



Deliverable 1.2

Baselines Indicators for Agriculture and Water sectors in Andhra Pradesh and Tamil Nadu

ADAPTATION TO CLIMATE CHANGE – An integrated science-stakeholder-policy approach to develop an adaptation framework for water and agriculture sectors in Andhra Pradesh and Tamil Nadu states of India



Synopsis of Key Indicators for Andhra Pradesh and Tamil Nadu



Clima-Adapt: Indicators for Agriculture and Water sectors in Andhra Pradesh and Tamil Nadu

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The overall goal of the Clima-Adapt program is to improve the adaptive capacity of the agriculture and water sectors. The aim is to achieve this by contributing to the adaptation and mitigation potential in the study regions through select project based interventions. The existing problems concerning rural population cannot be sustained by land alone given the size of the rural population and its growth dynamics. Additionally, over the past decades there have been increasing concerns about the impacts of climate change on the regions and households. Evidences point out the climate change is going to pose a further stress on the existing resources and endowments thereby creating a further strain on the different sectors of the economy. For example, many developing economies are heavily dependent on primary sectors like agriculture for their growth and development and climate change is likely to have a negative impact on this sector given the uncertainties about climate parameters like rainfall, temperature, sea level rise etc. In view of this, technological interventions related to agriculture assume significance especially in the context of production and income generation. The provisions for other components in the production process are taken care of by government agencies and other institutional and market mechanisms. From a developing country perspective, the interventions become more significant given the limits to exploitation of natural resources, demands from ever growing population, constraints regarding factor endowments and growing uncertainties regarding impacts of climate change. The most plausible solution to this problem is the selection and adoption of modern technologies relevant to rural areas. Along with finance, infrastructure and human resources, technology is a crucial input in the process of production and hence is important in the process of overall development of a region and socioeconomic wellbeing of the people.

Given this background, the Clima-Adapt project assumes significance. The planned interventions under this project are focused to enhance the nutrient and water use efficiencies in the project areas by minimizing the use of fossil fuel dependent agro inputs, besides reducing the emission of green house gases from agro eco system. Hence technologies that enhance the water and nutrient use efficiencies, reduce green house gases like methane and nitrous oxide, minimize chemical input usage, build up organic matter content of the soil etc have been identified and suggested for promotion in the project area. The identified technological interventions are eco-

friendly technologies. The underlying assumption is that the adoption of these technologies in the study region over the project period would indicate improvement of the overall adaptive capacity and resilience of the farming community. This in turn would contribute to their overall welfare and well being.

The proposed interventions aim to:

- Improve farmers ability to deal with the adverse impacts of climate change
- Increase agricultural productivity and production
- Improve access to resources (farm inputs, information services, extension services etc.)
- Sustainable use of natural resources
- Strengthen institutions

Accordingly, select indicators have been designed to capture the success of the interventions as well as learn the barriers and risks associated with efforts to build resilience in the study regions. The following table (Table 1) depicts the generic, macro level indicators that would help understand the contributions of the project towards its goals and objectives.

Table 1: Goals of the Indicators at a Macro Level

Impact Indicators	Intermediate Indicators	Outcome Indicators	Output Indicators
<ul style="list-style-type: none"> • Food and Water Security 	<ul style="list-style-type: none"> • Proportion of farmers benefitted • Water and food availability 	<ul style="list-style-type: none"> • Increased ability of farmers to deal with the adverse impacts of climate change • Increased production and productivity with existing resources 	<ul style="list-style-type: none"> • Increase in Irrigated land (as % of cropped land) • Extension coverage • Extent of buy-in of the promoted climate resilient technologies

These macro components projected here are the sum of the contributions of targeted sectoral interventions that are being assessed by specific disaggregated indicators. While Table 2 lists the indicators for the Andhra Pradesh study region, Table 3 catalogues the same for the Tamil Nadu study region.

