Centre on Integrated Rural Development
for Asia and the Pacific (CIRDAP)

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From Climate Challenges to Smart Solutions: Scaling Climate-Smart Agriculture across South Asia

THEME 2026

"Toward Vibrant, Prosperous and Happy Rural Communities"

SAARC

SAARC Agriculture Centre

- PEOPLE-CENTERED RURAL DEVELOPMENT
- CLIMATE-SMART AGRICULTURE
- INNOVATION & TECHNOLOGY
- REGIONAL COOPERATION FOR RESILIENT FUTURES
- INCLUSIVE GROWTH SUSTAINABLE PROSPERITY

From Climate Challenges to Smart Solutions: Scaling Climate-Smart Agriculture across South Asia

SAARC Agriculture Centre

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

SAARC Agriculture Centre implemented IFAD & SAARC Development Fund (SDF) co-funded project in 2022-2025 in SAARC member countries: Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka. Project goal was to promote sustainable and resilient agricultural intensification in South Asia through enhanced capacity to scale up climate-smart strategies and technologies.

Key Components

1. **Scaling up of Technically Viable and Gender-Sensitive CSA Technologies for Smallholders**

It comprises an initial assessment of Climate Smart Agriculture Technologies (CSA) by developing an inventory of CSA technologies, identifying the high-ranking CSA technologies through process of validation by conducting participatory Research (PR), benefit-cost analysis, impact assessment, and developing strategic solutions to challenges for scaling up CSA technologies.

2. **Policy Analysis/Advocacy and Institutional Development**

Inadequate policy support and weak institutions are undermining the adoption of CSA technologies. To analyze the hurdles and suggest solutions, a set of papers outlining policy and institutional constraints to scaling up selected CSA technologies have been produced. The exercise aimed at developing a regional strategy and program to support scaling up CSA technologies.

3. **Knowledge Management and Capacity Building**

Provision of sound, in-time information and knowledge to all stakeholders play a significant role in adaptation of technology. In this context, a rich repository was developed having a potential role in the promotion, popularization and adoption of CSA technologies in SAARC member countries. Four output are (i) Establishment of a well-functioning community of practice (CoP) (https://cop.sac.org.bd/) on CSA comprising researchers, entrepreneurs, farmer organizations, donors, and policymakers; developed training materials on CSA technologies and practices (ii) Development of training materials on CSA technologies for farmers, researchers, policy makers and entrepreneurs (iii) Enhanced knowledge and learning of farmers, researchers, service providers, and extension agents on CSA technologies, and (iv) Innovative knowledge sharing approaches and pilot tested with CSA community of practice.

Success Stories

World Bank Technology Index: adaptation, resilience and mitigation have been used to priorities CSA technologies. Prioritized climate technologies were validated across South Asia through participatory research trials (Table 1), the synergetic impacts of participatory research-based interventions are listed (Table 2 Figure 1).

Table 1: CSA technologies under participatory research trials in South Asia

	Technology	Crop	Country (s)
		A. Climate resilient crop varieties	
1.	Drought tolerant	Pigeon Pea, Setaria, Red gram	India
2.	Heat tolerant	Wheat (PBW 826)	Pakistan
3.	Submergence tolerant	Rice (Ranjit Sub-1)	India
4.	High yielding oilseeds	Toria	India
		B. Climate resilient soil & crop management	
5.	Direct Seeded Rice (DSR)	Rice	India, Nepal, Pakistan
6.	Strip planting (SP)	Maize, Mustard, Lentil, potato	Bangladesh
7.	Staggered planting	Rice	India
8.	Relay cropping	Rice + Lentil / Pea	Bangladesh
9.	Intercropping	Maize + Vegetables	Bangladesh
		Red gram + Seteria	India
		Maize + Soybean	Nepal
10.	Foliar spray of fertilizers	Wheat	India
11.	Bench terracing (hills)	Hedgerow plantation, Orchard	Bhutan
		C. Climate resilient irrigation & water management	
12.	AWD	Rice	Nepal, Sri Lanka, Pakistan
13.	Solar powered irrigation	Rice, maize, vegetable	Sri Lanka
14.	Micro-irrigation	Vegetables	Sri Lanka
15.	Check dams	Orchard	Bhutan
16.	Drip irrigation	Vegetables, Cereals	Bhutan, Nepal
		D. Climate resilient farm mechanization	
17.	Raised bed planting (Bed planting)	Lentil, Mustard, Wheat, Maize	Bangladesh
18.	Zero tillage	Wheat	Nepal, Pakistan

