Impact Assessment of Projects undertaken by ITC's Social Investments Programmes on Natural Resource Management, Climate Smart Agriculture, and Social Forestry

ITC Limited

MARCH 2025

Price Waterhouse Chartered Accountants LLP

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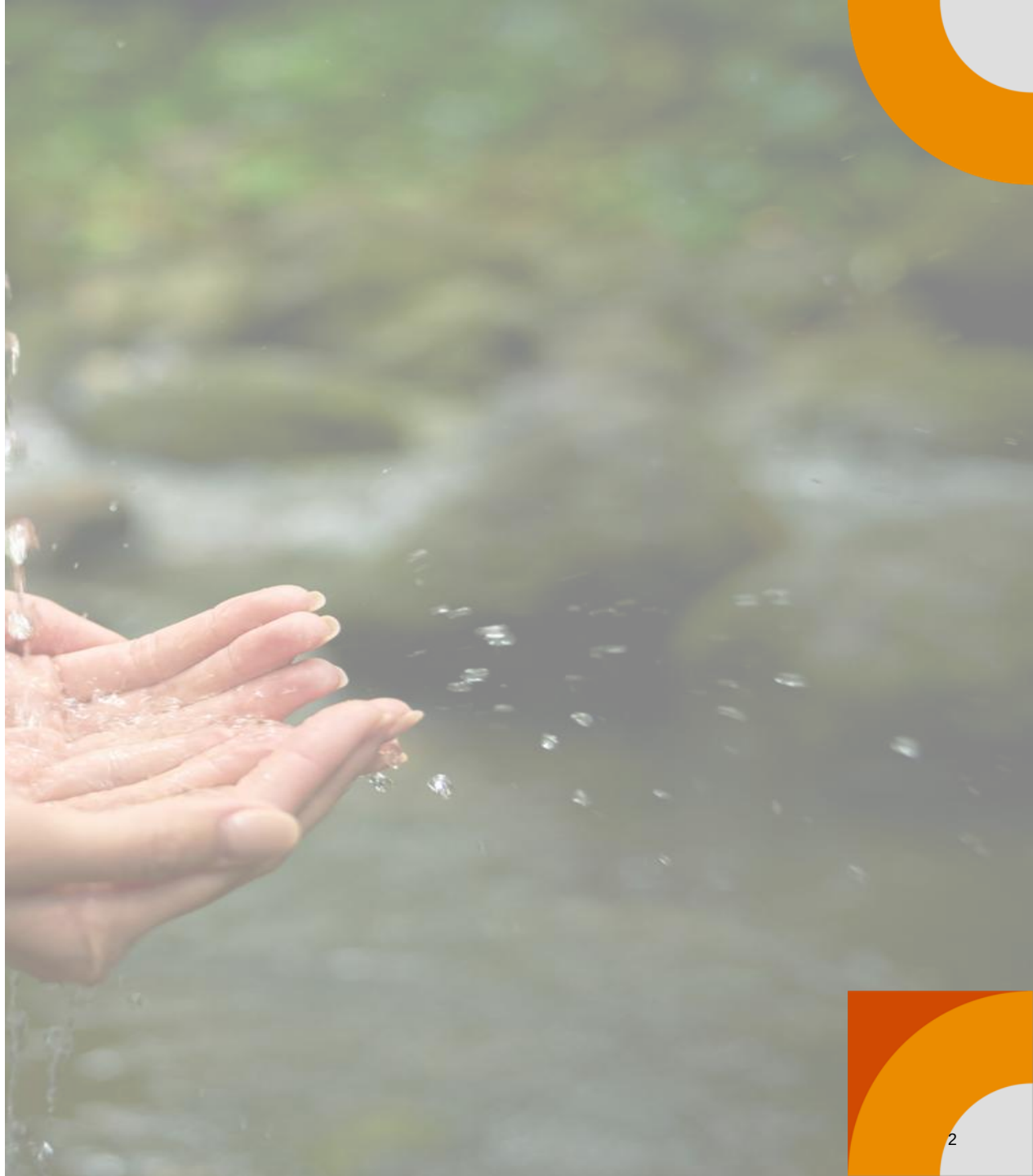


About the CSR programmes under Assessment

Programme 1: Natural Resource Management – Water Stewardship and Biodiversity	Programme 2: Climate Smart Agriculture (CSA)	Programme 3: On-farm Livelihood Diversification: Tree Plantation - Social Forestry (SF)
This initiative prioritized water security through community-based conservation efforts, enhancing groundwater and balancing water use in agriculture. The programme targeted revitalizing natural resources for sustainable agriculture, involving conservation efforts within supply chains, community-led landscape renewal, and restoring ecosystem services essential to agriculture, focusing on forest fringes and commons restoration.	The CSA initiative was designed to build climate change adaptation, enhance farmer resilience, and sustainably improve crop yield and income. It promoted practices that are regenerative, productive, and climate resilient. The programme focused on reducing emissions, improving water use efficiency, and building farmer capacity through the adoption of innovative agricultural practices.	The goal of this programme was to improve incomes and mitigate the risks posed by climate change through tree and fruit plantations incorporated with traditional crops (agro-forestry). By promoting plantations of various tree species, the programme planned to help farmers capitalize on market opportunities and meet their wood requirements. It supported small farmers through models like block plantations and bund plantations.
Specifics of "NRM programme": Scope of Impact Assessment	**Specifics of "CSA programme": Scope of Impact Assessment**	**Specifics of "Social Forestry programme": Scope of Impact Assessment**
Geographical Presence: Andhra Pradesh, Karnataka, and Tamil Nadu	**Geographical Presence:** Andhra Pradesh, Karnataka, and Tamil Nadu	**Geographical Presence:** Andhra Pradesh and Karnataka
Total number of beneficiaries: 10,345 Local farmers	**Total number of beneficiaries:** 16,752 Local farmers	**Total number of beneficiaries:** 5,295 Local farmers
Implementation partners: DHAN, OUTREACH, BAIF, MYKAPS, SEARCH, MYRADA	**Implementation partners:** DHAN, OUTREACH, BAIF, MYKAPS, SEARCH, MYRADA	**Implementation partners:** OUTREACH, BAIF, MYKAPS, SEARCH
Period of Review: FY 2022-23	**Period of Review:** FY 2022-23	**Period of Review:** FY 2022-23

Source: Data as shared by the ITC Ltd

Approach & Methodology

ITC Limited engaged PWCALLP to carry out the impact assessment of its 3 social investments programmes: (1) Natural Resource Management- Water stewardship and Biodiversity, (2) Climate Smart Agriculture, and (3) On-farm Livelihood Diversification: Tree Plantation- Social Forestry implemented. The assessment aimed to evaluate the effectiveness, efficiency, and sustainability of ITC's social impact initiatives under the aforesaid themes. The assessment was undertaken using the quantitative and qualitative methods to understand the impact of the activities undertaken under the CSR programmes in mutual discussion with ITC. The scope of work involved conducting the desk review of the programme documents, mapping of key programme stakeholders, developing research methodology, field-level data collection & analysis and report writing.

Stage 1: included an inception meeting with the ITC team to understand programme interventions, align on scope and expectations, and initiate stakeholder interactions and mapping.

