WORKING PAPER

UNVEILING THE SUCCESSES AND CHALLENGES OF

CLIMATE SMART

AGRICULTURE IN SRI LANKA:

INSIGHTS FOR FUTURE INTERVENTIONS

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Unveiling the Successes and Challenges of Climate Smart Agriculture in Sri Lanka: Insights for Future Interventions

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FOREWORD

This working paper, "Unveiling the Successes and Challenges of Climate Smart Agriculture (CSA) in Sri Lanka: Insights for Future Interventions," explores the key factors influencing the adoption and effectiveness of CSA practices. As agriculture becomes increasingly vulnerable to climate change, CSA emerges as an essential pathway toward sustainable food security and resilient livelihoods. Drawing on insights from systematic literature reviews and field-based case studies, the report analyzes agricultural, environmental, socio-economic, institutional, and external factors that shape the success of CSA initiatives in Sri Lanka.

Climate variability, including erratic rainfall, droughts, and rising temperatures poses severe challenges for farmers, leading to reduced crop yields, soil degradation, and water scarcity. Locally adapted solutions, such as water-efficient irrigation, crop diversification, and agroforestry, are crucial for mitigating these risks. However, farmers often struggle with limited financial resources, risk aversion, and knowledge gaps, which hinder the adoption of new technologies. In addition, social dynamics, such as gender inequality, can further restrict participation in CSA programmes, reducing the potential for broader community resilience.

Institutional factors also affect CSA implementation. Weak coordination among government agencies, inadequate extension services, and fragmented policy delivery limit the impact of national climate and agriculture policies. Strengthening institutional frameworks and improving collaboration across sectors are essential for promoting CSA practices. Additionally, external influences such as global market trends, donor funding priorities, and climate variability—exemplified by events like *El Nino*—further shape the success of these interventions.

This report emphasizes the need for a multi-faceted approach to effectively address these challenges. Strengthening capacity-building efforts, enhancing access to markets and financial resources, and fostering public-private partnerships are essential for achieving sustainable outcomes. Monitoring and evaluation frameworks will also be necessary to track progress and adapt strategies as conditions evolve. Through coordinated efforts among farmers, institutions, and policymakers, Sri Lanka can build a resilient agricultural sector, ensuring sustainable livelihoods and long-term food security in the face of climate change.

Prof. A.L. Sandika
Director/Chief Executive Officer

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We extend our sincere thanks to the District Commissioners, as well as other Officials, especially the Divisional Officers (DOs) of the Agrarian Services Centres (ASCs) under the Agrarian Development Department (DAD) in the selected districts where the study was conducted. We also greatly appreciate the unwavering support of all the officials of Agriculture Sector Modernization Project (ASMP) and Climate Smart Irrigated Agriculture Project (CSIAP), who provided their unconditional support in providing information. Their cooperation and endorsement were essential to the success of the project. Heartfelt gratitude is also extended to the farming communities within the respective ASC areas for their collaboration during the data collection phase.

This working paper forms a segment of a comprehensive research study conducted by the Environment Division of HARTI and its completion owes much to the hard work and dedication of all research members in the division. We express our profound appreciation for their unwavering commitment and valuable support.

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EXECUTIVE SUMMARY

This research study explored the successes, challenges, and policy implications of adopting Climate Smart Agriculture (CSA) in Sri Lanka, offering insights for future interventions. Both systematic literature review and case study methodologies were employed to gather comprehensive data. The literature review provided a broad understanding of CSA practices and policies, while case studies focused on two major projects—the Climate Smart Irrigated Agriculture Project (CSIAP) and the Agriculture Sector Modernization Project (ASMP). Field visits to districts of Monaragala, Kilinochchi, Anuradhapura and Jaffna enabled direct engagement with farmers and project officials, yielding practical insights into adoption of CSA technologies.

Sri Lanka has initiated CSA practices to address the challenges posed by climate change, including crop diversification, integrated pest management, water-saving techniques, and agroforestry. However, the adoption of these practices remains uneven across regions due to differences in climate conditions, farming systems, and institutional support. The Department of Agriculture (DOA) plays a pivotal role in promoting CSA technologies, but the success of these efforts largely depends on how effectively local-level challenges are addressed. Despite these efforts, farmers encounter numerous barriers, such as limited access to finance, inadequate technical knowledge, poor infrastructure and fragmented policies. Environmental factors, including soil degradation and water scarcity complicate adoption efforts further, while weak coordination between agencies and lack of market access discourage farmers from investing in new technologies.

There are significant opportunities for CSA adoption in Sri Lanka, including the development of irrigation systems, climate-resilient crop varieties, and training programmes such as Farmer Training Schools and demonstration of the potential to build farmers' capacity to adapt to climate variability. Public-private partnerships (PPP) offer a viable pathway to finance CSA interventions, enabling broader scalability and sustainability. However, the policy landscape needs better alignment between climate adaptation goals and agricultural policies to fully realize the potential of these opportunities. Farmers need access to credit, subsidies, and insurance schemes to mitigate climate risks, and there must be enhanced collaboration between government institutions and vulnerable communities, especially in the rural areas. Research and development are also essential for developing technologies suited to local conditions, while efforts to translate research outcomes into practical solutions should be prioritized.

Effective adoption of CSA practices will require comprehensive strategies, including capacity-building programmes, infrastructure development and targeted incentives. Expanding extension services to disseminate knowledge about CSA practices is crucial for fostering greater adoption. Investments in rural infrastructure, such as water storage facilities and irrigation systems, are critical for building long-term resilience. Cross-sectoral policy coordination will help integrate agricultural and water

management strategies with climate goals, ensuring that CSA practices align with broader national development efforts.

Monitoring and evaluation frameworks must be established to assess the effectiveness of interventions, with real-time feedback guiding future strategies. International cooperation will further strengthen the adoption of CSA by providing access to the best practices, technology and financial support. With strategic investments, enhanced institutional frameworks, and proactive farmer engagement, Sri Lanka can successfully transition towards CSA. This shift will not only ensure food security and environmental sustainability but also improve human and ecosystem health and livelihoods of vulnerable communities in the face of evolving climate challenges.

