Furrow, Improved seed varieties, Resilient intercropping system, and Zero tillage; similarly, for other member countries, several technologies were prioritized by each focal representative of member countries. Different parameters were used to prioritize these technologies (e.g., Production and yield of the crops, Income of the household, Ease of implementation of the technology, Adaptation to the technology, Cost of cultivation, Woman-friendliness, etc.). Moreover, policy issues were also discussed during the prioritization

of these technologies, including whether the technologies were suitable/affordable for the marginal and/or smallholder farmers? Subsequently, this capacity-building workshop is a complimentary program to the consultation workshop. Therefore, this capacity-building workshop aims to take forward the issues that lagged during the project consultation workshop and to achieve a clear concept of definition and prioritization of CSA in a methodological way.

With the presentation of **Ms. Shreya Kapoor**, the technical session of the capacity-building workshop started. In her presentation, she discussed the clarity on the definition of CSA, how do we label technology as climate-smart technology? and, principles based on which technology is classified as CSA. According to FAO, CSA is agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals; and CSA aims at sustainable intensification and rural development goals in achieving millennium development goals of reducing hunger and improved environmental management. Ms. Kapoor continues her lecture with the annals of CSA, the importance of CSA, GHG emissions, and food production trends in the South Asia region. Moving forward she specifically discussed the World Bank's definition and aims of CSA, and the need for the CSA. Moreover, she also presented the scheme of three pillars of CSA, features of CSA, dimensions of CSA, how practices and technologies are contributes to CSA, and the difference between CSA and traditional sustainable agricultural approaches were also described exclusively. Importantly, she stated four areas e.g., building evidence and assessment tools, strengthening national and local institutions, developing coordinated and evidence-based policies, and increasing financing and its effectiveness where urgent actions are needed from the public, private, and civil society stakeholders at the international to local level for the effective implementation of the CSA. Finally, Ms. Kapoor showed the recent milestones and future scopes to improve the valuations of the three pillars of the CSA.

Afterward, **Dr. N. K. Tyagi** adds up to the presentation of Ms. Shreya Kapoor. In the beginning, Dr. Tyagi simplifies the term 'smart' in reference to technology. He explains the two-term 'Mitigation' and 'Adaptation' and the methods to discourse their impacts on climate change.

To describe the complexities of adaptation in the agriculture and food sector Dr. Tyagi stated that "Agriculture & food systems are multidimensional: Biophysical systems, Economic systems,

Social systems, and Institutional. These dimensions interact from Local to Global scale; Global to Local scale. An adaptation option for one sector can put new pressure on another sector”. Lastly, Dr. Tyagi showed the planning and implementation of the Adaptation and its prospects in the future.

In the subsequent presentation, **Dr. N. K. Tyagi** discussed the “Prioritization of CSA Technologies”. He talked about the necessity of CSA technologies prioritization, he cited Sova et al, 2018-Global Report to show the insights of Top CSAs and the 10 smartest CSA technology clusters in Asia. According to that report, among the countless number of technologies, only five technology clusters (water management, crop tolerance to stress, intercropping, organic inputs, and conservation agriculture) account for almost 50 percent of all CSA technologies. Later, he explained different methods and steps of CSA technology prioritization and elaborated and exemplified the CSA Tech Indicator Method for scoring technologies.

A discussion session took place in-between the presentation, where participants raised questions to have a clear understanding of that topic.

Dr. Tika Ram Chapagain from Nepal wanted to know about the indicators, and how to set the indicators?

Dr. Tyagi answered that depending on the technology one has to choose the indicators, either quantitative or qualitative, and qualitative data can be converted to quantitative and vice-versa based on the range of the primary data.

Dr. V. K. Singh from India asked, not only crops, how to set indicators and score enterprises or other commodities (e.g., livestock)?

Dr. Tyagi answered that similar to the cropping system, indicators are available for the livestock also. To add up Mr. Himanshu referred to the shared document of the World Bank.

Dr. Anwar from Bangladesh asked what could be the possible indicators for homestead vegetable production models? The dissemination and adaptation of these models are not good enough.

Dr. Tyagi responds that, as these technologies are not getting proper acceptance among the users, we must find out the constraints as a scientist. We have to analyze the environment, policies, knowledge level, and socio-economic conditions of the target group to overcome the problem.

After the discussion session, Dr. Tyagi demonstrated an exercise on the computation of the World Bank CSA Index scores for Zero tillage + Direct seeded rice + Green Manure and Zero Tillage wheat.

