Climate-Smart Agriculture Practices Endorsed by Odisha's Priority Districts

Center for Study of Science, Technology and Policy (CSTEP)
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Contributors

CSTEP: Ajad Kumar Singh, Anika Dhiman, Dr Bhavin Gohel, Deeksha Shridhar, Dr Harishankar Kopperi, Dr Indu K Murthy, Dr Manish Kumar, Dr Pallavi Padmanav, Sachin Venkatrao Phad, Dr Srikanth Mekala, Suvid M, Tanushree Garg, Tashina Madappa Cheranda, and Vidhatri Thakkar

DA&FE: Dr Arabinda Kumar Padhee, Shubhranshu Mishra, Dr Sangram Keshari Pattnaik, Nagendra Kumar Mallik, and Dr Tushar Ranjan Mohanty (OUAT)

(The author list provided assumes no particular order as every individual contributed to the successful execution of the project)

Editor: Veena P

Designer: Bhawna Welturkar

Bengaluru
No. 18, 10th Cross, Mayura Street
Papanna Layout, Nagashettyhalli
RMV Stage 2, Bengaluru 560094
Karnataka (India)

Noida
1st Floor, Tower-A
Smartworks Corporate Park
Sector 125, Noida 201303
Uttar Pradesh (India)

Tel.: +91 (80) 6690 2500
Email: cpe@cstep.in

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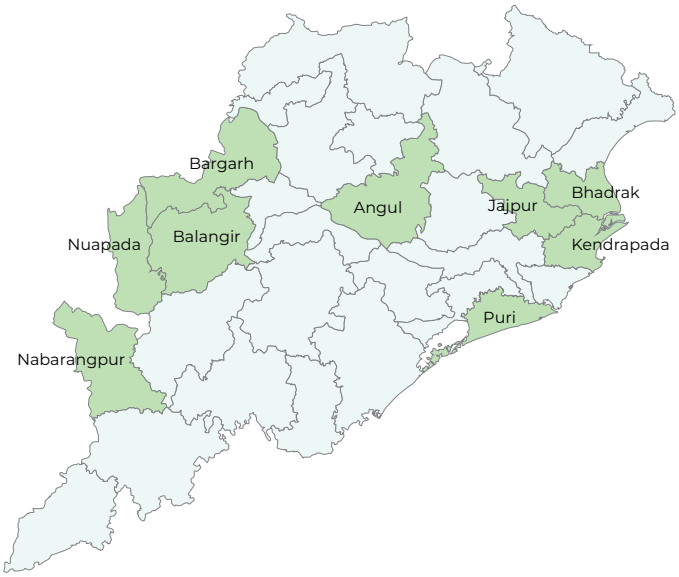

Introduction

This document presents climate-smart agriculture (CSA) practices that have been prioritised through district-level consultations with experts from nine districts. The districts include those with high climate risks (Nuapada, Kendrapara, and Angul), high resource use (Bargarh and Nabarangpur), and high greenhouse gas (GHG) emissions (Puri), along with those prone to all three, i.e. high climate risks, resource use, and GHG emissions (Jajpur, Bhadrak, and Balangir).

The experts were from the three Directorates of the Department of Agriculture and Farmers' Empowerment (DA&FE): the Directorate of Agriculture and Food Production, the Directorate of Horticulture, and the Directorate of Soil Conservation and Watershed Development. Scientists from each district's krishi vigyan kendras (KVKs) were also consulted. The prioritised CSA practices were then validated by farmer groups, including farmer producer organisations (FPOs), self-help groups (SHGs), and mixed farmer groups, in a random sample of villages. This allowed us to ensure that the prioritised practices reflected farmer relevance, technical feasibility, and gender-balanced participation.

The practices may be applied to paddy and other crops. Other crops include maize, millets, mustard, sesame, a range of vegetables and fruits (onion, cowpea, brinjal, ladyfinger, tomato, potato, beans, pumpkin, cabbage, and mango), spices (ginger, turmeric, chilli, coriander, and garlic), and pulses (black gram and green gram). The type of crops sown varies from district to district; however, the practices are broad enough that they may be applied to all of them.

Each district has prioritised a set of ten CSA practices. Furthermore, the Chief District Agriculture Officer (CDAO) from each district identified the top three CSA practices for implementation, reflecting immediate district priorities.