Stage 2: involved finalizing the data collection plan and research tools with ITC's feedback, digitizing and translating tools into the local language, and briefing ITC's team on the field visit data collection strategy.

Stage 3: the field team received training on data collection tools and initiated the process, conducting quantitative surveys and qualitative discussions with beneficiaries and other stakeholders to gather and corroborate feedback.

Stage 4: the team performed data cleaning and analysis, ensured validation through triangulation, assimilated key findings, drafted the impact assessment report for ITC, and integrated feedback.

IRECS Framework used for the assessment

Inclusiveness

Ability of different stakeholders, particularly poorest and most marginalised - to access the benefits of activities

Relevance

Are the services /inputs in the programme able to meet community priorities? How was the planning done ? Was it participatory ?

Effectiveness

Have the activities been able to effectively address community expectations? How efficiently have the resources been deployed, monitored and utilised?

Convergence

Degree of convergence with government/other partnerships; relationship between individuals, community, institutions and other stakeholders

Sustainability

Do communities feel ownership over the assets created by the activities and/or will the programmme initiated community interventions sustain even after the exit?

Sampling Plan

Quantitative Sample

Programme	Sample Size for Case Group	Actual Coverage for Case Group*	Sample Size for Control Group	Actual Coverage for Control Group
NRM*	371	501	304	304
CSA	376	430		
SF	359	471		
TOTAL	**1,106**	**1,402**	**304**	**304**

*As the programme beneficiaries received multiple programme benefits, the number of respondents for each programme exceeded the initial estimates made at the study's inception.

Qualitative Sample

Programme	In Depth Interview		Key Informant Interview		Focus Group Discussion	
	Target	Achieved	Target	Achieved	Target	Achieved
NRM	14	14	12	12	24	24
CSA	20	20	12	12	18	18
SF	8	8	12	12	12	12
TOTAL	**42**	**42**	**36**	**36**	**54**	**54**

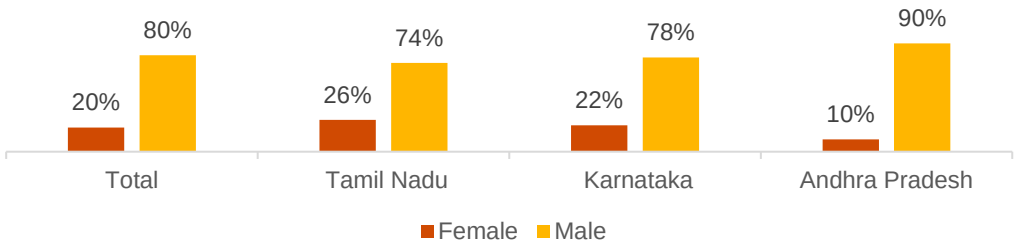
*NRM- Natural Resource Management, CSA- Climate Smart Agriculture, SF- Social Forestry

Profile of the respondents

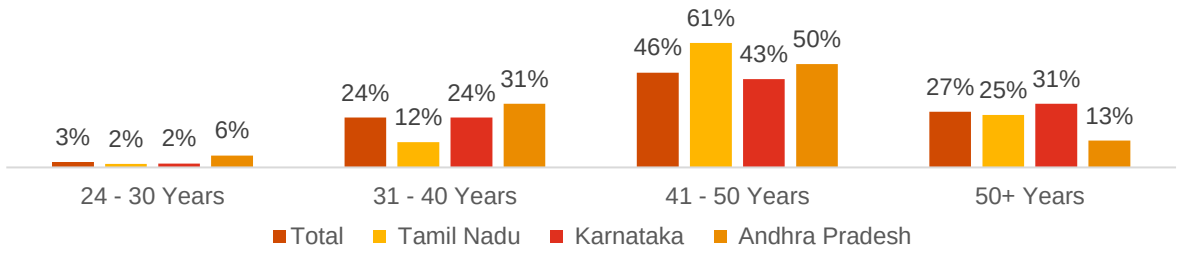
Profile of the respondents

This section illustrates the demographic and socio-economic profile of respondents across the case and control groups for all the 3 programmes combined. Analysis has been done basis the interactions carried out with 1,106 respondents as part of the case group and 304 respondents as part of the control group.

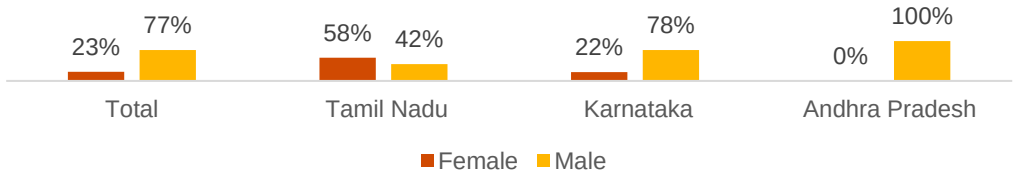
Gender of the case respondents



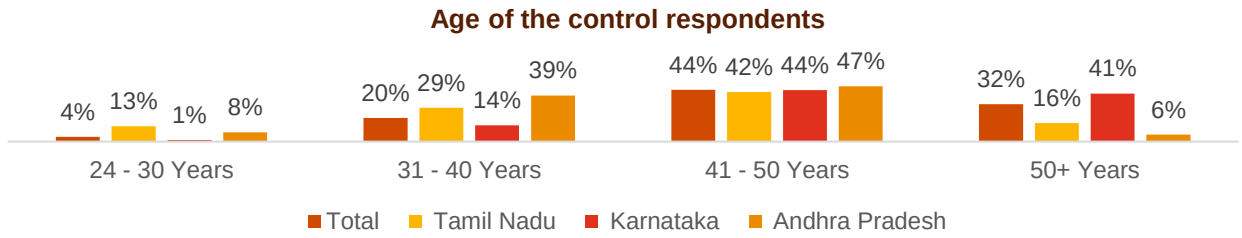
Age of the case respondents



Gender of the control respondents



Age of the control respondents



- **Education Level of Respondents:** Overall, the case group faces high illiteracy levels, contrasting with the control group's better educational attainment, as some of the control villages had better access to schools and colleges in comparison to the case villages.
- **Chief Breadwinner Status:** In both groups, a substantial majority are chief breadwinners, highlighting widespread economic responsibility among respondents, which likely reflects broader household dependency on their income-generating capabilities.
- **Social Category Distribution:** The general and OBC categories show strong representation across both groups, illustrating socio-economic stratification, possibly influenced by regional policies and historical socio-cultural dynamics.
- **Primary Income Source:** Cultivation stands as the primary income source for both groups, underscoring agriculture's essential role and its expansive economic impact on livelihoods within the surveyed respondents overall.
- **Alternative Sources of Income:** Both groups show engagement in diverse alternative income sources, primarily cultivation and labor, which demonstrates economic adaptability and varied employment opportunities beyond primary agricultural activities.

The CSA, Social Forestry, and NRM programmes **enhanced inclusivity** by targeting **smallholder farmers and promoting gender participation**, empowering communities through climate-smart practices, social forestry, and water management strategies.

Key Findings – Natural Resource Management

Type of support provided and benefits realized

The following section of the report highlights the key findings and analysis of the impact created by the "Natural Resource Management – Water Stewardship and Biodiversity Programme" among the beneficiaries. These **findings and analysis are based on the responses of 501 participants (n=501) from the case group and 304 participants (n=304)** from the control group (wherever relevant) of the quantitative study along with information gathered during the interactions with key stakeholders.