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LIST OF ABBREVIATIONS

ASC	-	Agrarian Services Center
ASMP	-	Agriculture Sector Modernization Project
ATDP	-	Agriculture Technology Demonstration Parks
CMC	-	Cascade Management Committees
COP	-	Cost of Production
CSA	-	Climate Smart Agriculture
CSFTS	-	Climate Smart Farmer Training School
CSIAP	-	Climate Smart Irrigated Agriculture Project
DAD	-	Department of Agrarian Development
DoA	-	Department of Agriculture
DS	-	Divisional Secretariat
EU	-	European Union
FAO	-	Food and Agriculture Organization
FGDs	-	Focus Group Discussions
FO	-	Farmer Organization
FTS	-	Farmer Training Schools
GND	-	Grama Niladhari Division
HARTI	-	Hector Kobbekaduwa Agrarian Research and Training Institute
IDA	-	International Development Association
IPM	-	Integrated Pest and Disease Management
KIIs	-	Key informant interviews
M&E	-	Monitoring and Evaluation
NGO	-	Non-Government Organizations
O&M	-	Operation and Maintenance
PG	-	Producer Groups
PMP	-	Pest Management Plan
PPP	-	Public-private partnerships
PS	-	Producer Societies
PUC	-	Public Unlisted Companies
SLR	-	Systematic literature review
TA	-	Technical assistance

CHAPTER ONE

Introduction

1.1 Background

Climate change and environmental risks are among the most significant global challenges of the future, yet society remains unprepared to effectively manage their impacts (World Economic Forum, 2023). Progress towards achieving climate goals has been slow, highlighting a gap between necessary actions and what is politically feasible (Regufe *et al*., 2021). Current crises divert resources, complicating efforts to address climate challenges and support communities in adapting to these changes. As natural ecosystems continue to deteriorate, the interconnected issues of climate change, biodiversity loss, food insecurity, and resource depletion pose serious threats to livelihoods and global progress (World Economic Forum, 2022; FAO, 2015; De Costa, 2012).

In Sri Lanka, agriculture—a cornerstone of the economy and a lifeline for rural communities—is particularly vulnerable to climate change. Rising temperatures, unpredictable rainfall, and extreme weather events such as floods, droughts, and cyclones are becoming more frequent and severe, significantly impacting food security (IPS, 2024). Provinces like North, North Central, Western, and North-Western are especially at risk from these changes, which include rising sea levels and altered rainfall patterns (Mani *et al*., 2018; World Bank, 2018). These climatic shifts have been linked to phenomena like *El Niño* and *La Niña*, causing widespread damage to crops, livelihoods, and infrastructure (Siriwardana *et al*., 2018; Sumathipala, 2014; Hapuarachchi and Jayawardene, 2015).

Recent events underscore the scale of the challenge in Sri Lanka. A severe drought in 2016 reduced paddy production by 40 percent, leaving over 229,000 households' food insecure (Coslet *et al*., 2017). In 2017, extreme weather events caused over 246 deaths and displaced 600,000 people, ranking Sri Lanka as one of the most climate-affected countries that year in the Global Climate Risk Index (Eckstein *et al*., 2019). Such disasters are not only threatening food security but also undermining the stability of rural economies and exacerbating poverty (Aheeyar *et al*., 2021).

To address the growing risks posed by climate change, Sri Lanka must take proactive steps to enhance climate resilience in the agricultural sector. This involves adopting sustainable farming practices, improving disaster preparedness, and implementing smart climate strategies tailored to local needs (De Costa, 2020; Marambe *et al*., 2015). The National Policy on Climate Change of 2023 emphasizes adaptation measures to safeguard food security and reduce vulnerabilities. However, efforts that are more comprehensive are needed to integrate climate smart agriculture, strengthen vulnerable communities such as those in the rural areas, and ensure environmental sustainability.

Sri Lanka's National Policy on Climate Change, adopted in 2023 as an updated version of the National Climate Change Policy of 2012, emphasizes adaptation strategies to mitigate climate impacts on agriculture and ensure national food security. Although some initiatives have been implemented, further efforts are required to reduce the sector's vulnerability and build community resilience (Najim *et al*., 2022). A holistic approach that integrates CSA is essential to address nutritional challenges and ensure stability of the entire food system. Collaboration among stakeholders and adopting a comprehensive development approach that addresses socio-economic and environmental factors are crucial to meet these challenges (PAGE, 2016; Gonsalves, 2005).

1.2 Purpose of the Study

Sri Lanka's agriculture sector, which is vital to rural livelihoods and the national economy, faces significant challenges due to climate change and evolving socio-economic conditions. While the government, NGOs, and private sector have implemented various initiatives to support agriculture—such as promoting good agricultural practices and assisting small and medium-sized enterprises—these efforts often fall short of addressing the specific needs and challenges of farming communities. Issues such as low productivity, limited access to markets, and the slow adoption of modern technologies persist, particularly among small-scale farmers who lack the resources needed to adapt and remain competitive (Najim *et al*., 2022).

Climate Smart Agriculture (CSA) and climate change adaptation strategies have shown promise in addressing these challenges by focusing on sustainable productivity, building resilience to climate impacts and reducing greenhouse gas emissions. CSA is an approach designed to tackle the challenges of climate change and food security by promoting sustainable productivity growth, strengthening resilience to climate impacts, minimizing greenhouse gas emissions and supporting national food security and development objectives (FAO, 2010). However, the effectiveness of CSA depends on how well it aligns with local farming systems, ecological conditions and socio-economic realities. To design impactful interventions that truly benefit Sri Lankan farmers, it is essential to study the successes and limitations of past CSA initiatives and adaptation strategies.

Currently, Sri Lanka lacks a well-coordinated and evidence-based national strategy to address climate change impacts on agriculture. This gap highlights the need for reliable research to evaluate how past CSA and adaptation efforts have influenced agricultural productivity, environmental sustainability and farmer livelihoods. By drawing lessons from these experiences, policymakers and stakeholders can design more targeted and effective interventions that address root causes rather than just the symptoms.

Some CSA practices have already been introduced in Sri Lanka, but their adoption remains limited to certain areas or farming communities (World Bank and CIAT, 2015). Scaling up these practices requires an in-depth understanding of the factors that

influence their acceptance and success. Critical considerations on acceptance and successful interventions of these practices ensure the effectiveness of these practices at the ground level that include the unique characteristics of small-scale farmers, the availability of appropriate technologies and the role of knowledge-sharing mechanisms. Gaining these insights is essential to overcoming barriers to adoption and enhancing the effectiveness of future interventions at the grassroots level.

Given the critical role of agriculture in Sri Lanka's development, it is imperative to focus on past experiences with CSA and climate adaptation to ensure that future initiatives are more customized, efficient and impactful. This research aims to bridge the gap by evaluating past CSA and adaptation efforts in Sri Lanka, identifying their strengths and weaknesses and offering actionable recommendations for developing tailored strategies that enhance resilience, productivity and sustainability in the agricultural sector.

1.3 Research Questions

1. What have been the key successes and achievements of Climate Smart Agriculture (CSA) initiatives implemented in Sri Lanka?
2. What challenges and barriers have been encountered during the implementation of CSA practices in Sri Lanka?
3. How has the implementation of CSA practices influenced agricultural productivity, resilience and the livelihoods of vulnerable farming communities?
4. What are the primary factors influencing the adoption of CSA practices among farmers in climate-vulnerable regions of Sri Lanka?
5. How can the effectiveness and efficiency of future CSA interventions be enhanced in Sri Lanka?

1.4 Objectives

The primary objective of this research was to analyze past CSA interventions in Sri Lanka to identify scalable practices and formulate strategies for their broader implementation.

Specific Objectives

- To examine the CSA initiatives previously implemented in Sri Lanka.
- To identify the key challenges and barriers that have hindered the effective implementation of CSA practices.
- To investigate the factors influencing the adoption and potential scalability of CSA practices across diverse regions in Sri Lanka.