Dr. Shahbaz Hussain from Pakistan asked if the numbering in the productivity (P) column may depend on the experience of the researcher?

Dr. Tyagi and Mr. Himanshu jointly answered that the raw value depends on the expertise of the researcher. However, it also has to be synthesized from publications, and reports, through consultancy. When the team consists of a large number of members, then the average of all should be considered.

Ms. Rinchen from Bhutan asked who should be involved in the survey for giving scores to prioritized climate-smart agriculture technologies. Is it the researchers or Extensions or management /policymakers or all? or shall I give scores to respective CSA technologies from the published papers?

Dr. Tyagi replied that the author(s) of the published papers not necessarily be included in this process, but yes, the extension workers, policymakers, field workers, surveyors, researchers, farmers, and importantly the team must be involved in the scoring. As it is a diverse method, based on a large number of research data output, analysis, and the advice of the expert members the scoring should be done, he added.

Dr. Mamata asked does the composite values (final score of R, P, and M) indicates whether the technology is scalable or not? Or this is a different exercise altogether?

Dr. Tyagi answered that if the values are satisfactory, we will consider it a good CSA technology. However, it depends on several other factors, we must assess the cost involved, the socio-economic conditions, and the government policies whether these all support the technology or not. Then explains with the example of micro-irrigation.

Dr. Prasad from India asked what is the minimum value to categorize a technology as a CSA technology?

Dr. Tyagi answered if it is less than 3 it will not be applicable, and if it is more than 3 and close to 5 then it will be considered a CS technology (according to the Likert scale, Dr. Mamata added).

The session proceeds with the presentation of **Mr. Himanshu Pathak** on the Introduction to Climate Smart Feasibility Index (CSFI). CSFI is an index to estimate the relative score of CSA technologies, and relative advantage; needs to be calculated for each technology for each crop in the region, and the higher the value of CSFI, the higher the suitability of the technology for a particular crop in the area/region. He presented the data required for CSFI estimation, weights of indicators, and the calculation and conversion processes of CSFI with relevant examples. For the determination of the weights of indicators, he suggests using the combination of the three processes, which are Principal Component Analysis (PCA), Expert solicitation, and Participatory Research. Mr. Himanshu emphasized data, which are crucial for CSFI calculation. He has shown some indicators used in the calculation of CSFI and exemplified with fictional data of several technologies.

Mr. Jigme from Bhutan asked can you please explain again how you came up with the 'weights' and 'index'?

Mr. Himanshu answered that at first, we must consider the area where the technology will be scaled up. After that, the combination of the three methods (PCA, expert solicitation, and participatory research) have to use to determine the weights. Where PCA mainly relies on the raw/field data. However, expert solicitation and participatory research are more important in setting the weights. He suggested not using a single method for the determination of weights, but their combination. The index is prepared by multiplying the weights by the respective absolute value of the monetary saving, he added.

“Willingness to Pay (WTP) for prioritization of CSA Technologies” was the last presentation for day 1 of the workshop delivered by **Dr. N. K. Tyagi**. In his speech, he showed the classification framework for methods to measure the WTP, differences between revealed preferences (RP) and stated preference (SP), and steps and approaches involved in preference appraisal. Later he explained the WTP method with a few practical examples. To conclude he mentioned that the success of prioritization depends on the availability and reliability of data, which is common to all approaches; prioritization through the WTP method is more participatory oriented, and the technology choices, at most times, are based on cost and travel on the wings of policies and recommendations must keep these considerations in view.

Mr. Kinzang Gyeltshen, the Regional Programme Coordinator, highlights some key points from the project management perspective. He stated that the workshop is a part of the knowledge management and capacity-building activity of the C-SUCSeS Project. Through this training, he wished all participants of respective countries to be on the same page regarding the concept and understanding of CSA. Although member countries have the freedom to choose their indicators and prioritize their technologies depending on the local, bio-physical, and ecological conditions of the respective countries. However, according to the project document during the prioritization and selection of CSA technologies women-friendliness criteria, we must keep in mind. Moreover, the technologies should be adaptable and scalable by the smallholder farmers. Mr. Kinzang referred to the activities, and outputs of component no. 1 of the project and appeal to all Member States to closely collaborate with IFPRI to develop the CSA strategy for each country. He acknowledged the moderator, resource person, speakers, and all the participants for their esteemed contribution to the workshop.

Dr. Mamata Pradhan thanked all and invite them to attend the day 2 workshop.