		Garlic and potato using mulch	Bangladesh
19.	Seeding with improved seeder (Super seeder, Surface seeder, Happy seeder)	Wheat	India, Pakistan
20.	Protected house	Vegetables, Chili	Bhutan, Sri Lanka

Table 2: Synergetic impacts of Participatory Research based activities among productivity, adaptation and mitigation

CSA Practices	Productivity Impacts	Climate adaptation & Resilience	GHG Mitigation	Countries
Use of drought, heat & submergence tolerant variety of crops	Increased crop yield due to use of stress tolerant varieties	Increased resilience to climate change effects	Increased soil carbon storage	India, Pakistan
Relay and intercropping	Increased system yields due to the addition of a second crop	Improved soil N fertility if legume crops are added in sequence	Increased soil carbon sequestration	Bangladesh, India, Nepal
Bed planting	Increased economic crop yield	Reduces waterlogging stress, facilitates mechanical weeding and harvesting	Enhances soil carbon storage	Bangladesh
Zero tillage (wheat, garlic)	Increased economic crop yield	Increased water-holding capacity of soil	Enhances soil carbon storage	Nepal, Pakistan
Strip planting	Increased economic crop yield	Reduced labor, fuel and irrigation water use	Increased soil carbon stock and reduced GHG emissions	Bangladesh
Dry Seeded Rice (DSR)	Increased economic yield of rice	Increased water saving, fuel and labor-saving resilience to climate change	Increased soil carbon stock and reduced GHG emissions	India, Nepal
AWD in rice	Increased economic crop yield due to use	Increased water saving, resilience to climate change	Reduced methane and nitrous oxide emissions	Nepal, Pakistan, Sri Lanka

	of water saving technology			
Drip Irrigation	Increased economic crop yield due to use of water saving technology	Reduces water use, improved fertilizer use efficiency	Reduced methane and nitrous oxide emissions	Bhutan, Nepal
Protected house (Polyhouse, Glasshouse)	Production of safe food crops (vegetables)	Resilience to climate change	Reduced carbon footprint compared to open-field losses	Bhutan, Sri Lanka
Super seeder/Surface Seeder	Economic crop yield	Minimize soil disturbance	Improved soil organic carbon, reduced labor and fuel use	India, Pakistan

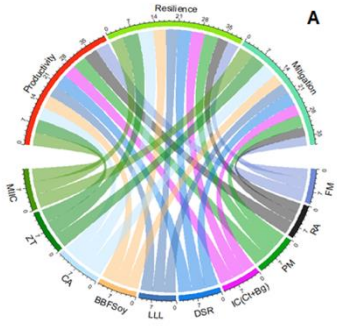

Figure 1: CSA tech. Prioritization against productivity, resilience and mitigation

- The validation of CSA technologies showed that Direct seeded rice in India, Nepal and Pakistan contributed to resource efficiency by saving 20% water, 40% labor saving and 60% energy (diesel) saving while Alternate wetting and drying contribute to climate resilience by reducing Methane emission by 48%, and water saving by ~30% in Nepal, Pakistan and Sri Lanka.
- Intercropping, mixed cropping in Bangladesh, India, Nepal, Pakistan contribute to system level benefits by better utilization of resources, improve moisture conservation, N2 fixation by legume (20 -25 kg N/ha) and weed control. Zero tillage resulted in enhanced organic matter contents.
- Raised bed technology resulted in productivity enhancement of crops: mustard yield increased by 15%; wheat by 20%, maize by 14% and lentil by 18%.
- Protected house technology (polyhouse, glasshouse) contributed to adaptation by boosting farm income, and year-round availability of vegetables.
- Integrated farming system: crop-livestock farming resulted in diversification, resilience and productivity resulting in ~20% yield increase in India.
- High yield improved varieties contributed to profitability and efficiency by enhancing farm income @ PKR: 25000/acres and saving of water up to 30% in Pakistan.
- The scale of impacts from capacity building point of view can be assessed by involving as much as 3093 farmers in participatory research for validation of CSA technologies, around 5833 farmers including 32% women farmers have been trained in CSA technologies.
- Published 6 training manual: Orientation and Establishment of farmers' Learning Group; Climate change and the local context; introduction of CSA technologies to farmers and farms; why, where, and how to apply CSA technologies; Gender, social inclusion and adapting climate change and Sustainable Land Management.
- Synthesis reports were published to showcase comparative analysis of CSA technologies and practices in South Asia.