CHAPTER TWO

Methodology

The study adopted a combination of case study and systematic literature review approaches to comprehensively examine the implementation of Climate Smart Agriculture (CSA) practices in Sri Lanka. The case study approach was selected to gain an in-depth, contextual understanding of how CSA initiatives have been implemented on the ground, focusing on specific projects in different regions of the country. This approach allowed for the collection of rich qualitative data through direct engagement with project stakeholders and farmers, providing practical insights into the successes and challenges of adopting CSA practices. Complementing this, a systematic literature review was conducted to analyze existing research and documented evidence on CSA interventions, both within Sri Lanka and globally. This approach ensured a comprehensive overview of the theoretical foundations, previously identified challenges, and best practices in the field of CSA, offering a robust framework for comparing the case study findings. Together, these two offered a holistic understanding of the CSA landscape in Sri Lanka, combining empirical evidence from the field with established knowledge from the literature, to inform future interventions in the agricultural sector.

2.1 Case Studies

The case study approach is a qualitative research method used to gain in-depth insights into specific phenomena, contexts, or issues within real-life settings. This method enables researchers to explore complex subjects by focusing on detailed examples and drawing on various data sources, including interviews, observations and document reviews. In the context of this research, a case study approach was employed to gather comprehensive information on implementing of CSA practices in Sri Lanka, focusing on two major projects: the Agriculture Sector Modernization Project (ASMP) and the Climate Smart Irrigated Agriculture Project (CSIAP) that are currently implementing through the government of Sri Lanka related to CSA initiatives.

The case study approach enabled an examination of how these projects were implemented in different regions, as well as the challenges and successes encountered at various administrative levels and by the farming communities involved. Data collection was conducted through visits to four districts: Monaragala, Kilinochchi, Jaffna and Anuradhapura - where the two selected CSA projects were implemented. These districts were selected after having discussions with project directors of these two projects. Researchers engaged with project officials at the national, district and field levels to gain insights into the planning, execution and monitoring processes. In addition, beneficiary farmers who were directed by the project officials in each district were interviewed to gather firsthand insights into their experiences with CSA practices, including their perspectives on productivity improvements and resilience to climate change. Key informant interviews (KIIs) and

Focus group discussions (FGDs) were conducted with project officials and selected beneficiaries in each district.

This approach provided a rich understanding of how CSA was operationalized within the two projects (ASMP and CSIAP) and the factors influencing their outcomes in different climatic and socio-economic contexts across Sri Lanka.

2.2 Systematic Literature Review

A systematic literature review (SLR) was conducted to evaluate the lessons learned, successes, and challenges of climate change adaptation interventions in Sri Lanka. This method provides a comprehensive and structured analysis of existing research by identifying, selecting, and synthesizing relevant studies according to predefined criteria. The SLR approach was particularly suitable for this study, as it provided insights from prior research, highlighted knowledge gaps, and assessed the effectiveness of various interventions, thereby complementing the field level findings from the case studies.

The literature search was conducted using Google Scholar and ScienceDirect, two widely recognized academic search engines known for their extensive repositories of peer-reviewed articles, reports, books, and conference papers. To retrieve relevant literature aligned with the research objectives, specific keywords and Boolean operators were used. Primary keywords included terms such as “climate change adaptation” AND “Sri Lanka,” “adaptation interventions” AND “Sri Lankan agriculture,” “climate adaptation” AND “vulnerable communities in Sri Lanka,” and “climate resilience” AND “Sri Lanka agriculture.” Secondary keywords were used to narrow the search, including terms like “successes of adaptation” OR “challenges in adaptation,” “sustainable agriculture” AND “resilience strategies,” “community-based adaptation” AND “farming practices,” and “policy frameworks” AND “adaptation outcomes.”

To ensure the relevance of the selected studies, inclusion and exclusion criteria were applied. The inclusion criteria prioritized peer-reviewed publications, government reports, and studies published between 2010 and 2023 to capture recent developments. Only literature focusing specifically on adaptation interventions in Sri Lanka and providing insights into agriculture, community resilience, or policy frameworks was included. In contrast, studies that addressed only the general impacts of climate change without specific adaptation strategies, research conducted in other countries (unless it offered relevant comparisons), and articles with insufficient information were excluded. Duplicate entries were also removed, to maintain the integrity of the review.

Key information was extracted from the identified literature, with a focus on the types of adaptation interventions implemented, their reported successes and challenges, lessons learned, and factors influencing adoption, scalability, and sustainability. The extracted data were synthesized thematically, grouping the findings into key areas

such as agricultural resilience, policy initiatives, community-based adaptation practices, and institutional frameworks. This thematic analysis provided a comprehensive understanding of the current state of climate change adaptation interventions and generated actionable insights for future strategies.

A significant number of studies were retrieved, focusing on key interventions, such as the CSIAP and initiatives led by the International Water Management Institute (IWMI). These efforts included bundled solutions like weather index insurance, climate-resilient seed systems, and agro-advisories, which aimed to enhance farmers' resilience to extreme weather conditions.

The search process identified various sources documenting both traditional and modern CSA strategies implemented across multiple districts, including Monaragala and Anuradhapura. Government institutions, non-governmental organizations (NGOs), and international research bodies were reported to be actively involved in supporting these interventions. The studies highlighted the adoption of practices to address challenges such as droughts, floods, and shifting rainfall patterns. However, barriers related to scaling these interventions, building capacity, and ensuring access to necessary technologies were also noted.

Following the initial retrieval, 14,200 articles were excluded based on their titles, which were deemed irrelevant to the research scope. This screening resulted in 8,340 articles remaining. Subsequently, 450 duplicate entries were removed, leaving 7,890 articles for further evaluation. Abstracts, publication years, methodologies, and—when necessary—the full texts of these articles were reviewed to assess their relevance to the research objectives. During this stage, 7,520 articles were found to be beyond the scope of the study, as they focused on unrelated sectors, broader climate policies, or geographical regions outside Sri Lanka.

This rigorous filtering process resulted in 370 articles considered relevant for in-depth analysis. After a more detailed review, which included cross-referencing and checking for alignment with the research objectives, 18 articles were identified as the final set. These articles provided critical insights into the implementation, successes, and challenges of CSA interventions, including key projects such as the CSIAP and the ASMP. The final selection was carefully analyzed thematically to inform finding of the study.

CHAPTER THREE

Climate Smart Agriculture in Sri Lanka

3.1 Introduction to Climate Smart Agriculture (CSA)

Climate Smart Agriculture (CSA) is a comprehensive approach designed to address the challenges of climate change while promoting sustainable agricultural growth. It was first introduced by the Food and Agriculture Organization of the United Nations (FAO) in 2010 at the Hague Conference on Agriculture, Food Security, and Climate Change. The primary goal of CSA is to achieve three interrelated objectives: (i) sustainably increase agricultural productivity and income, (ii) enhance resilience and adaptation to climate change, and (iii) reduce greenhouse gas emissions where possible (FAO, 2010). This integrated approach ensures that agricultural development aligns with climate adaptation and mitigation efforts to secure long-term food security.