Day-2 July 6 | 2022

Day 2 schedule started with the follow-up presentation of **Dr. N. K. Tyagi** on “Willingness to Pay (WTP) for prioritization of CSA Technologies”. To provide an accurate understanding and to proceed to the prioritization session Dr. Tyagi recap the WTP method once again.

Mr. Himanshu Pathak discussed “Estimation of GHG Emissions from Agriculture and Review of Studies on GHG Emissions from a few CSA Technologies”. He presented the types of emissions from the farm and showed the data required for the calculation of emissions. He explained the calculation process with the secondary data of the micro irrigation technology. Not necessarily we can say a specific technology emits GHGs if we do not calculate the emissions because in real life it differs, he added.

Dr. Tika Ram Chapagain from Nepal wanted to know about the emissions per unit of the crop.

Mr. Pathak explained that to calculate the emissions per unit of the crop (unit: Kg CO₂ Kg⁻¹ of crop) we have to divide the total emission by the total yield.

Dr. Shahbaz Hussain from Pakistan asked if the emission factor is a variable or fixed one?

Mr. Pathak answered that the emission factor is variable and varies from country to country, and it also depends on the power plant used to generate electricity.

Continuing his presentation, Mr. Himanshu clarifies the calculation procedure of emission with the example of micro irrigation, direct seeded rice (DSR), and laser land leveling (LLL) concerning water requirement, diesel, and electricity requirements.

Dr. Shakhwat from Bangladesh asked about discharge capacity or pump capacity which one will be more reliable to calculate the emission?

Dr. Tyagi answered that discharge and pump capacity depends on the place where it was set to pump, if the depth is more then more suction power will be required to pump the same amount of water. So, calculating the emission pump capacity will give a more accurate result.

Dr. Apurbo Chaki from Bangladesh asked for urea we have used scopes 1 and 3, but why we didn't use it in the previous example (micro irrigation)?

Mr. Himanshu answered when we apply the urea in the field two sorts of emissions we will consider, firstly to produce and transport of urea emission occurs, and second urea contains carbon which will also add emission in the field condition. On the other hand, when electricity is being used it will not produce any emissions, but when the electricity is produced at that time it generates emissions. Additionally, when we use diesel, it will contribute to emissions in both the way, to produce the diesel and while using the diesel. Dr. Tyagi added that LLL is tractor driven machine that uses diesel to be operated, hence it also contributes to the emissions in two ways.

Next **Dr. N. K. Tyagi** lectured on “CSA technologies: categorization, adoption barriers, and issues of small farm holders/women”. CSA technologies are categorized based on three main categories i. Smartness, ii. capital and the marginal cost of intervention, and iii. effectiveness of technology, which was illustrated by the World Bank Report, 2018. He presented some secondary statistical data to show how much GHG emissions were reduced by CSA technologies and the reduction in groundwater draft energy saving due to crop diversification by CSA technologies. According to CIMMYT 2018, he shows some low-cost options to cut GHG emissions in agriculture in India. Then he presented the rating of CSA technology /interventions in terms of contribution potential to increased production, adaptation, and mitigation of climate change impacts, and the possible impacts and required policies for out scaling the CSA technologies in the farm, local/regional, and

country level. Dr. Tyagi pointed out that women prefer labor-saving technologies and for that, they become more empowered and thereby exercise better control over their labor allocation for different farm operations. Gender-responsive technologies are categorized based on the needs and interests of both males and females, technologies that reduce time and labor for women farmers, and technologies that are accessible and affordable to both men and women. Based on the report of the World Bank, FAO, and IFAD (2015), Dr. Tyagi showed the potential gender considerations of various CSA-sensitive practices, and the indicators of project outcomes to capture information for analyzing the gender-related impacts. Small farms do not characterize depending on the land a farmer has, but limited access to land, geographical attributes, access, use, and ownership of capital, livestock, and inputs (non-climatic stresses). Consequently, the farm size remains the same, and the capacity to adopt CSA changes due to non-climatic factors. Dr. Tyagi exemplifies Landholding, HDI, vulnerability, and adaptive capacity in IGP with the secondary data of Sehgal et al, 2013. To conclude he showed the policy options to strengthen smallholder farmers with agricultural potential.

Dr. Sachin Kumar from Nepal suggested some technologies are complementary to each other (e.g., DSR and LLL), so there should be some packages of technologies in CSA, and adaptation barriers should be further clarified to shift the technologies. Later he wanted to know about the adaptation area under zero tillage in India.