Table 2: Indicators for Andhra Pradesh Study Region

Sl. No.	Focus Areas	Interventions	Output Indicator	Outcome Indicator (Units)	Impact Indicator
1	Farming Practices	Modified SRI	<ul style="list-style-type: none"> Use of improved seedlings Fertilizer consumption Water Use Efficiency (WUE) Production Yield Soil organic matter Water holding capacity Soil fertility 	<ul style="list-style-type: none"> No. of farmers adopted (Nos. / %) Per capita consumption expenditure (Rs.) Average total income (Rs.) Share of agricultural income (Rs.) Income derived from other sources (Rs.) Cost of inputs (Rs.) Cost of production (Rs.) 	<ul style="list-style-type: none"> Climate Change Resilient Agriculture Enhanced adaptive capacity to deal with natural disaster risks and climate change
		Alternate wetting and drying			
		Green manure cultivation prior to first monsoon			
		New varieties in Paddy and Cotton			
2	Soil	Green manure cultivation (e.g. <i>Azolla</i> / Blue green Algae)	<ul style="list-style-type: none"> Production Yield Soil organic matter Water holding capacity Soil fertility 	<ul style="list-style-type: none"> No. of farmers adopted (Nos. / %) Per capita consumption expenditure (Rs.) Average total income (Rs.) Share of agricultural income (Rs.) Income derived from other sources (Rs.) Cost of inputs (Rs.) Cost of production (Rs.) 	<ul style="list-style-type: none"> Climate Change Resilient Agriculture Enhanced adaptive capacity to deal with natural disaster risks and climate change
		Soil test based fertilizer application			
		Micronutrient application			
3	Water	Drip irrigation	<ul style="list-style-type: none"> Application efficiency of water Units established 	<ul style="list-style-type: none"> No. of farmers adopted (Nos. / %) Acreage area (km²) Net area under cultivation (acres) Quantum of water saved (liters) 	<ul style="list-style-type: none"> Enhanced WUE which is one among the main adaptation strategies in water sector
		Use of sprinklers			
4	Information and Insurance Services	Weather based crop insurance	<ul style="list-style-type: none"> No. of farmers insured 	<ul style="list-style-type: none"> Compensation received (Rs.) 	<ul style="list-style-type: none"> Risk reduction in agricultural production Enhanced Adaptive capacity to deal with natural disaster risks and climate change
		Village Resource Centre (VRC) [#]	<ul style="list-style-type: none"> No. of centers established Access to information services 	<ul style="list-style-type: none"> People visited (Nos.) Kind of information sought (Scale) Applications of information (Nos.) Percentage of farmers that have knowledge / use advice Percentage of people satisfied with the knowledge being 	<ul style="list-style-type: none"> Awareness on Climate Risk Acceptance of farming practices Changes in adaptive capacity

				disseminated by VKC	
5	Capacity Building	Management of resources	<ul style="list-style-type: none"> Improved knowledge and awareness 	<ul style="list-style-type: none"> No. of trainings organized (Nos.) 	<ul style="list-style-type: none"> Farm productivity enhancement measures Technology Transfer Climate Resilient package practices for Training of Trainers (ToTs)
		Local institutions	<ul style="list-style-type: none"> Water User Associations (WUAs) 	<ul style="list-style-type: none"> No. of WUAs No. of Penalties in WUAs (Nos.) 	<ul style="list-style-type: none"> Water distribution pattern and sharing benefits on and off agriculture
6	Policy	Macro and Micro level Policy	<ul style="list-style-type: none"> Uptake of Policy inputs at various levels 	<ul style="list-style-type: none"> No. of meetings held Knowledge sharing events Briefs / Reports brought out 	<ul style="list-style-type: none"> Reflections in State Policy
7	Gender Issues	Gender*	<ul style="list-style-type: none"> Gender empowerment and mainstreaming 	<ul style="list-style-type: none"> Percentage of population (men & women) with access to education (%) Percentage of women farmers (%) Percentage of women in WUAs (%) On and Off farm practices (Nos. / %) 	<ul style="list-style-type: none"> Change in equity and welfare Income diversification and stability Drudgery reduction

Note: The exact base value for some interventions are difficult to quantify and hence the subsequent measurement surveys should quantify it as increase / decrease from 2012-13. The baseline value for interventions like Green Manure, AWD, Soil test based fertilizer application, Micronutrient application etc. are very low and stand at below 3-5%

The ICT division of the MSSRF is in charge for the establishment and functioning of the VKC/VRCs. They have their own set of indicators for measuring the output, outcome and impacts due to the VKC / VRCs

* Gender indicators provided here at a generic level. More specifics will be worked out by the Gender coordinator from MSSRF who is providing the overall support on gender aspects of the project