3.2 Evolution of CSA in Sri Lanka

The adoption of CSA in Sri Lanka has gradually evolved over the past two decades as the country began to experience the intensifying impacts of climate variability. Sri Lanka's agricultural sector, the cornerstone of its rural economy, has encountered major difficulties, including unpredictable monsoon rainfall, prolonged droughts, and severe floods and rising temperatures. These adverse conditions necessitated a shift toward more sustainable agricultural practices to safeguard food security and the livelihoods of smallholder farmers (Weerasooriya and Karthigayini, 2023).

Initially, agricultural interventions in Sri Lanka focused on conventional adaptation strategies, including irrigation expansion and fertilizer use. However, over time, these practices proved inadequate to cope with the severity of climate change impacts. In response, the government, in collaboration with international organizations like FAO, the World Bank and IWMI, started implementing CSA projects such as the Climate Smart Irrigated Agriculture Project (CSIAP). These efforts helped integrate traditional practices with modern technologies to foster resilience among farming communities (World Bank, 2023).

Sri Lanka’s shift toward CSA has also been supported by national policy frameworks, such as the *Draft Agriculture Policy 2019* (Government of Sri Lanka), which emphasizes climate adaptation, sustainable resource management, and food security. Partnerships between government institutions, NGOs, and universities have promoted CSA adoption, particularly in vulnerable districts such as Monaragala, Kilinochchi, and Anuradhapura (Weerasooriya and Karthigayini, 2023).

3.3 Key Agricultural Practices under CSA in Sri Lanka

Several practices have been integrated into CSA projects in Sri Lanka to achieve sustainable agricultural outcomes. These include a combination of crops, soil, water, and pest management practices, aimed at building resilience to climate stressors (Ginigaddara and Kodithuwakku, 2024).

3.3.1 Water Management Practices

Given the increasing frequency of droughts and erratic rainfall patterns, water management has become central to CSA. Techniques such as drip irrigation, rainwater harvesting and agro-wells[1] are widely promoted. These methods optimize water use, particularly in the dry zone, reducing dependency on rain-fed agriculture (World Bank, 2023). Additionally, CSIAP has also introduced parametric insurance models to protect farmers from losses due to droughts and floods (Aheeyar, Samarakoon and Silva, 2021).

3.3.2 Crop Diversification and Climate-resilient Varieties

CSA interventions encourage diversifying crop production as a strategy to reduce the risks associated with monocropping and increase income sources. The adoption of drought-resistant and heat-tolerant crop varieties has been promoted to cope with rising temperatures and water scarcity (Weerasooriya and Karthigayini, 2023). Crops such as maize, pulses, and millets have been introduced to supplement traditional paddy cultivation, ensuring productivity even under increasingly adverse conditions.

3.3.3 Soil and Nutrient Management

To address soil degradation and enhance soil fertility, CSA emphasize techniques such as organic manure preparation, mulching, and crop rotation. Farmers are trained in integrated nutrient management, balancing organic and chemical fertilizers to improve soil health. These practices are particularly crucial in degraded areas prone to erosion and nutrient loss (Marambe *et al*., 2015).

3.3.4 Integrated Pest and Disease Management (IPM)

CSA also promotes IPM practices to reduce the reliance on chemical pesticides, thereby minimizing environmental harm. Farmers are trained to use biological control agents and organic pesticides as sustainable alternatives. This approach helps manage pest outbreaks, which are becoming more frequent due to climate variability (De Costa, 2020).

[1] Agro-wells, which are wells utilized at least in part for agricultural purposes, are generally shallow and fall into three categories: lined dug wells, unlined dug wells, and tube wells (Kikuchi *et al*., 2003).

3.3.5 Agroforestry and Conservation Agriculture

Agroforestry systems—where trees are integrated into agricultural lands—are promoted to enhance biodiversity, carbon sequestration, and soil moisture retention. Similarly, conservation agriculture practices such as minimal tillage and residue management are encouraged to reduce soil erosion and improve productivity over time (Weerasooriya and Karthigayini, 2023).

3.3.6 Market Linkages and Farmer Business Schools

CSA initiatives also focus on enhancing market access for smallholder farmers. The Farmer Training Schools (FTS) established under CSIAP provide farmers with entrepreneurial skills, helping them engage in value-added agricultural activities. These programmes empower farmers to diversify their income and access new markets, making them more resilient to economic shocks.

3.4 Factors Affecting the Success of CSA in Sri Lanka

The adoption of CSA in Sri Lanka is crucial for addressing the pressing challenges posed by climate change, which threaten agricultural productivity and food security (Amarnath *et al*., 2023). However, the success of these practices is influenced by a multitude of interrelated factors, including agricultural and environmental conditions, farmer-related dynamics, socio-economic circumstances, and institutional frameworks. Erratic weather patterns, water scarcity, and soil degradation complicate the ability of farmers to implement CSA practices effectively. Additionally, the challenges posed by increased pest outbreaks and resource degradation necessitate a comprehensive approach to agriculture that integrates both ecological and economic considerations (Aheeyar, Samarakoon and Silva, 2021; Weerasooriya and Karthigayini, 2023).

Farmers' attitudes and socio-economic conditions significantly impact the adoption of CSA. Financial constraints, risk aversion, and limited access to resources can deter farmers from investing in climate smart practices, particularly among smallholders who prioritize immediate returns over long-term sustainability (World Bank, 2023). The alignment of policy frameworks is vital for supporting CSA initiatives, yet inconsistencies in implementation and weak coordination among governmental and non-governmental organizations often hinder effective action (FAO, 2022). By understanding and strategically addressing these multifaceted challenges, Sri Lanka can enhance the resilience of its agricultural sector and promote sustainable livelihoods for its rural communities.

3.4.1 Agricultural and Environmental Factors Influencing CSA Adoption

The successful adoption of CSA practices in Sri Lanka is deeply intertwined with the country’s agricultural and environmental conditions. Climate variability, soil degradation, water scarcity and ecosystem vulnerabilities pose significant challenges

that hinder widespread adoption. These environmental stressors not only affect productivity but also influence farmers' willingness and ability to adopt CSA practices. Addressing these challenges is essential for promoting resilience in the agriculture sector.

1. Erratic Weather Patterns and Climate Variability

Sri Lanka's agriculture is highly sensitive to unpredictable rainfall patterns and prolonged droughts, especially in the dry and intermediate zones. Traditionally dependent on seasonal monsoons, farmers now face inconsistent weather that disrupts crop cycles and complicates the management of resources, especially water. Heavy rainfall outside of typical growing seasons often leads to flooding, while delayed or insufficient rainfall exacerbates water scarcity during critical crop growth stages (Aheeyar *et al.*, 2023). This unpredictability poses a challenge for farmers to commit to CSA practices such as crop diversification or optimized planting schedules, as they struggle to synchronize agricultural activities with shifting weather patterns (Marambe *et al*., 2015).

2. Water Scarcity and Resource Management

Water scarcity remains a critical issue, particularly in districts such as Anuradhapura, Monaragala, and Kilinochchi, which are prone to frequent droughts. Efficient water management practices such as drip irrigation and rainwater harvesting are essential components of CSA, yet the poor state of irrigation infrastructure limits their application. Even in areas with adequate rainfall, the absence of functional water storage systems results in excessive water loss during floods, highlighting the need for infrastructure investments (Weerasooriya and Karthigayini, 2023). Access to modern irrigation systems is often constrained by high initial costs and limiting adoption among resource-poor farmers.