Type of support received under the programme

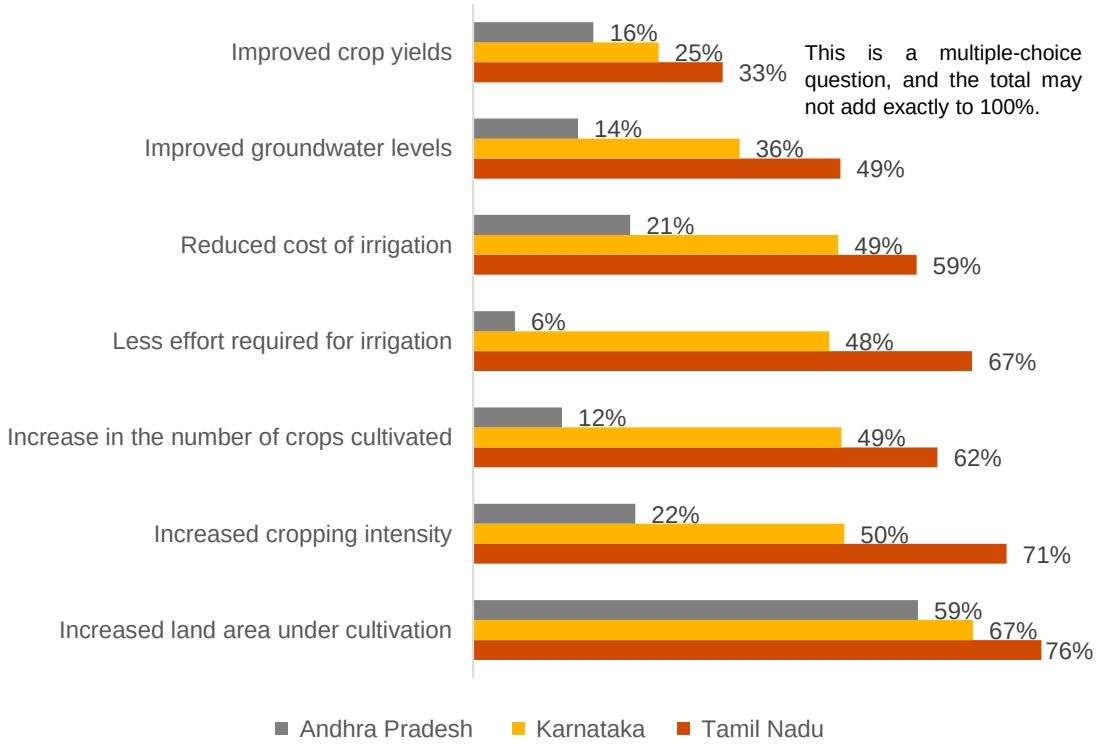
Infrastructure support

- The programme has improved water availability through the construction of various water harvesting structures. Farm ponds, prevalent among 72% of respondents, are notable in Andhra Pradesh (83%) and Tamil Nadu (71%), capturing rainwater for irrigation and domestic use.
- Additionally, trench cum bunding and loose boulder structures in Andhra Pradesh (22%) and Karnataka (53%) aid water conservation. Rock fill dams and mini percolation tanks enhance groundwater recharge, with Tamil Nadu showing higher numbers of mini percolation tanks at 30% and significant tank desilting efforts at 52%.
- Supported by government schemes like PMKSY, the programme also encourages efficient irrigation practices using subsidies for drip and sprinkler systems.

Training support

- The programme complements infrastructural improvements with comprehensive training for farmers, enhancing the effectiveness of micro irrigation systems.
- In Tamil Nadu, all participants were trained on water harvesting importance (81%), efficient crop choices (89%), and soil conservation techniques (67%). Though less widespread, Karnataka and Andhra Pradesh focused on the economic benefits of water conservation and biodiversity.
- Training in Andhra Pradesh, reaching 97% on water harvesting structures, addresses vital issues of water scarcity and unpredictable rainfall. By combining infrastructure with education, the Water Stewardship Programme advances water security, agricultural sustainability, and community resilience amidst climate challenges.

Impact of the programme activities as per case respondents



In case of AP, while the area under cultivation has witnessed improvement, because the primary crop cultivated in project locations being less water intensive, the impacts on productivity and cost etc. due to water are not as significant as in case of Karnataka and Tamil Nadu.

Detailed impact of the programme activities (1/2)

Change in land area under cultivation

Parameter	Case Group				Control Group			
Total land area under cultivation	Total	TN	KN	AP	Total	TN	KN	AP
Pre-intervention (A)	3.4	3.5	3.2	3.7	3.02	1.8	3.2	3.1
Post intervention (B)	3.5	3.7	3.3	3.7	3.02	1.8	3.2	3.1
% Change (B-A)	3%	6%	4%	0%	0%	0%	0%	0%

Change in time required for irrigation per acre

Parameter	Case Group				Control Group			
Time required to irrigate one acre of land	Total	TN	KN	AP	Total	TN	KN	AP
Pre-intervention (A)	5.34	4.18	5.62	5.74	8.58	8.50	8.60	8.51
Post intervention (B)	5.07	3.25	5.60	5.37	8.69	8.74	8.69	8.67
% Change (A-B)	5%	22%	0%	6%	-1%	-3%	-1%	-2%

Change in groundwater levels

Parameter	Case Group				Control Group			
Average groundwater levels (in feet)	Total	TN	KN	AP	Total	TN	KN	AP
Pre-intervention (A)	350	350	351	349	351	353	350	354
Post intervention (B)	301	299	300	303	362	359	362	363
% of enhancement (A-B)	14%	15%	15%	13%	-3%	-2%	-3%	3%

***The numbers used here are weighted average of the responses.**

- The programme's impact was driven by the construction and renovation of water harvesting structures, enhancing water availability and reliability for farming activities. This transformation enabled farmers to **cultivate once-unproductive or underutilized land**, optimizing agricultural potential and environmental resource stewardship. In stark contrast, the control group remained static, unable to capitalize on potential expansion due to continued limitations in land use and productivity.

- Farm ponds and tank desiltation ensured optimal water storage and distribution, enabling farmers to cultivate more frequently and intensively—despite less favorable growing periods—thereby supporting greater yield. In contrast, the control group saw no changes in cropping intensity, highlighting static productivity and the necessity of dedicated water management interventions to facilitate increased farming intensity and sustainability.

- The reliable water sources and structured irrigation systems allowed farmers to **diversify crop production**, overcoming previous constraints imposed by inconsistent water access. Infrastructure improvements, including farm ponds and percolation tanks, provided steady water supply for trying different crops, previously unsustainable. The programme's training components empowered farmers with knowledge for optimal crop selection, encouraging diverse planting. In contrast, the control group saw no gains in crop diversity, underscoring water supply limitations without the programme’s support.

- **Irrigation efficiency improved** across the case group, reducing time required per acre by 5%, from 5.34 to 5.07 hours. This suggests significant enhancements in irrigation practices due to programme interventions, reducing associated costs by 19%, providing financial relief to farmers. Conversely, the control group saw a slight increase in irrigation time, from 8.58 to 8.69 hours per acre, indicating increased strain without programme interventions, highlighting the programme's effectiveness in optimizing irrigation and reducing operational burdens.