Table 3: Indicators for Tamil Nadu Study Region

Sl. No.	Sectors	Interventions	Output Indicator	Outcome Indicator (Units)	Impact Indicator
1	Farming Practices	Modified SRI	<ul style="list-style-type: none"> • Use of improved seedlings • Fertilizer consumption • Water Use Efficiency (WUE) • Production • Yield 	<ul style="list-style-type: none"> • No. of farmers adopted (Nos. / %) • Per capita consumption expenditure (Rs.) • Average total income (Rs.) • Share of agricultural income (Rs.) • Income derived from other sources (Rs.) 	<ul style="list-style-type: none"> • Climate Change Resilient Agriculture • Enhanced adaptive capacity to deal with natural disaster risks and climate change
		<i>Azolla</i> Cultivation			
		Application of biofertilizers like <i>Azospirillum</i> , Blue green algae and biocontrol agents like <i>Trichoderma</i> and <i>Pseudomonas</i>			
		New varieties in paddy			
2	Soil	Green manure cultivation	<ul style="list-style-type: none"> • Soil organic matter • Water holding capacity • Soil fertility 	<ul style="list-style-type: none"> • Cost of inputs (Rs.) • Cost of production (Rs.) 	
		Soil test based fertilizer application			
		Usage of leaf colour chart by the farmers to decide fertilizer dose and time of application			
		Micronutrient application			
3	Water	Drip irrigation	<ul style="list-style-type: none"> • Application efficiency of water • Units established 	<ul style="list-style-type: none"> • No. of farmers adopted (Nos. / %) • Acreage area (km²) • Net area under cultivation (acres) • Quantum of water saved (liters) 	<ul style="list-style-type: none"> • Enhanced WUE which is one among the main adaptation strategies in water sector
		Use of sprinklers			

4	Pollution	Quality of water resources	<ul style="list-style-type: none"> Measures of pollution like BOD / COD etc. during last 3 years (ppm) Additional household expenditure due to incidence of diseases (Rs.) 	<ul style="list-style-type: none"> Incidence of major diseases during last 3 years (Nos.) 	<ul style="list-style-type: none"> Health status Morbidity
5	Information and Insurance Services	Weather based crop insurance	<ul style="list-style-type: none"> No. of farmers insured 	<ul style="list-style-type: none"> Compensation received (Rs.) 	<ul style="list-style-type: none"> Risk reduction in agricultural production Enhanced adaptive capacity to deal with natural disaster risks and climate change
		Village Resource Centre (VRC) [#]	<ul style="list-style-type: none"> No. of centers established Access to information services 	<ul style="list-style-type: none"> People visited (Nos.) Kind of information sought (Scale) Applications of information (Nos.) Percentage of farmers that have knowledge / use advice Percentage of people satisfied with the knowledge being disseminated by VKC 	<ul style="list-style-type: none"> Awareness on climate risk Acceptance of farming practices Changes in adaptive capacity
6	Capacity Building	Management of resources	<ul style="list-style-type: none"> Improved knowledge and awareness 	<ul style="list-style-type: none"> No. of trainings organized (Nos.) 	<ul style="list-style-type: none"> Farm productivity enhancement measures Technology Transfer Climate Resilient package practices for Training of Trainers (ToTs)
		Local institutions	<ul style="list-style-type: none"> Water User Associations (WUAs) 	<ul style="list-style-type: none"> No. of WUAs No. of penalties in WUAs (Nos.) 	<ul style="list-style-type: none"> Water distribution pattern and sharing benefits on and off agriculture

7	Policy	Macro and Micro Level Policy	<ul style="list-style-type: none"> Uptake of Policy Inputs at various levels 	<ul style="list-style-type: none"> No. of meetings held Knowledge sharing events Briefs / Reports brought out 	<ul style="list-style-type: none"> Reflections in State Policy
8	Gender Issue	Gender*	<ul style="list-style-type: none"> Gender empowerment and mainstreaming 	<ul style="list-style-type: none"> Percentage of population (men & women) with access to education (%) Percentage of women farmers (%) Percentage of women in WUAs (%) On and Off farm practices (Nos. / %) 	<ul style="list-style-type: none"> Change in equity and welfare Income diversification and stability Drudgery reduction

Note: The exact base value for some interventions are difficult to quantify and hence the subsequent measurement surveys should quantify it as increase / decrease from 2012-13. The baseline value for interventions like *Azolla* cultivation, Soil test based fertilizer application, Usage of leaf color chart by the farmers to decide fertilizer dose and time of application, Micronutrient application etc. are very low and stand in between 5-25%

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