3. Soil Degradation and Declining Fertility

Sri Lanka's agricultural sector faces challenges related to soil degradation, including erosion, nutrient depletion and salinization, particularly in areas where monocropping and excessive use of chemical fertilizers are common. The adoption of CSA practices such as mulching, crop rotation, and organic manure application is essential for restoring soil health. However, these practices require time to yield benefits, and many farmers—facing immediate economic pressures—are reluctant to invest in them (Marambe *et al*., 2015). Additionally, degraded soils are less responsive to traditional agricultural practices, which further discourages farmers from adopting CSA methods.

4. Increased Pest and Disease Outbreaks

Climate change has contributed to the emergence of new pests and diseases as warmer temperatures and altered precipitation patterns create favourable conditions for invasive species. CSA practices, including integrated pest management (IPM) and the use of biological control agents, offer solutions to these challenges (Kandegama

et al, 2022). However, many farmers continue to rely on chemical pesticides due to limited knowledge, inadequate awareness and a lack of technical support for implementing sustainable pest management practices (Weerasooriya and Karthigayini, 2023). The increased frequency of pest outbreaks also raises production costs, making it difficult for farmers to maintain profitability.

5. Ecosystem Degradation and Loss of Biodiversity

Unsustainable agricultural practices, such as deforestation for cropland expansion, have contributed to the loss of biodiversity and ecosystem services. Agroforestry, which integrates trees with annual crops, is promoted under CSA to enhance biodiversity, improve soil health, and provide shade. However, the adoption of agroforestry systems remains limited due to land tenure issues and the lack of long-term incentives. Farmers are often unwilling to allocate space for tree cultivation, especially when short-term economic returns are uncertain (Najim *et al*., 2022).

6. Limited Local Adoption of CSA Technologies

Although climate-resilient crop varieties and advanced technologies are promoted under CSA, these solutions are not always tailored to local conditions (Ginigaddara and Kodithuwakku, 2024). For example, some drought-resistant crop varieties may require specific soil types or agronomic practices that differ from cultivation are traditionally practiced. Without adequate field testing and localized adaptation, farmers may face unexpected challenges when adopting new technologies, further discouraging participation (FAO, 2022).

Addressing these agricultural and environmental challenges necessitates targeted investments in infrastructure, capacity building, and research. Developing locally adapted CSA technologies and improving access to water and soil conservation methods will be crucial for building resilience in Sri Lanka’s agriculture sector (Marambe *et al*., 2015). Furthermore, efforts must also focus on enhancing farmer awareness and technical knowledge to ensure that sustainable practices are embraced across regions.

3.4.2 Farmer-related Factors Influencing the Successful Adoption of CSA

The socio-economic conditions and personal motivations of farmers play a pivotal role in shaping the adoption of CSA practices in Sri Lanka. These factors significantly influence their ability and willingness to transition from traditional farming methods to more sustainable, climate-adaptive practices. Smallholder farmers, who form the majority of Sri Lanka's agricultural population, encounter various challenges that affect their engagement with CSA initiatives (Amarnath *et al*., 2023). Understanding these farmer-related factors is crucial for designing interventions that encourage participation and long-term success.

1. Limited Financial Resources and Investment Capacity

Access to financial resources is a major factor influencing CSA adoption. Smallholders often lack the capital to invest in modern agricultural technologies, such as drip irrigation systems or climate-resilient crop varieties (Amarnath *et al*., 2023). Even when technologies are available, their high initial costs deter adoption, especially without subsidies or credit facilities. Many farmers operate on tight margins, prioritizing immediate returns over long-term sustainability. Additionally, limited access to low-interest loans or insurance increases farmers' vulnerability to crop failures and discourages investment in CSA practices (World Bank, 2023). The lack of comprehensive crop insurance schemes exposes farmers to climate-related risks, further hindering their willingness to experiment with new practices.

2. Risk Aversion and Traditional Farming Mindsets

Sri Lankan farmers are generally risk-averse, preferring familiar practices that have been passed down through generations. This mindset makes them reluctant to adopt new technologies unless the benefits are well established. The unpredictability of climate conditions adds to their concerns, as farmers may fear experimenting with new crops or techniques could result in losses (Weerasooriya and Karthigayini, 2023). CSA practices such as agroforestry or crop diversification require adjustments to traditional farming systems, which farmers may view as disruptive without clear evidence of short-term gains (Ginigaddara and Kodithuwakku, 2024). Risk aversion is particularly acute among smallholders, who cannot afford the failure of even a single cropping cycle (Najim *et al.*, 2022).

3. Knowledge Gaps and Limited Technical Expertise

Many farmers in rural Sri Lanka lack access to information and technical expertise necessary for the effective implementation of CSA practices. Weak agricultural extension services mean that critical knowledge about sustainable farming techniques—such as soil management, organic pest control, or integrated water management—fails to reach farmers at the grassroots level (FAO, 2022). Without sufficient knowledge, farmers may struggle to properly implement climate smart practices, even if they recognize their benefits. Furthermore, the digital divide also affects access to real-time agro-climatic information, such as weather forecasts and crop advisories, which are vital for planning adaptive measures (Aheeyar *et al*, 2021).

4. Limited Market Access and Value Chain Integration

Even when CSA practices lead to increased productivity, many farmers often face difficulties in accessing markets to sell their produce. Inadequate transportation networks and volatile commodity prices reduce the profitability of adopting CSA practices, which require higher upfront investments. The absence of organized value chains also limits the incentives for smallholders to engage in value-added activities, such as processing or packaging (World Bank, 2023). In the absence of reliable market access, and stable returns, the long-term sustainability of CSA practices is undermined, discouraging farmers from fully committing to these practices.

5. Gender Inequality and Social Dynamics

In Sri Lanka, women play a significant role in agricultural activities, yet they often face significant barriers to accessing resources, training, and decision-making processes (FAO, 2022). Gender inequality limits their involvement in CSA programmes, reducing the overall effectiveness of interventions. Women are frequently excluded from land ownership and financial services, preventing them from investing in new technologies or participating in extension services (United Nations, 2023). Moreover, social norms and cultural expectations further restrict their opportunities to contribute to agricultural innovation, diminishing the potential impact of CSA initiatives at the community level.

6. Fragmented Farmer Networks and Limited Collective Action

The lack of strong cooperative structures and farmer networks limits knowledge sharing and pooling of resource opportunities (Izuchukwu, Erezi and Emeka, 2023). Farmer cooperatives and associations can play a critical role in promoting CSA by providing access to training, credit, and market linkages, but these networks remain underdeveloped in many regions. Collective action is essential for certain CSA practices, such as community-based water management or shared seed banks, but the fragmented nature of smallholder farming reduces farmers' ability to collaborate effectively (Weerasooriya and Karthigayini, 2023).