- The programme resulted in a 14% **improvement in groundwater levels** in the case group, with Tamil Nadu seeing a 15% rise, as average depths decreased by 51 feet—from 350 to 299 feet—post-intervention. Conversely, the control group experienced a 3% groundwater depletion, consistent across Tamil Nadu, Karnataka, and Andhra Pradesh, with levels dropping from 350 to 362 feet.

Detailed impact of the programme activities (2/2)

Impact on yield of different crops

Crop	Group	Average Yield Pre-Intervention (quintals)	Average Yield Post-Intervention (quintals)	Yield Change
Paddy	Case	16.0	18.0	Increase
	Control	15.3	14.8	Decrease
Maize	Case	20.0	22.0	Increase
	Control	19.7	18.9	Decrease
Ragi	Case	5.0	6.0	Increase
	Control	8.5	7.3	Decrease
Turmeric	Case	18.0	20.0	Increase
	Control	14.9	14.1	Decrease
Oilseeds	Case	6.0	7.0	Increase
	Control	Doesn't grow	Doesn't grow	Not applicable
Pulses	Case	5.0	7.0	Increase
	Control	Doesn't grow	Doesn't grow	Not applicable

- The implementation of the water stewardship programme resulted in **increase in crop yields** within the case group with 24% reporting the same. 33% in Tamil Nadu reported rise in yields, signifying effective farming practices facilitated by the programme. Various crops showed improved yields across the case group, underscoring the positive effects of the interventions.
- Overall, the gains in yield for the case group, particularly in Tamil Nadu, demonstrate the effectiveness of the water stewardship programme in enhancing agricultural productivity. These outcomes contrast with yield declines observed in the control group, highlighting the significance of the programme's interventions in achieving improved income from agriculture among the case group respondents.
- It was understood from the qualitative discussions that the surface water resources (farm ponds) promoted under the programme is majorly used for farm activities like irrigation. None of the respondents reported that they use the water from these farm ponds for drinking purpose. Hence, there is no impact of these farm ponds on access to drinking water and in turn, reduction in waterborne diseases.
- In addition to these impacts, many respondents reported that the water structures created under the programme has helped enhancing ecosystem services such as improving groundwater recharge and local biodiversity. In total, 42% of respondents indicated that the program has **positively impacted local biodiversity**, evidenced by an increase in bird species observed in the project area and a rise in new plant species and pollinators, such as bees and butterflies. This information is depicted in the graph on the left.

> "With water available in the community tank until February, we can now provide more irrigation to our paddy crop during the Rabi season, resulting in improved yields. Previously, I produced around 18 quintals of paddy per acre in the Rabi season, which has now increased to 22 quintals per acre- As narrated by a local farmer"

IRECS Analysis

Parameter	Assessment from Study
Inclusiveness	❑ The programme demonstrated an emphasis on inclusiveness, particularly through the **formation of Water User Groups (WUGs).** With 29% of respondents participating in these groups, the programme facilitated community involvement in water management. ❑ 41% of **women reported active participation**, highlighting efforts to promote gender inclusivity in decision-making processes. However, participation varied regionally, with Tamil Nadu exhibiting high involvement at 97%, while Karnataka and Andhra Pradesh showed lower rates, suggesting a need for more tailored regional outreach and engagement strategies.
Relevance	❑ The programme's alignment with local agricultural and water management needs underscores its relevance. By addressing **critical issues like water scarcity and inefficient irrigation,** the programme provided solutions that directly responded to the environmental and agricultural challenges faced by the communities. ❑ The focus on improving water accessibility and management through infrastructure such as farm ponds and check dams was central to supporting sustainable agricultural practices. The programme's design effectively targeted pressing needs such as optimization of water use during droughts and expanded agricultural possibilities through diversity in cropping.
Effectiveness	❑ The programme achieved **a 3% increase in the total land area under cultivation**, which notably included a 6% expansion in Tamil Nadu. ❑ Further supporting the programme's success is a **46% rise in cropping intensity within the case group**, with Tamil Nadu again seeing a particularly significant impact at 71%. ❑ Additionally, the programme produced a substantial improvement in groundwater levels, **achieving a 14% enhancement.** This was especially beneficial in Tamil Nadu and Karnataka, where groundwater levels rose by 15%, demonstrating the success of the water conservation strategies employed. ❑ In terms of agricultural output, the case group experienced a **24% increase in crop yields**, further illustrating the programme's positive effect. This increase contrasts with the control group, which saw a decline in yields, underscoring the programme's role in enhancing farming efficiency and productivity. ❑ The programme also demonstrated its impact by **reducing the effort and costs associated with irrigation**. The time required to irrigate reduced by 16%, and costs decreased by 3% overall. These reductions reflected the improved efficiency of water management interventions, which streamlined irrigation processes and optimized the use of resources. ❑ Overall, these outcomes testify to the effectiveness of the programme's interventions in transforming water management and agricultural practices, leading to enhanced productivity across the communities involved.
Convergence	❑ The programme worked closely with **government initiatives such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY**) to promote efficient irrigation practices. Subsidies provided under these schemes supported the installation of drip and sprinkler irrigation systems, reducing water wastage and ensuring more effective irrigation practices. Its collaboration with government programs like **MGNREGA** for labor activities exemplifies external coherence, coordinating with existing frameworks to optimize resource utilization and impact.
Sustainability	❑ The programme laid a foundation for **long-term sustainability by promoting community-driven stewardship and the establishment of WUGs** responsible for water structure maintenance. These groups' self-reliance in conducting upkeep signifies a shift towards enduring sustainable practices. The programme's infrastructure improvements contributed to groundwater recharge and biodiversity enhancement, indicating ongoing benefits for ecological systems. Ensuring the continuation of these practices, particularly in areas with lower engagement, remains vital for sustained impact.

Key Recommendations/ Best Practices

Implementation of Soil Moisture Conservation Techniques	Although the programme beneficiaries have adopted drip and sprinkler irrigation methods, mulching practices and cover cropping, there is still scope of promoting these at scale.
Soil Health Monitoring	Promote regular soil-health assessments to devise specific soil conservation strategies. These evaluations enable farmers to understand the nutrient levels and soil composition, facilitating precise interventions that uphold long-term soil fertility and agricultural productivity.
Community Training Programmes on Regen-Ag	Facilitate hands-on learning experiences by promoting regenerative agricultural practices like cover cropping, zero tillage, and in-situ crop residue management.
Diversified Water Management Solutions	Expand the scope of water management infrastructure to include innovative solutions such as rainwater harvesting systems, solar-powered irrigation, and greywater recycling to increase resilience against water scarcity and drought conditions.