- The video modules were validated for the following CSA technologies: strip tillage, bed planting, zero tillage and relay cropping.

Publications and Snapshots

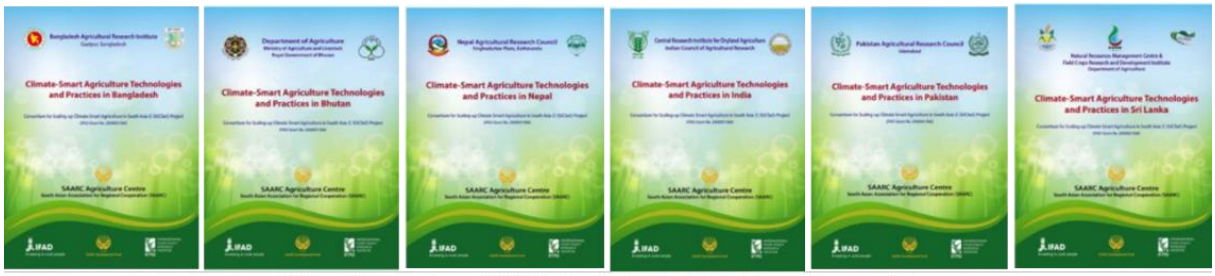

Figure 2: Inventory of CSA technologies in SAARC member countries

Figure 3: Participatory Research Reports of CSA technologies in SAARC member countries

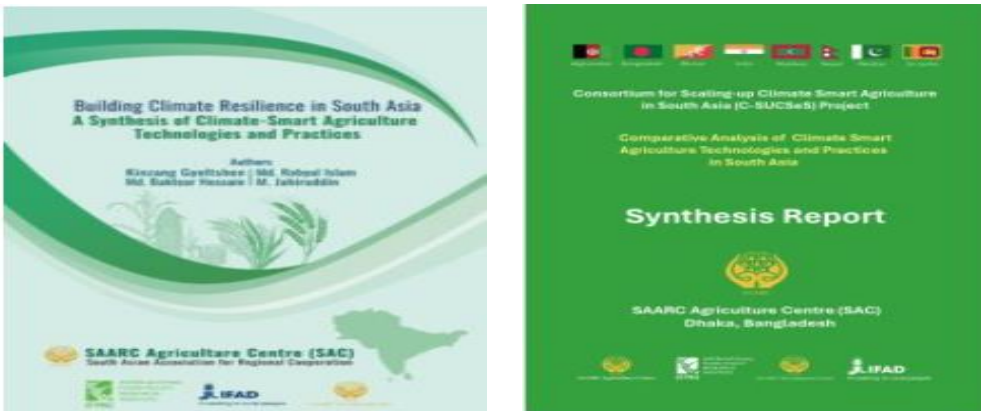

Figure 4: Synthesis Reports of CSA in SAARC technologies member counties

Zero tillage technology site, Bangladesh

Sustainable Land Management site, Bhutan

Direct seeded Rice technology site, India

Alternate Wetting and Drying site, Nepal

Improved Wheat Variety Demo. site, Pakistan

Micro-drip and Protected site, Sri Lanka

Plate 2: Photos of PR Sites in the SAARC Member Countries


Participatory Research Sites, Bangladesh


Participatory Research Sites, Pakistan


Participatory Research Sites and Farmer Field School, Sri Lanka