Farmer-related challenges such as limited financial resources, risk aversion, knowledge gaps, poor market access, gender inequality, and weak collective action significantly challenges to the adoption of CSA in Sri Lanka. Addressing these barriers requires targeted interventions, including financial support mechanisms, capacity-building programmes, and infrastructure development. Strengthening extension services, promoting gender-inclusive programmes and fostering farmer cooperatives are critical strategies for ensuring the sustainable adoption of CSA practices. Tailoring interventions to meet the specific needs of smallholder farmers will be the key to enhancing resilience, improving livelihoods and securing long-term food security in Sri Lanka's agricultural sector (Ginigaddara and Kodithuwakku, 2024; Amarnath *et al*., 2023; Najim *et al*., 2022).

3.4.3 Institutional Factors Influencing CSA Adoption in Sri Lanka

The success adoption of CSA in Sri Lanka is closely linked to the effectiveness of institutional frameworks and governance structures. Institutions play a crucial role in policy formulation, resource allocation, knowledge dissemination, and coordination among stakeholders. However, several institutional challenges have been identified that limit the ability of CSA interventions to achieve sustainable outcomes.

1. Weak Coordination across Institutions and Sectors

A major barrier to the adoption of CSA in Sri Lanka is the lack of effective coordination among government agencies, non-governmental organizations (NGOs) and the private sector. Although institutions such as the Department of Agriculture, Ministry

of Environment, and various water management authorities are involved in climate-related efforts, their activities often remain fragmented (FAO, 2022). This uncoordinated approach results in duplicated efforts and missed opportunities for synergy between agriculture, climate adaptation and water resource management initiatives (Weerasooriya and Karthigayini, 2023). Effective CSA implementation requires cross-sectoral collaboration to align agricultural policies with climate action strategies, but weak institutional integration slows down progress.

2. Limited Institutional Capacity and Extension Services

The success of CSA initiatives depends on robust agricultural extension services to disseminate knowledge and technologies to farmers. However, Sri Lanka's extension system faces capacity constraints in terms of both staffing and technical expertise. Many extension officers are not adequately trained in CSA practices, limiting their ability to provide farmers with the necessary guidance (Najim *et al*., 2022). Furthermore, the uneven distribution of extension services across rural areas results in knowledge gaps, with remote and marginalized communities often being left out. Strengthening the capacity of institutions to provide timely and relevant agricultural advice is essential for promoting CSA adoption.

3. Bureaucratic Barriers and Inefficiencies

Bureaucratic inefficiencies in the implementation of agricultural programmes also pose significant challenges to CSA adoption. Many CSA-related government initiatives suffer from delays in funding disbursements and complicated administrative processes that discourage farmers from participating in these programmes. For example, farmers often face difficulties in accessing subsidies, loans and insurance schemes due to cumbersome paperwork and unclear eligibility criteria (World Bank, 2023). These bureaucratic barriers not only slow down the adoption of CSA technologies but also reduce trust between farmers and institutions.

4. Inconsistent Policy Implementation at the Local Level

Although the National Policy on Climate Change and Draft Agriculture Policy promote sustainable agricultural practices, their implementation at the local level has been inconsistent. Local authorities often lack the capacity and resources to implement national policies effectively (Marambe *et al*., 2015). The disconnect between national-level strategies and local-level execution undermines the impact of CSA interventions (Weerasooriya and Karthigayini, 2023). A more decentralized governance approach, where local institutions are empowered to tailor CSA practices to their specific contexts, is necessary for improving outcomes.

5. Gaps in Financial and Market Support Systems

Institutional weaknesses are also evident in financial and market support mechanisms. While CSA practices often require upfront investments in modern technologies, farmers face challenges accessing credit, subsidies, and crop insurance due to weak institutional support. Additionally, limited public-private partnerships hinder the

scaling of CSA initiatives. Without reliable access to financial services and market linkages, farmers struggle to make the necessary investments to adopt and sustain CSA practices (FAO, 2022).

6. Limited Research-Policy Linkages

Translating research into actionable policies needs a more proactive approach in Sri Lanka's agricultural sector. Research institutions and policymakers often operate independently, resulting in a lack of evidence-based policy formulation. As a result, innovative agricultural practices developed through research do not always reach farmers through policy frameworks or extension services (Marambe *et al*., 2015). Strengthening the link between research, policy, and practice will be essential to ensure that CSA technologies are both relevant and widely adopted.

Institutional challenges such as poor coordination, limited capacity, bureaucratic inefficiencies, and weak financial and market support systems significantly hinder the adoption of CSA practices in Sri Lanka. Addressing these barriers will require institutional reforms to improve inter-agency collaboration, enhancing extension services, and simplifying administrative processes. Strengthening research-policy linkages and promoting decentralized governance will also play a critical role in aligning CSA practices with local needs and national development priorities (Najim *et al*., 2022).

Enhanced institutional support in Sri Lanka—through improved access to credit and financial services, the formulation of clear and effective policies, investment in agricultural research and development, strengthened extension services and training, and the promotion of collective action through farmer organizations and networks—can create a more enabling environment for the widespread adoption of Climate Smart Agriculture (CSA). Additionally, supporting climate-resilient initiatives such as disaster risk management and early warning systems is essential for building long-term agricultural sustainability and climate resilience (De Costa, 2020).

3.4.4 External Factors Influencing the Success of CSA

The success of CSA in Sri Lanka is not only determined by local agricultural and institutional factors but also shaped by external influences beyond farmers' direct control. These include global economic trends, international funding mechanisms, donor priorities, technological innovations, and climate variability, all of which have significant implications for the adoption, scaling, and sustainability of CSA initiatives.

1. Global Market Trends and Price Fluctuations

The prices of agricultural inputs and outputs in Sri Lanka are heavily influenced by global market trends, which in turn affect farmers' income and investment capacity. Fluctuations in commodity prices—especially in crops such as tea, rice, and spices—can discourage farmers from investing in CSA technologies that require high initial costs (Amarnath *et al*., 2023). For example, global downturns in crop prices reduce the

profitability of adopting improved practices, such as drought-resistant crops or organic farming methods. Additionally, farmers engaged in export-oriented agriculture may experience volatility due to shifts in international trade policies and consumer demand for sustainable products.

2. Dependency on International Funding and Donor Priorities

External funding supports projects such as the CSIAP and ASMP, providing essential financial and technical assistance to farmers (World Bank, 2023). However, dependency on donor funding introduces challenges, as changing donor priorities and short project cycles can disrupt the continuity of CSA programmes. Once funding ends, the sustainability of interventions may be compromised, especially if adequate local resources are not mobilized to maintain progress (FAO, 2022). Therefore, integrating CSA projects into national policy frameworks and programmes/plans is essential to reduce overreliance on external sources.

3. Technological Innovations and Access to Global Knowledge

The availability of technological innovations plays a crucial role in advancing CSA practices. Breakthroughs in climate-resilient crop breeding, remote sensing, and weather forecasting systems provide farmers with tools to adapt to climate risks more effectively. However, Sri Lanka's access to such technologies depends on international collaboration and technology transfer agreements. Participation in global knowledge networks allows Sri Lanka to benefit from research and best practices from other countries, but adopting these technologies requires customization to local agricultural contexts (Weerasooriya and Karthigayini, 2023).