Key Findings – Climate Smart Agriculture

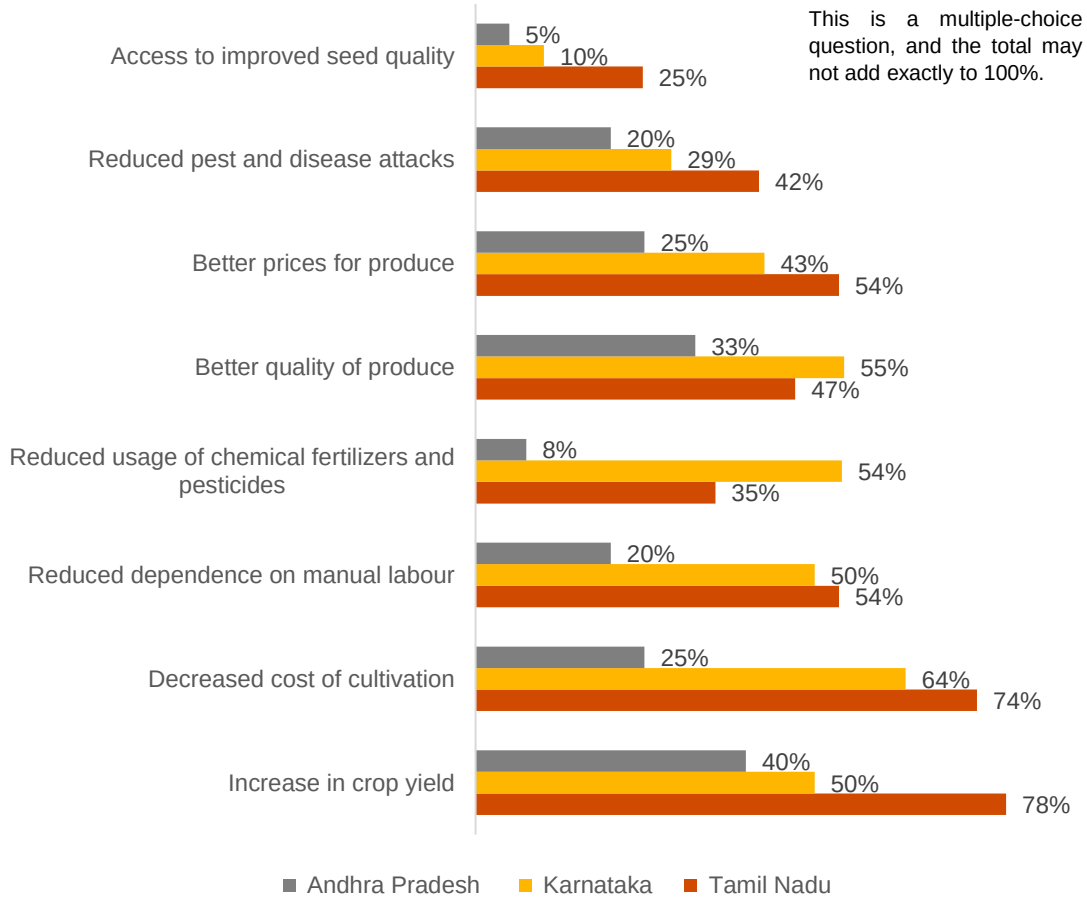
Type of support provided and benefits realized

The following section of the report highlights the key findings and analysis of the impact created by the “Climate Smart Agriculture Programme” among the beneficiaries. These **findings and analysis are based on the responses of 430 participants (n=430) from the case group and 304 participants (n=304)** from the control group (wherever relevant) of the quantitative study along with information gathered during the interactions with key stakeholders.

Type of support received under the programme

Training Initiatives	• The programme offered extensive training to boost agricultural productivity and sustainability, focusing on modern farming techniques. Integrated Pest Management minimized reliance on chemical pesticides, maintaining ecological balance. Integrated Nutrient Management was introduced to optimize fertilizer use, enhancing soil fertility and yield. Trainings in Direct Seeding of Rice, drip, and sprinkler systems improved irrigation efficiency and conservation. Techniques like green manuring, seed treatment, and soil testing were taught, enhancing germination and soil conditions.
Establishment of Agri Business Centers (ABCs)	• The ITC's Climate Smart Agriculture programme established ABCs to enhance access to agricultural resources and services. These centers reduced input costs, offering machinery rentals at 50% of traditional expenses, saving farmers significantly. • ABCs facilitated bulk input procurement and improved market linkages, helping farmers store and sell crops favorably, boosting revenue. While mechanization levels saw minimal change, shared machinery and reduced rental rates decreased labor expenses and promoted equipment sharing among farmers.
Convergence efforts for impact maximization	• The programme collaborated with government departments to promote Climate Smart Agriculture, aligning with initiatives like soil health management and zero budget natural farming. Partnerships with Krishi Vigyan Kendras provided soil testing and fertilizer advice, reducing costs and improving yields. Collaboration with Horticulture Departments distributed drought-resistant saplings, enhancing crop resilience. The programme supported land preparation and efficient irrigation adoption, aligning with initiatives like the Pradhan Mantri Krishi Sinchayee Yojana.

Impact of the programme activities as per case respondents



Detailed impact of the programme activities (1/2)

Adoption rate of sustainable agricultural practices

Which of the practices are you following on a regular basis?	Tamil Nadu		Karnataka		Andhra Pradesh	
	Case	Control	Case	Control	Case	Control
IPM	78%	21%	56%	38%	38%	69%
INM	78%	32%	60%	15%	20%	8%
Direct Seeding of Rice	73%	24%	43%	11%	18%	4%
Drip/ Sprinkler systems	20%	18%	47%	11%	20%	0%
Irrigation scheduling	52%	34%	52%	13%	23%	0%
Green manuring	35%	24%	45%	10%	25%	2%
Line sowing	18%	24%	26%	5%	13%	0%
Furrow irrigation	45%	21%	11%	4%	10%	0%
Seed treatment	56%	11%	4%	2%	3%	0%
Deep ploughing	55%	8%	4%	1%	0%	0%
Soil testing	59%	21%	2%	0%	0%	2%

> The farmer field school trainings have equipped us with essential skills; we now understand how to optimize resources and reduce manual labor in cultivation, translating into significant cost savings.
> -As narrated by a local farmer

- In the case group, Integrated Pest Management is widely used by 59% of farmers, especially in Tamil Nadu (78%) and Karnataka (56%). Integrated Nutrient Management is similarly adopted, though less so in Andhra Pradesh (20%). Direct Seeding of Rice (DSR) is practiced by 47% of the case group, notably in Tamil Nadu (73%), indicating a move from traditional methods. Drip and sprinkler systems are more prevalent at 39%, particularly in Karnataka (47%).
- Unlike the control group, where these techniques are rare. Irrigation scheduling is adopted by 49% of the case group, showcasing better water management. Green manuring and line sowing are moderately used, while advanced techniques like seed treatment and soil testing are promoted in Tamil Nadu. The control group's limited engagement indicates the programme's role in enhancing climate-resilient farming, boosting productivity, sustainability, and resilience.
- A significant **88% of respondents in the case group are small and marginal farmers**, owning less than 5 acres of land. The integration of climate-smart practices has played a crucial role in their agricultural operations. These practices have not only led to a reduction in the cost of cultivation and an increase in crop yields, but discussions with farmers revealed they have also enhanced their resilience against climate challenges, such as unexpected rainfall and drought conditions. This adaptability to climatic fluctuations ensures that these farmers are better prepared and equipped to maintain productivity and income stability despite environmental uncertainties.
- Adoption of sustainable agricultural practices such as IPM, INM, DSR, Irrigation scheduling, Green manuring, etc. has led to various impacts on the lives of the case group respondents especially, **increase in crop yields and reduction in cost of cultivation** has been reported by more than 50% of the case respondents as illustrated in the graph in the previous slide.