Dr. Tyagi answered that the adaptation of zero tillage has spread in India like wildfire, because of its low cost and low management practices. Zero tillage covers around 2.5-3.0 million ha area under adaptation and LLL covers more than 10 million ha according to the recent data, he added. Further, he corresponded to Dr. Sachin about the packages of CSA technologies and suggested scaling up a similar type of technologies at once rather singly. The adaptation policy should be made in such a way that allows the target group to access the technology very easily, he recommended.

The final agenda of the workshop was the discussion on the results of prioritized CSA technologies as submitted by an individual state representative. In this session, the delegates from member states presented their hands-on exercises of data scoring of CSA technologies. Lots of ambiguities were clarified during the session regarding the calculation and scoring process of the CSA technologies. Member states have already started to develop the inventory of CSA technologies and some of the

countries also prioritized their technologies. With the understanding and calculation processes shown in this workshop, the Member States will carry forward the work of developing inventory and prioritizing the CSA technologies more scientifically, it was a consensus from all Member States during this session.

Mr. Kinzang Gyeltshen, the Regional Programme Coordinator, C-SUCSeS Project stated that it was a wonderful event for all and in the upcoming days there will be more similar kinds of capacity-building programs like training, exposure visits, and workshops. He added that this event will help all the participants to carry out the project activities efficiently and requested the Member States to share the prioritized documents and scoring sheets with Mr. Himanshu and PCU once they are done. He also requested the Member States and partners to carry out the project activities according to the project documents, request their guidance, comments, and suggestions to implement the project, and submit the first semi-annual progress report by 20th July 2022 according to the shared format.

In his closing remarks, **Dr. Md. Baktear Hossain** expressed his happiness to be a part of this workshop. He wholeheartedly thanked and applauded the resource persons and distinguished delegates for their keen interest and active participation. He mentioned it was the perfect time to organize such kind of workshop as all partners have just started implementing the project activities. Highlighting the significance of this workshop, he informed the participants about the possibilities of exploring funds for these climate change challenges. Lastly, Dr. Baktear acknowledged again the contributions of all participants and the organizer and wished for the success of this project to make a difference in the lives of millions of farmers in the South Asian Region.

Dr. Mamata Pradhan announced the vote of thanks and the way forward. She especially thanked Dr. N. K. Tyagi for his tremendous effort in this workshop. She thanked Mr. Himanshu, and Shreya Kapoor for their hard work. She also acknowledged Dr. Baktear Hossain, Mr. Kinzang, and the PCU. Dr. Mamata was grateful for the dedication and enthusiastic participation of the Member States. Scientists from all over the world might come together to conquer climate change and find out the smartest solutions for agriculture, she stated as the way forward. Finally, she thanked all again and officially ended the two days capacity-building virtual workshop with a virtual group photo.

Annexure

Program Schedule

Indian Standard Time (IST)

Time	Topic	Speaker
Day-1 July 5, 2022		
09.30-9.35	Welcome Remarks	Dr. Md. Baktear Hossain Director, SAC
09.35-9.45	Introduction to the capacity-building workshop	Dr. Mamata Pradhan
09.45-10.45	- Clarity on the definition of CSA - How do we label technology as climate-smart technology - Principles based on which technology is classified as CSA	- Shreya Kapoor - Dr. N K Tyagi
10.45-11.00	Tea/Coffee Break	
11.00-12.15	- Prioritization of CSA technologies using the World Bank CSA technology index - Introduction to the Willingness to Pay (WTP) method	Dr. N K Tyagi
12.15-12.30	- Introduction to Climate Smart Feasibility Index (CSFI)	Himanshu Pathak
12.30-13.00	Discussion	
Day-2 July 6, 2022		
9.30-10.30	CSA technologies: categorization, adoption barriers, and issues of small farm holders /women	Dr. N K Tyagi
10.30-11.00	Estimation of GHGs emissions and review of available data from field studies on GHG emissions for a few CSA technologies	Himanshu Pathak
11.00-11.15	Tea/Coffee Break	
Discussion on results of prioritized CSA technologies as submitted by individual state representative (The tutorial sheet is attached with the agenda)		
11.15-11.30	Bangladesh	- Dr. N K Tyagi - Country representatives - Himanshu Pathak
11.30-11.45	Bhutan	
11.45-12.00	India	
12.00-12.15	Nepal	
12.15-12.30	Pakistan	
12.30-12.45	Sri Lanka	
12.45-13.00	Way Forward and Vote of Thanks	Dr. Mamata Pradhan

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