4. Climate Variability and Extreme Weather Events

Global climate variability continues to challenge the effectiveness of CSA interventions. Unpredictable weather events, such as floods, droughts, and tropical storms, place enormous pressure on agricultural systems. Even with CSA measures in place, extreme events can cause sudden crop losses that undermine farmers' resilience. These climate shocks highlight the need for continuous adaptation, making it essential for CSA programmes to incorporate early warning systems and disaster preparedness strategies to mitigate risks (Aheeyar *et al*., 2021). Additionally, Sri Lanka's agriculture is sensitive to global climate phenomena such as *El Niño* and *La Niña*, which further complicate seasonal planning and resource management (FAO, 2022).

5. Influence of Regional Cooperation and Trade Policies

Sri Lanka's ability to promote CSA is influenced by its engagement in regional partnerships and trade agreements. Collaboration with neighbouring countries through platforms such as SAARC (South Asian Association for Regional Cooperation) facilitates the exchange of technologies, best practices, and financial resources for sustainable agriculture. However, restrictive trade policies or export bans imposed by other nations can limit Sri Lanka's market access, reducing incentives for farmers to

adopt value-added CSA practices (Weerasooriya and Karthigayini, 2023). Strengthening regional cooperation can enhance access to seeds, technologies, and markets, promoting greater resilience across the agricultural sector.

The success of CSA adoption in Sri Lanka depends on several external factors, including global market dynamics, international funding flows, access to advanced technologies, climate variability, and regional cooperation. Addressing these factors requires integrating CSA into national development frameworks and diversifying financial support mechanisms to reduce dependency on external donors. Continuous engagement with international partners will enable Sri Lanka to access new technologies and align agricultural practices with global sustainability goals. By effectively managing these external factors effectively, Sri Lanka can enhance the resilience of its agriculture sector and ensure sustainable livelihoods for rural communities.

3.4.5 Policy Factors Influencing the Success of (CSA)

The successful adoption of CSA practices in Sri Lanka is shaped by a complex interplay of socio-economic and policy factors. A clear understanding of these elements is crucial for designing effective interventions that promote resilience and sustainability in the agricultural sector.

1. Policy Framework and Alignment

The effectiveness of CSA practices is contingent on a supportive policy environment. While Sri Lanka has developed national policies such as the National Policy on Climate Change and Draft Agriculture Policy, the alignment and enforcement of these policies at the local level are often inconsistent (Weerasooriya and Karthigayini, 2023). For CSA to be successful, there needs to be a stronger integration of agricultural, environmental, and climate policies to create a cohesive approach to sustainable agriculture (Marambe *et al*., 2015).

2. Institutional Support and Capacity Building

Institutional factors, particularly the capacity of agricultural extension services, play a critical role in the success of CSA initiatives. Weak institutional frameworks and insufficient extension services limit farmers' access to vital information about CSA practices. Strengthening institutional capacity and improving the effectiveness of extension services are necessary for disseminating knowledge and resources to farmers (Aheeyar *et al*., 2021). Furthermore, establishing partnerships between government agencies and local communities can significantly improve the reach and effectiveness of CSA initiatives.

3. Financial Support and Incentives

Policies that offer financial support and incentives are crucial for encouraging farmers to adopt CSA practices. Implementing subsidies for climate-resilient technologies, providing access to low-interest loans, and establishing crop insurance schemes can

help mitigate the risks associated with climate variability. Such policies not only enhance farmers' economic viability but also promote long-term investment in sustainable practices (FAO, 2022).

4. Monitoring and Evaluation

Establishing robust monitoring and evaluation (M&E) frameworks is essential for assessing the effectiveness of CSA policies and interventions. A comprehensive M&E system should include clearly defined objectives and indicators, data collection mechanisms, institutional framework and governance, data analysis and interpretation, feedback and decision-making integration, reporting and communication and evaluation and continuous improvement. Regular evaluations can help policymakers identify successful strategies, address emerging challenges, and refine approaches based on real-time feedback from farmers. A continuous assessment process will ensure that CSA initiatives remain relevant and effective in addressing the evolving impacts of climate change (World Bank, 2023).

In summary, the success of CSA in Sri Lanka is intricately linked to socio-economic conditions and policy frameworks. Addressing financial barriers, enhancing education and awareness, promoting gender equity, and improving market access are essential for encouraging farmer participation in CSA. On the policy front, aligning national strategies, strengthening institutional support, providing financial incentives, and implementing robust monitoring frameworks are crucial for fostering a conducive environment for CSA adoption. By tackling these socio-economic and policy factors, Sri Lanka can effectively enhance the resilience of its agricultural sector and ensure sustainable livelihoods for its rural communities.

CHAPTER FOUR

Climate Smart Agriculture Interventions in Sri Lanka

Sri Lanka has increasingly prioritized Climate Smart Agriculture (CSA) practices to address the pressing challenges posed by climate change. Two major initiatives, the Climate Smart Irrigated Agriculture Project (CSIAP) and the Agriculture Sector Modernization Project (ASMP) have been instrumental in promoting sustainable agricultural practices across the country. These interventions seek to improve the resilience of farmers, enhance agricultural productivity, and ensure food security by integrating climate smart technologies and sustainable management practices.

This chapter presents two recent stories of these CSA interventions, highlighting the practical experiences, successes, and challenges encountered during their implementation. The CSIAP primarily focuses on climate-resilient water management and improved irrigation techniques in areas prone to drought and water scarcity, while ASMP promotes agricultural modernization by introducing technology-driven farming solutions and improving value chains. Both projects aim to enhance the livelihoods of rural farmers, with particular attention to vulnerable districts such as Monaragala, Kilinochchi and Jaffna.

The stories captured in this chapter were drawn from field visits, interviews with farmers, and insights from project officials at national, district, and field levels. By documenting real-life experiences, these accounts provide a nuanced understanding of the interventions' impact on agricultural communities. They also highlight on how climate smart practices have been adapted to local contexts, offering valuable lessons for scaling up and refining future CSA initiatives in Sri Lanka. Through these narratives, the chapter aims to bridge the gap between policy and practice, demonstrating how climate adaptation strategies are being realized on the ground.

4.1 Agriculture Sector Modernization Project (ASMP)

4.1.1 Project Overview

The Agriculture Sector Modernization Project (ASMP), executed by then Ministry of Agriculture (MoA) and the Ministry of Primary Industries (MoPI), operates across five participating provinces in Sri Lanka from 2016 to 2022: Northern, Eastern, Central, North-Central, and Uva Provinces. Its primary objective is to support Sri Lanka in modernizing its agricultural sector. Funding for this initiative comes from the International Development Association (IDA) of The World Bank, with the EU serving as the co-financing agent. The projected cost of the project stands at US$ 169.84 million, with IDA financing US$ 125 million of the total sum. The implementation period spans five years.