Detailed impact of the programme activities (2/2)

Summary of impact on cost of cultivation and yield

Crop	Group	Cost Pre-Intervention (INR)	Cost Post-Intervention (INR)	Cost Change	Yield Pre-Intervention (quintals)	Yield Post-Intervention (quintals)	Yield Change
Paddy	Case	10,010	9,078	Decrease	16.0	18.0	Increase
	Control	10,987	12,023	Increase	15.3	14.8	Decrease
Maize	Case	11,929	11,198	Decrease	20.0	22.0	Increase
	Control	10,530	11,028	Increase	19.7	18.9	Decrease
Ragi	Case	6,004	5,470	Decrease	5.0	6.0	Increase
	Control	5,940	6,087	Increase	8.5	7.3	Decrease
Turmeric	Case	86,340	74,380	Decrease	18.0	20.0	Increase
	Control	89,905	99,927	Increase	14.5	14.3	Decrease
Oilseeds	Case	18,164	15,681	Decrease	6.0	7.0	Increase
	Control	17,957	20,067	Increase	5.0	4.8	Decrease
Pulses	Case	14,898	13,535	Decrease	5.0	7.0	Increase
	Control	14,025	14,964	Increase	4.0	3.6	Decrease

> The adoption of climate-smart practices has greatly reduced our cultivation costs. The programme's emphasis on efficient water use and nutrient management has helped us lower input costs, reinforcing sustainable farming. - As narrated by a local farmer

- Overall, 55% of respondents report an **increase in crop yield** due to the Climate Smart Agriculture programme. The data suggests that the programme has had varying levels of impact across different regions and crops. In Tamil Nadu, the programme seems to have had a significant effect, with 78% of respondents noting an increase in yield. Specifically, the average yield per acre for paddy in Tamil Nadu increased from 16 quintals before the programme to 18 quintals after its implementation. 9.31
- In Karnataka, the data indicate similar results for paddy and oilseeds, maintaining an increase from 16 to 18 quintals and from 6 to 7 quintals, respectively. Conversely, Andhra Pradesh shows a lower level of impact, with only 40% of respondents reporting increased yields. The yield for paddy remained constant at 16 quintals across the programme phases.
- The programme has not only contributed to increased crop yields but also to a **reduction in cultivation costs**. A notable 62% of respondents across various regions report a decrease in costs, with Tamil Nadu showing the most substantial reduction at 74%. In contrast, Andhra Pradesh records a lower impact at 25%, indicating areas for improvement in cost-reduction strategies.
- The support initiatives provided to farmers have resulted in improved crop quality and yields, which in turn have led to **increased selling prices** for various crops. In Tamil Nadu, the impact was observed by 54% of farmers, with paddy prices rising from INR 1,940 to INR 2,300 per quintal. The average prices for ragi and turmeric also saw substantial increases.
- In contrast, Andhra Pradesh reported a lower impact of 25%. This may suggest that issues such as market access, product quality, or regional economic conditions could be affecting the extent of benefit realized from better pricing.

IRECS Analysis

Parameter	Assessment from Study
Inclusiveness	❑ The programme empowered **small and marginal farmers**, primarily those owning less than 5 acres, by integrating climate-smart agricultural practices to enhance sustainability and resilience. ❑ The programme was carried out with communities experiencing issues such as water shortages, declining soil quality, and rising cultivation costs.
Relevance	❑ The programme was designed to address **critical agricultural issues such as climate adaptation, cost reduction, and yield improvement**, making it highly relevant to the needs of the farming community. ❑ By focusing on organic, productive, and sustainable agricultural practices, the programme effectively aligned with the immediate and long-term challenges faced by farmers in Tamil Nadu, Karnataka, and Andhra Pradesh.
Effectiveness	❑ The programme's effectiveness is reflected in its impact on the adoption of climate-smart practices and improvements in agricultural productivity among the case group participants. ❑ Specifically, 55% of respondents **experienced increased crop yields**, showcasing the programme's success in enhancing farming outputs. The programme improved yields for paddy, maize, ragi, turmeric, oilseeds, and pulses in the case group, while the control group experienced declines across these crops, highlighting the programme's positive impact. ❑ The adoption of Integrated Pest Management and water-efficient systems contributed substantially to these agricultural gains, with 59% of farmers in Tamil Nadu and 56% in Karnataka regularly implementing Integrated Pest Management. ❑ The programme also promoted Direct Seeding of Rice (DSR), adopted by 47% of farmers in the case group, notably 73% in Tamil Nadu, indicating a move from traditional methods. ❑ Moreover, the programme influenced a **reduction in cultivation costs**, reported by 62% of participants, illustrating its role in promoting cost-efficiency. ❑ Efficient irrigation systems like drip and sprinkler setups, adopted by 39%, especially in Karnataka (47%), further enhanced resource management and sustainability.
Convergence	❑ The programme successfully converged with government initiatives, harnessing existing support systems like the National Mission for Sustainable Agriculture and Pradhan Mantri Krishi Sinchayee Yojana. Partnerships with Krishi Vigyan Kendras and other government departments optimized synergies, offering tailored solutions like soil testing and training on good farm practices. This collaboration enhanced resource utilization, reduced input costs, and promoted sustainable agricultural practices that complemented government efforts.
Sustainability	❑ Sustainability was a core focus of the programme, with emphasis on building resilience against climate variability and promoting environmentally sustainable practices. ❑ By training farmers in efficient farming methods and establishing support structures like Agri Business Centres, the programme laid the groundwork for long-term impact. ❑ The integration of sustainable practices and convergence with government schemes provided a robust framework for continued benefits beyond the programme's duration, enhancing the sustainability of agricultural productivity and rural livelihoods.

Key Recommendations/ Best Practices

Enhancement of Post-Harvest Management Practices	Implement training programs focused on post-harvest management for crops relevant to the programme areas, such as those identified in local assessments. Cover critical aspects like handling, drying, grading, and storage, aiming to improve crop quality and market value while reducing spoilage. These initiatives will strengthen the economic viability of participant farmers by minimizing losses and maximizing income from their produce.
Development of Bio-Resource Centers	Set up community-managed bio-resource centers that produce and supply local bio-inputs sustainable for agriculture, such as organic fertilizers and pest management solutions. These centers will decrease input costs for farmers, promote eco-friendly farming practices, and contribute to the long-term sustainability of the Climate Smart Agriculture initiatives by ensuring economic viability and alignment with environmental goals.
Strengthening Connections with Agri Business Centers (ABCs) and Private Companies	Enhance partnerships between local farmers, Agri Business Centers (ABCs), and private sector players in agriculture and food processing. This will improve access to quality inputs, expand market opportunities, and facilitate better channels for selling produce, strengthening the supply chain, and ensuring that farmers benefit from enhanced market integration and economic returns from their agricultural efforts.
Promotion of ICT-Enabled Training and Simple Technologies for Enhanced Agricultural Productivity	Integrating Information and Communication Technology (ICT) into farmer training can help enhance learning outcomes and accessibility. By developing digital materials such as videos, mobile apps, and interactive online courses, farmers can access tailored information on climate-smart practices at their convenience.