District 1: Puri

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice		
First	Direct-seeded rice (DSR) – mechanised	Paddy	Crop management
Second	Recommended integrated farming system (IFS) modules; paddy cultivation along with livestock (e.g., rice–duck or rice–fish); biosaline farming involving both halophytes and marine aquaculture (Pokkali rice, where feasible)	Paddy	Crop management
	Organic and biofertilisers – vermicompost, farmyard manure (FYM), compost, and cow-based manures	All crops	Resource management
Third	Digital tools, information and communications technology (ICT), printed materials, and exposure to exhibitions	All crops	Supporting
	Alternate wetting and drying (AWD)	Paddy	Resource management
	Safe disposal waterways	Paddy	Resource management
	Diversification into high-value crops (fruits/vegetables/spices) and forgotten foods	Other crops	Crop management
	Intercropping / multiple cropping (e.g., cereals and legumes), deep-rooted with shallow-rooted crops	Other crops	Crop management
	Border strip irrigation	Other crops	Resource management
	Micro-irrigation – drip / sprinkler irrigation	Other crops	Resource management

Crop type Practice type

District 2: Angul

Ranking, in terms of the top three CSA practices to be implemented

CSA practice

First		Micro-irrigation – drip / sprinkler irrigation / rain guns	Other crops · Resource management
Second		Diversification into high-value crops (fruits/vegetables/spices) and forgotten foods	Other crops · Crop management
Third		Utilisation of rice fallows with short-duration rabi pulses/oilseeds	Other crops · Crop management
		Intercropping / multiple cropping (e.g., cereals and legumes), deep-rooted with shallow-rooted crops	Other crops · Crop management
		Mulching (organic/inorganic)	Other crops · Resource management
		Broad bed and furrow (BBF)	Other crops · Crop management
		Post-harvest management, value addition for agricultural produce, and creation of green value chains	Other crops · Crop management
		Soil-test-based nutrients, including micro-nutrients	All crops · Resource management
		Natural farming principles/practices	All crops · Crop management
		Addressing human–wildlife conflict through solar fences or the use of biorepellents	All crops · Supporting

Crop type · Practice type

District 3: Jajpur

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice	Crop type	Practice type
First	Improved drought-, flood-, salt-, heat-, pest-, and disease-tolerant crop varieties	Paddy	Crop management
Second	Soil-test-based nutrients, including micro-nutrients	All crops	Resource management
Third	Diversification into high-value crops (fruits/vegetables/spices) and forgotten foods	Other crops	Crop management
	Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops	Resource management
	BBF	Other crops	Crop management
	Vegetative barriers / hedgerows / field bunding / contour bunding	Other crops	Resource management
	Mulching (organic/inorganic)	Other crops	Resource management
	Agri-horti-silvopasture or horti-silvopasture	Other crops	Crop management
	Bund/block plantation–based farm forestry (horticulture trees, forest trees, and commercial trees such as teak)	Other crops	Crop management
	IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops	Supporting

Crop type

Practice type

District 4: Nabarangpur

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice		
First		Diversification into high-value crops (fruits/vegetables/spices) and forgotten foods	Other crops · Crop management
Second		Micro-irrigation – drip / sprinkler irrigation / rain guns	Other crops · Resource management
Third		Intercropping / multiple cropping (e.g., cereals and legumes), deep-rooted with shallow-rooted crops	Other crops · Crop management
		Mulching (organic/inorganic)	Other crops · Resource management
		Post-harvest management, value addition for agricultural produces, and creation of green value chains	Other crops · Crop management
		Repair/renovation/lining of farm ponds or irrigation/field channels	All crops · Resource management
		Summer ploughing every year/once in 3 years, using a mould board (MB) plough for soil moisture conservation	All crops · Resource management
		Soil-test-based nutrients, including micro-nutrients	All crops · Resource management
		Pest and disease surveillance and forewarning systems	All crops · Supporting
		Customised and digitised weather forecast–based crop advisory services	All crops · Supporting

Crop type · Practice type

District 5: Balangir

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice		
First	DSR – mechanised	Paddy	Crop management
Second	Post-harvest management, value addition for agricultural produce, and creation of green value chains	Other crops	Crop management
Third	Access to services of KVKs and regional research stations (RRSs) of state agricultural universities (SAUs) – Organisation of demonstration plots, farmer field schools, training programmes, and field visits	All crops	Supporting
	Improved drought-, flood-, salt-, heat-, pest-, and disease-tolerant varieties	Paddy	Crop management
	Summer ploughing every year/once in 3 years, using an MB plough for soil moisture conservation	Paddy	Resource management
	AWD	Paddy	Resource management
	Intercropping / multiple cropping (e.g., cereals and legumes), deep-rooted with shallow-rooted crops	Other crops	Crop management
	Diversification into high-value crops (fruits/vegetables/spices) and forgotten foods	Other crops	Crop management
	Orchard management (nursery, propping, windbreaks, shade nets, canopy management, and pruning)	Other crops	Crop management
	IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops	Supporting