Key Findings –Social Forestry

Type of support provided and benefits realized

The following section of the report highlights the key findings and analysis of the impact created by the “On-farm Livelihood Diversification: Tree plantation - Social Forestry Programme ” among the beneficiaries. These **findings and analysis are based on the responses of 471 participants (n=471) from the case group and 304 participants (n=304)** from the control group (wherever relevant) of the quantitative study along with information gathered during the interactions with key stakeholders.

Type of support received under the programme

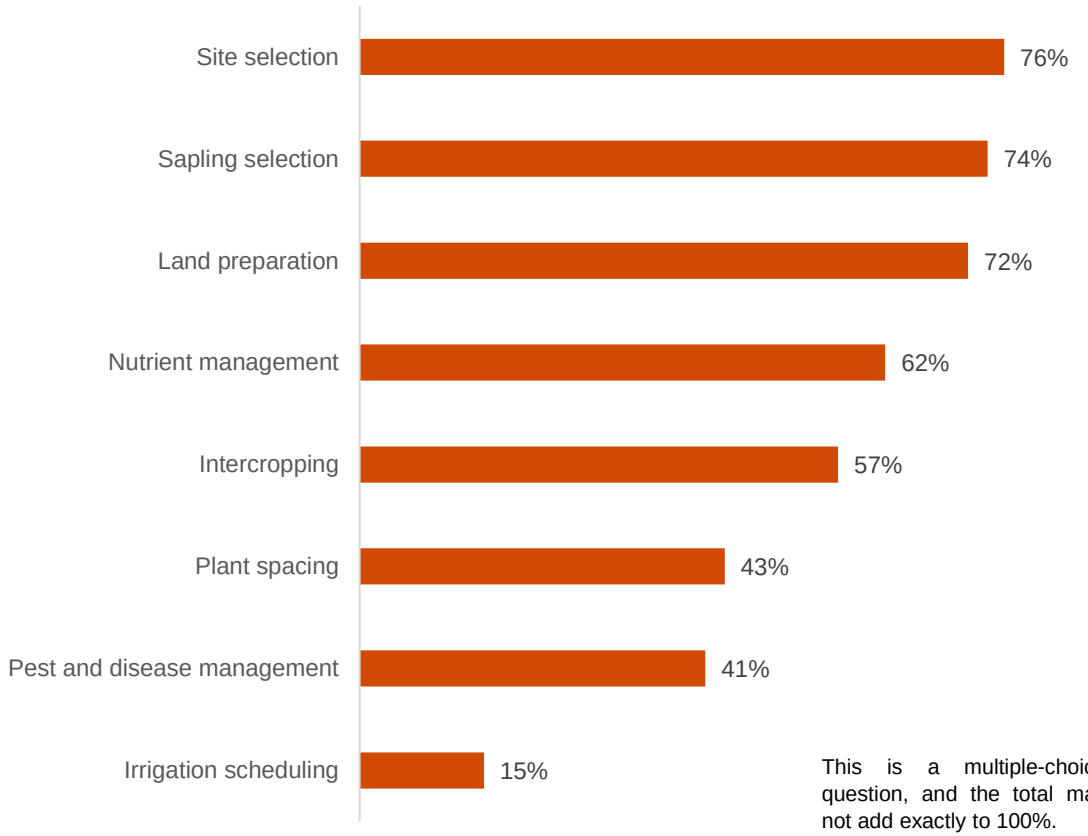
Training support

- The Social Forestry Programme equipped farmers with comprehensive training to boost the sustainability and productivity of tree plantations. Key areas included site selection for optimal tree growth, plant spacing to reduce resource competition, and sapling selection for robust plantation outcomes.
- Land preparation improved soil conditions, while nutrient management optimized fertilizer use, enhancing sapling health. Intercropping provided additional income opportunities and improved land efficiency.
- Pest management emphasized natural methods to maintain ecological balance. Irrigation scheduling ensured efficient water use, promoting tree growth. Together, these trainings aimed to promote sustainable forestry practices and strengthen rural communities' economic resilience.

Distribution of quality saplings through convergence

- The programme, in collaboration with the Forest Department, provided high-quality saplings of fast-growing species like Silver Oak, Eucalyptus, Casuarina, and Melia Dubia to farmers, enhancing sustainable tree plantation practices. This initiative promotes rapid economic returns and increased land productivity, reducing farmers’ reliance on external firewood.
- Aligning with government schemes like the Sustainable Management of Agriculture and Krushi Aranya Protsaha Yojane, it advocates integrated land-use systems benefiting local economies and the environment. By ensuring access to resilient tree varieties, the programme supports strategic rural livelihood resilience, climate adaptation, and sustainable forestry management.

% of respondents reporting they have received training under various topics (n=305)



This is a multiple-choice question, and the total may not add exactly to 100%.

Detailed impact of the programme activities (1/2)

Adoption rate of sustainable practices

Adoption rate of practices	Case	Control
Site selection	73%	30%
Plant spacing	47%	14%
Sapling selection	73%	16%
Land preparation	67%	33%
Nutrient management	60%	12%
Intercropping	66%	12%
Pest and disease management	43%	10%
Irrigation scheduling	25%	11%

More than 50%

Impact of adoption of sustainable practices

Type of impact	Comparative Analysis
Higher survival rates of saplings	Case group: 77%, Control group: 48%. The case group shows a more effective strategy in nurturing saplings to maturity.
Involvement in best practices	Case group's greater involvement leads to better productivity and sustainability outcomes.
Faster tree growth	Case group: 68%, Control group: 35%. Likely tied to effective land preparation and intercropping strategies.
Improved quality/quantity of timber and produce	Case group: 60%, Control group: 44%. Case group achieves superior quality and quantity.
Market prices received	Case group: 43%, Control group: 23%. Better market prices underscore the impact of efficient practices on economic returns.
Production cost reduction	Case group: 33%, Control group: 32%. Both show similar levels, but case group's practices likely optimize resources more effectively.

- Among the case respondents, 66% in Karnataka reported that they received training under the programme. However, none of the respondents in Andhra Pradesh reported that they received training support.
- As illustrated in the graph in the previous slide, the training topics covered various aspects of tree plantation and management. The most frequently reported training topics included site selection (76%) and sapling selection (74%), indicating a strong focus on foundational aspects of successful plantation establishment. Land preparation (72%) and nutrient management (62%) also received significant attention, reflecting their importance in ensuring soil health and tree growth.
- Intercropping was reported by 57% of respondents, showing an emphasis on integrating multiple crops to maximize land use and increase biodiversity. Plant spacing (43%) and pest and disease management (41%) were moderately covered, while irrigation scheduling received the least attention, with only 15% of respondents reporting training in this area.
- The data indicates that the **case group is more involved in implementing practices for plantation management**. This engagement likely leads to better outcomes in terms of productivity and sustainability. Their focus on land preparation and intercropping shows a strategic approach to using land efficiently and increasing biodiversity, which may result in ecological and economic gains.
- On the other hand, the **control group shows lower adoption rates across all practices**. This difference suggests there may be challenges in accessing the information or resources needed to implement these plantation techniques. The control group's limited use of nutrient and pest management could lead to less effective growth conditions and greater exposure to environmental challenges. Additionally, the low adoption of irrigation scheduling in the control group could result in inefficient water use, affecting tree growth and sustainability.
- These differences highlight the need for interventions or support for the control group. Providing better access to resources, information, and training could help these farmers adopt effective practices, improve their plantation outcomes, and contribute to environmental and economic sustainability.

Detailed impact of the programme activities (2/2)

Average sampling survival rate

Average sapling survival rate (in %)	Case Group	Control Group
Pre-Intervention (A)	50	40
Post intervention (B)	70	45
% Change (B-A)	40%	12%

Average change in yield (in %)

Type of tree	Case Group	Control Group
Eucalyptus	20%	5%
Silver Oak	20%	10%
Melia Dubia	20%	0%
Casuarina	20%	4%

Cost of plantation per acre (in INR)

Change in average cost of production per acre	Case Group	Control Group
Pre-Intervention (A)	100,000	85,000
Post intervention (B)	80,000	100,000
% Change (A-B)	20%	-18%

- **Higher survival rates of saplings**: Initially, the case group's survival rate was 50%, increasing to 70% post intervention, marking a 40% improvement. The control group started at 40% and rose to 45%, a 12% increase.
- **Faster tree growth**: Pre intervention, both groups required around 4 years for harvesting readiness. Post intervention, the case group reduced this time to 3.5 years, a 13% improvement, while the control group's average time decreased slightly to 3.93 years, marking a modest 3% change.
- **Improved quality/ quantity of timber and produce**: Eucalyptus and Silver Oak yields grew by 20% and 20%, respectively, for the case group, compared to modest increases of 5% and 10% in the control group. The case group also saw a 20% improvement in yields for Melia Dubia and Casuarina, in stark contrast to the control group's stagnant or minimal changes.
- **Production cost reduction**: The production costs reduced among the case group by 20%, from INR 100,000 to INR 80,000 per acre over four years on an average, demonstrating resource optimization. In contrast, the control group experienced an 18% increase in costs, rising from INR 85,000 to INR 100,000 per acre on an average.
- **Cropping** has proven economically beneficial for SF farmers, with 92% (N=38) of those practicing it reporting an increase in overall annual farm income. The data reveals that annual income per acre from cropping practices in the SF plots, stood at INR 50,000 post-intervention, which is 25% higher than control (INR 40,000 per acre).
- **Annualised income from plantations** post-intervention, stood at INR 46,300 per acre which is an increase of almost 27% as compared to control (INR 33,500 per acre).

IRECS Analysis

Parameter	Assessment from Study
Inclusiveness	❑ The programme engaging farmers with varying landholdings, as evidenced by an average plantation size of 3.21 acres. With 87% of respondents possessing less than 5 acres of land, the programme reached out to smallholder farmers, addressing their specific needs and ensuring broad participation and benefit across different community segments.
Relevance	❑ The programme has addressed both economic and ecological challenges faced by rural communities. By reducing soil erosion, improving groundwater levels, and enhancing biodiversity, the initiative directly tackles critical environmental issues. ❑ Additionally, the focus on diversified income sources (Intercropping) aligns with financial stability objectives, making the programme pertinent to farmers' immediate economic conditions and long-term sustainability needs.
Effectiveness	❑ The programme's effectiveness is demonstrated through various metrics highlighting the impact of sustainable practices adopted by the case group compared to the control group. ❑ Higher sapling survival rates in the case group, improving from 50% pre-intervention to 70% post-intervention (a 40% increase), underscore the effectiveness of strategies like site selection, sapling quality, and land preparation. The control group saw only a modest rise from 40% to 45%, indicating the need for additional support. ❑ Faster tree growth is evident, with the case group reducing harvest readiness time by 13%, thanks to effective land preparation and intercropping strategies, while the control group saw a marginal 3% improvement. The case group also achieved superior timber and produce yields across tree types, with significant improvements compared to the control group. ❑ Economic outcomes are reflected in the better market prices received by the case group; for instance, Silver Oak prices increased by 50% against just 38% in the control group, highlighting efficient practices. Meanwhile, the case group successfully reduced production costs by 20%, where the control group's costs rose by 18%, underscoring the importance of strategic resource management. These results affirm the program's ability to enhance ecological and economic objectives through targeted interventions. ❑ A notable 72% of participants reported reduced soil erosion, improving soil health. Enhancements in groundwater levels (47% increase) and faunal species diversity (48% rise) contributed to ecological sustainability. ❑ Additionally, floral species increased by 73%, and air quality improved by 75%, demonstrating broader environmental advantages. These results highlight how diversified agricultural practices can simultaneously boost economic resilience and ecological well-being, enhancing community adaptation to climate variability.
Convergence	❑ The programme created convergence by partnering with the Forest Department to supply high-quality saplings, such as Silver Oak, Eucalyptus, Casuarina, and Melia Dubia, the initiative promotes sustainable tree plantation practices. These fast-growing species were chosen for their potential to provide quick economic returns and boost land productivity, thereby enhancing the livelihoods of farmers and reducing reliance on external firewood. ❑ This alignment of efforts supports the goals of rural development and fits seamlessly with government agroforestry schemes like the Sustainable Management of Agriculture (SMA) and Krushi Aranya Protsaha Yojna.
Sustainability	❑ The intercropping practices promoted by the programme have contributed to improvements in soil health, water table levels, and biodiversity, bolstering both immediate agricultural productivity and long-term ecological balance necessary for climate resilience. These environmentally and economically viable practices reinforce sustainability among participating communities, offering a robust response to climate variability. ❑ However, the programme lacks an institutional mechanism to ensure that farmers continue these practices beyond the programme's duration. This absence might affect the consistent application and sustainability of the promoted practices, as ongoing support and monitoring are crucial for maintaining and advancing the progress initiated by the programme. Establishing such mechanisms would help secure the continuation of these valuable practices, ensuring lasting impacts and resilience in the face of climate challenges.

Key Recommendations/ Best Practices

Strengthening Institutional Mechanisms

The programme demonstrated positive impact in promoting intercropping and sustainable forestry practices; however, a key area for improvement is the establishment of robust institutional mechanisms. Implementing an ongoing support structure could ensure that farmers continue these practices beyond the programme's duration. Establishing local farmer cooperatives or community-based organizations could facilitate regular training, resources, and monitoring, ensuring the long-term sustainability of the programme outcomes.

Enhancing Training and Resource Accessibility

Although the programme delivered comprehensive training, expanding access to resources and information, particularly in case of Andhra Pradesh it can be improved. Regional workshops and resource centers could be established to ensure continuous capacity building and access to high-quality saplings, tools, and market information.

Expanding Intercropping Adoption

Given the promising economic and ecological benefits of intercropping, efforts should be made to increase its adoption. The programme could integrate demonstration plots to showcase best practices and outcomes, encouraging more farmers to embrace this approach. Furthermore, diversifying the range of intercrops based on local climate and market demands can optimize land use and generate additional income streams.

Aligning with Market Demands

To ensure economic sustainability, the programme should continuously align tree and crop selections with current and emerging market demands. Conducting regular market analyses and fostering connections between farmers and buyers could optimize returns for the participants.

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