Crop type

Practice type

District 6: Nuapada

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice		
First		IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops / Supporting
Second		Farm ponds / water harvesting structures for irrigation during dry spells	Other crops / Resource management
Third		Access to services of KVKs and RRSs of SAUs – Organisation of demonstration plots, farmer field schools, training programmes, and field visits	All crops / Supporting
		Residue retention with no stubble burning and brown manuring / incorporation of green manure crops	Paddy / Resource management
		Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops / Resource management
		Agri-horti-silvopasture or horti-silvopasture	Other crops / Crop management
		Bund/block plantation–based farm forestry (horticulture trees, forest trees, and commercial trees such as teak)	Other crops / Crop management
		Check dams / earthen bunds / bori bandh / stone bunds / gully plugs	Other crops / Resource management
		Post-harvest management, value addition for agricultural produce, and creation of green value chains	Other crops / Crop management
		Digital tools, ICT, printed materials, and exposure to exhibitions	All crops / Supporting

Crop type

Practice type

District 7: Kendrapada

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice	Crop type	Practice type
First	Improved drought-, flood-, salt-, heat-, disease-, and pest-tolerant varieties	Paddy	Crop management
Second	Recommended IFS modules; cultivation of paddy along with livestock (e.g., rice–duck or rice–fish); biosaline farming involving both halophytes and marine aquaculture (Pokkali rice, where feasible)	Paddy	Crop management
Third	Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops	Resource management
	Natural farming principles/practices	All crops	Crop management
	Short-duration, early maturing varieties, resilient local landraces, or rootstocks	All crops	Crop management
	Utilisation of rice fallows with short-duration rabi pulses/oilseeds	Other crops	Crop management
	Micro-irrigation – drip / sprinkler irrigation / rain guns	Other crops	Resource management
	Mulching (organic/inorganic)	Other crops	Resource management
	Repair/renovation/lining of farm ponds or irrigation/field channels	All crops	Resource management
	Use of renewable energy for irrigation (solar/wind)	All crops	Resource management

Crop type

Practice type

District 8: Bargarh

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice	Crop type	Practice type
First	Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops	Resource management
Second	Repair/renovation/lining of farm ponds or irrigation/field channels	All crops	Resource management
Third	Micro-irrigation – drip / sprinkler irrigation / rain guns	Other crops	Resource management
	Soil-test-based nutrients, including micro-nutrients	All crops	Resource management
	Check dams / earthen bunds / bori bandh / stone bunds/ gully plugs	All crops	Resource management
	Use of slow-release fertiliser, i.e. neem- or sulphur-coated urea and nano-fertilisers	All crops	Resource management
	Digital tools, ICT, printed materials, and exposure to exhibitions	All crops	Supporting
	Access to services of KVKs and RRSs of SAUs – Organisation of demonstration plots, farmer field schools, training programmes, and field visits	All crops	Supporting
	IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops	Supporting
	Azolla cultivation, green fodder cultivation (maize, sorghum, or cow pea cultivation for a short duration and fed to livestock)	NA	Supporting

District 9: Bhadrak

Ranking, in terms of the top three CSA practices to be implemented

	CSA practice		
First		Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops · Resource management
Second		IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops · Supporting
Third		Access to services of KVKs and RRSs of SAUs – Organisation of demonstration plots, farmer field schools, training programmes, and field visits	All crops · Supporting
		Customised leaf colour chart for guiding fertiliser application	All crops · Resource management
		Seed/seedling treatment with bioinoculants	All crops · Resource management
		Soil-test-based nutrients, including micro-nutrients	All crops · Resource management
		Farm ponds / water harvesting structures for irrigation during dry spells	Other crops · Resource management
		Micro irrigation – drip / sprinkler irrigation / rain guns	Other crops · Resource management
		Digital tools, ICT, printed materials, and exposure to exhibitions	All crops · Supporting
		Azolla cultivation, green fodder cultivation (maize, sorghum, or cow pea cultivation for a short duration and fed to livestock)	NA · Supporting

Crop type Practice type

Odisha – Strategic CSA Practices

CSA practice		
	DSR – mechanised	Paddy · Crop management
	AWD*	Paddy · Resource management
	Recommended IFS modules; cultivation of paddy along with livestock (e.g., rice–duck or rice–fish); biosaline farming involving both halophytes and marine aquaculture (Pokkali rice, where feasible)	Paddy · Crop management
	Summer ploughing every year/once in 3 years, using an MB plough for soil moisture conservation	All crops · Resource management
	Improved drought-, flood-, salt-, heat-, pest-, and disease-tolerant varieties	All crops · Crop management
	Soil-test-based nutrients, including micro-nutrients	All crops · Resource management
	Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops · Resource management
	Check dams / earthen bunds / bori bandhs / stone bunds / gully plugs	All crops · Resource management
	Micro-irrigation – drip / sprinkler irrigation / rain guns	Other crops · Resource management
	BBF	Other crops · Crop management
	Mulching (organic/inorganic)	Other crops · Resource management

Crop type Practice type

CSA practice		
	Diversification into high-value crops (fruits/ vegetables/spices) and forgotten foods	Other crops / Crop management
	Intercropping / multiple cropping (e.g., cereals and legumes), deep-rooted with shallow-rooted crops	Other crops / Crop management
	Utilisation of rice fallows with short-duration rabi pulses/oilseeds	Other crops / Crop management
	Agri-horti-silvopasture or horti-silvopasture	Other crops / Crop management
	Bund/block plantation–based farm forestry (horticulture trees, forest trees, and commercial trees such as teak)	Other crops / Crop management
	IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops / Supporting
	Access to services of KVKs and RRSs of SAUs – Organisation of demonstration plots, farmer field schools, training programmes, and field visits	All crops / Supporting
	Digital tools, ICT, printed materials, and exposure to exhibitions	All crops / Supporting
	Azolla cultivation, green fodder cultivation (maize, sorghum, or cow pea cultivation for a short duration and fed to livestock)	NA / Supporting

Crop type Practice type

The CSA practices listed above have been prioritised by at least two out of the nine selected districts.

* While DSR can be adopted across most paddy systems, AWD is feasible only in areas where farmers have sufficient control over irrigation and drainage. As a result, AWD may be scaled more selectively, depending on local water management practices.

Odisha – District-wise Prioritised CSA Practices

SN	CSA practice	Crop type	Practice type	Puri	Angul	Jajpur	Nabarangpur	Balangir	Nuapada	Kendrapara	Bargarh	Bhadrak
1	DSR – mechanised	Paddy	Crop management	■				■				
2	AWD	Paddy	Resource management	■				■				
3	Recommended IFS modules; cultivation of paddy along with livestock (e.g., rice–duck or rice–fish); biosaline farming involving both halophytes and marine aquaculture (Pokkali rice, where feasible)	Paddy	Crop management	■						■		
4	Summer ploughing every year/once in 3 years, using an MB plough for soil moisture conservation	All crops	Resource management				■	■				
5	Improved drought-, flood-, salt-, heat-, pest-, and disease-tolerant varieties	All crops	Crop management			■		■		■		
6	Soil-test-based nutrient application, including micro-nutrients	All crops	Resource management		■	■	■				■	■
7	Organic and biofertilisers – vermicompost, FYM, compost, and cow-based manures	All crops	Resource management	■		■			■	■	■	■
8	Check dams / earthen bunds / bori bandhs / stone bunds / gully plugs	All crops	Resource management						■		■	
9	Micro-irrigation – drip / sprinkler irrigation / rain guns	Other crops	Resource management	■	■		■			■	■	■
10	BBF	Other crops	Crop management		■	■						
11	Mulching (organic/inorganic)	Other crops	Resource management		■	■	■			■		
12	Diversification into high-value crops (fruits/vegetables/spices) and forgotten foods	Other crops	Crop management	■	■	■	■	■				
13	Intercropping / multiple cropping (e.g., cereals and legumes), deep-rooted with shallow-rooted crops	Other crops	Crop management	■	■		■	■				

SN	CSA practice	Crop type	Practice type	Puri	Angul	Jajpur	Nabarangpur	Balangir	Nuapada	Kendrapara	Bargarh	Bhadrak
14	Utilisation of rice fallows with short-duration rabi pulses/ oilseeds	Other crops	Crop management		■					■		
15	Agri-horti-silvopasture or horti-silvopasture	Other crops	Crop management			■			■			
16	Bund/block plantation–based farm forestry (horticulture trees, forest trees, and commercial trees such as teak)	Other crops	Crop management			■			■			
17	IFS modules – mushroom cultivation; bee keeping; fishery practices in small ponds, including hatcheries; backyard rearing of poultry; rearing small ruminants	All crops	Supporting			■		■	■		■	■
18	Access to services of KVKs and RRSs of SAUs – Organisation of demonstration plots, farmer field schools, training programmes, and field visits	All crops	Supporting					■	■		■	■
19	Digital tools, ICT, printed materials, and exposure to exhibitions	All crops	Supporting	■					■		■	■
20	Azolla cultivation, green fodder cultivation (maize, sorghum, or cow pea cultivation for a short duration and fed to livestock)	NA	Supporting								■	■

Appendix

Table A1: Exhaustive list of stakeholders engaged during field visits across districts

District	Civil society organisation / non-governmental organisation	Farmer producer organisation (FPO) / farmer producer company (FPC)	Self-help group (SHG)
Angul	Joint Endeavour for Emancipation Training & Action of Women (JEETA)	Charamallik FPC	Abhiram, Banarpal
	Voluntary Institute for Rural Development (VIRD)	Somanatha FPC	Baba Dhabaleshwar, Athamallik
			Jamardihi SHG1, Pallahara
Balangir	Action for Social Advancement (ASA)	Bancharen FPC	Bijayalakshmi, Bongomunda
	Mahashakti Foundation	Bastarani	Mahamangala, Bongomunda
		Green Gudvela FPC	Mahasaraswati, Turekela
	Vikalpa	Harishankar FPC	Mahatulsi, Turekela
		Muribahal FPO	
		Puintala FPC	
Bargarh	Mahashakti Foundation	Bhatli FPC	-
		Chirasabuja FPC	
	New Life Foundation	Sabujima FPC	
Bhadrak	-	Aradi Tihidi Block 4S4R FPC	-
		Bajrangi FPC	
		Dhamnagar 4S4R FPC	
		Kunteshwar FPC	
Jajpur	Adarsh Odisha Foundation	Adarsh FPO	-
	Gangotri	Gangotri FPO	
	Danagadi Village Cooperative Society	Taradevi Women FPO	
	Barundei Village Cooperative Society		
	SAHELI		
Kendrapara	Action for Protection of Wild Animals (APOWA)	Baladevjew FPO	Adishakti SHG, Rajnagar
	Gram-Utthan		
	Nature's Club	Krushi Bikash FPC	
	Sri Satya Sai Institute of Technical Management		

District	Civil society organisation / non-governmental organisation	Farmer producer organisation (FPO) / farmer producer company (FPC)	Self-help group (SHG)
Nabarangpur	Harsha Trust	Ma Pendrani FPC	Budha Chauria, Papadahandi
			Ma Durga, Papadahandi
			Ma Sanadoi, Papadahandi
			Ma Tarini, Papadahandi
			Ma Thakurani, Papadahandi
	Odisha Professional Development Service Consultants (OPDSC)		Mahalaxmi, Papadahandi
			Olekh Mahima, Papadahandi
			Saraswati, Nowrangpur
			Tulsi, Nowrangpur
			Tulsi, Papadahandi
Nuapada	Prateeksha	Pallijagaran FPC	Maa Biranjadevi , Sinapali
			Maa Kalijai, Sinapali
		Maa Sunadei FPC	Jhansirani, Sinapali
	CPSW Kendubata	Maa Sunadei FPO	Maa Dharani, Komna
		Sabuja Komna FPC	Mahalakshmi, Khariar
			Bedamata, Sinapali
			Radhakrushna, Sinapali
Puri	Gopabandhu Seva Parisad (GSP)	Samarpita FPC	Mahalakshmi, Pipli
	Odisha State Volunteers and Social Workers Association (OSVSWA)	Parikalpana FPC	Serei Village SHG, Kanas
	Organisation for Farmer's Solidarity & Integrated Farming System (OFSIFS)		

Center for Study of Science, Technology & Policy

Bengaluru

#18, 10th Cross, Mayura Street, Papanna Layout,
Nagashettyhalli (RMV II Stage),
Bengaluru – 560094, Karnataka, India

Noida

1st Floor, Tower-A, Smartworks
Corporate Park, Sector-125,
Noida-201303, Uttar Pradesh,
India


www.cstep.in


+91-8066902500


cpe@cstep.in


@cstep_India