The project design offers a structured framework for the government to experiment with innovative strategies aimed at addressing agricultural sector issues nationwide. Its primary goals include attracting investment into the sector, surpassing the low productivity threshold, increasing diversification levels and strengthening agriculture's contribution to the economy. The project prioritizes areas marked by high poverty rates and substantial numbers of impoverished individuals. Initially, it encompassed seven priority districts—Jaffna, Mullaitivu, Anuradhapura, Batticaloa, Monaragala, Matale and Polonnaruwa. Subsequently, with additional financing from the EU, the project expanded its scope to include five new districts: Kandy, Ampara, Kilinochchi, Vavuniya, and Badulla. One of the objectives of this project is to demonstrate new agricultural technologies and innovations at a sufficient scale to enhance productivity, resilience and diversification in selected priority lagging regions. Additionally, it promotes technology diffusion through capacity building, training and the introduction of new models for extension service delivery, helping to strengthen agricultural resilience to climate change.

4.1.2 Project Components

The project consists of three main components, each detailed below Table 4.1 for a comprehensive understanding.

Table 4.1: Detail of the ASMP Components

Key Components	Sub-components	Allocation	Description
Agriculture Value Chain Development	Investment Preparation Support	Total cost US$ 102.73 million	This component aims to stimulate commercial and export-focused agriculture. It aims to attract investments from farmer producer organizations and agri-businesses, enhancing high-value agricultural production and value addition.
	Matching Grants to Farmer Producer Organizations and Agribusinesses		
	Partial Credit Guarantee		
Productivity Enhancement and Diversification Demonstrations	Farmer Training and Capacity Building	Total Cost US$ 58.63 million	This component focuses on aiding smallholder farmers in producing competitive and marketable commodities. It strives to enhance their capacity to meet market demands and transition towards greater commercialization.
	Modern Agriculture Technology Parks		
	Production and Market Infrastructure		
	Analytical and Policy Advisory Support		
Project Management, Monitoring and Evaluation		Total Cost US$ 8.48 million	This component provides support for project management and coordination, technical supervision, financial management, procure-ment, social and environmental safeguards as well as monitoring and evaluation efforts

Source: World Bank, 2016.

4.1.3 Project Beneficiaries

The project anticipates supporting around 350 existing and newly established farmer producer organizations, along with approximately 50 agri-business partnership arrangements. Around 30 percent of the benefiting farmer producer organizations are expected to be led by women. The project's direct impact is estimated to benefit up to 15,000 smallholder farm households (World Bank, 2016).

It is estimated that a minimum of 14,000 farm households will directly benefit from the project's agriculture technology demonstrations, leading to enhanced production capacity. Additionally, around 20,000 farm households are expected to benefit from the project's assistance in establishing professional farmer organizations and capacity building via farmer business and marketing training activities (World Bank, 2016).

4.1.4 Productivity Enhancement and Diversification Demonstrations

The Project Management Unit (PMU) of the MoA, in collaboration with the Provincial Project Management Units (PPMUs), plays a pivotal role in implementing Component 2 activities. This component is geared towards aiding smallholder farmers in producing competitive and marketable commodities, enhancing their capacity to seize market opportunities, and advancing towards greater agricultural commercialization. Its primary focus is on boosting agriculture commercialization and introducing innovative technology packages through Agriculture Technology Demonstration Parks (ATDP). The role of the ATDP is serving as hubs for showcasing and promoting innovative agricultural technologies.

Presently, the ASMP initiative is actively fostering the development of 42 Agriculture Technology Demonstration Parks (ATDPs), with an equal distribution of 21 in both the original and newly added districts. Additionally, during the project's initial phase, ASMP provided support for 32 pilot demonstrations on crop management technologies. These demonstrations encompass a variety of crops, including both biannual and perennial fruits such as avocado, banana, guava, mango, papaya, pineapple, pomegranate, etc., primarily for export purposes. The initiative also focused on annual crops like chili, potatoes, red onion, and organic vegetables, primarily catering to the domestic market. Furthermore, the project emphasizes the production of high-quality seeds, including hybrid maize and chili, ground nuts, onion, potato, and various vegetables, through providing proper management practices.

4.1.4.1 Farmer Producer Organizations (FPOs)

The ASMP focuses primarily on transforming agriculture into viable agri-businesses, thereby fostering connections between farmers and agri-business entities. Within this initiative, the project has facilitated the establishment of farmer producer organizations (FPOs), through a different approach by registering them under the Companies Act No. 7 of 2007 as Public Un-listed Companies (PUCs). Additionally, the

project has aided PUCs in accessing financial support, operating under the guidance of private companies.

The primary goal is to establish them as independent economic entities. All essential funding is channeled through these PUCs, enabling them to function autonomously even after the completion of the project. The PUCs (farmer companies) have designated office bearers such as the president, secretary, and treasurer. These individuals are selected from within the PUCs based on their qualifications. Sometimes, even the children of the farmers are appointed as office bearers. Farmers who aren't directly associated with the project have the opportunity to join these PUCs. Once part of these organizations, they can sell their products through the established market channels facilitated by the farmer companies.

The PUCs have responsibilities in managing all the activities under the project at ground level. Their tasks include:

- Organizing group members effectively.
- Executing approved activities outlined in investment and business plans.
- Conducting training sessions for their members.
- Facilitating connections between organizations and agri-businesses.
- Supporting the implementation of new technologies.
- Offering technical training, exchanges, and advisory services to their members.

4.1.4.2 Agriculture Technology Demonstration Parks (ATDPs)

The Agriculture Technology Demonstration Parks (ATDPs) serve as comprehensive showcases of the entire agricultural value chain, emphasizing a specific focus on end-market viability for chosen crops within distinct regions. Each ATDP encompasses 10 to 12 villages engaging in the production of similar products using consistent production systems.

Originally, the plan was to establish 21 clusters of ATDPs under the European Union funding in five selected districts: Ampara, Badulla, Vavuniya, Kilinochchi, and Kandy. A cluster is essentially a group of farmers cultivating the same crops (Table 4.2). The PUCs play a crucial role in ensuring sustainable business activities within a cluster. Additionally, an ATDP within a district comprises several such clusters, creating a comprehensive demonstration area for agricultural practices and value chain development.

There are specific criteria involved in selecting farmers and forming clusters within a particular area. Some of these criteria include:

- Farmers should possess a minimum of 0.5 acres of land for cultivation.
- Ownership of the land should be clearly documented and legally established.
- The land should be suitable for cultivating the specified crop.
- Adequate and reliable access to water for irrigation purposes.
- The land should be free from previous or ongoing crop cultivations.
- Consideration of the living conditions of the farmers within the area.

These criteria are vital in the selection process, ensuring that the chosen farmers and land meet the necessary requirements for successful cultivation and participation within the designated clusters.

Within the ATDPs, farmers are required to cultivate their crops following specific manuals of instructions and modern technological packages provided to them. Compliance with these guidelines is crucial. Farmers are expected to adhere to these instructions; failure to do so may result in their exclusion or elimination from the project. This adherence ensures uniformity in the application of modern techniques and methodologies, contributing to the success and effectiveness of the project.

In addition to establishing ATDPs, the project has played a pivotal role in facilitating various rural infrastructure improvements. These include rehabilitation or enhancement of access roads and tracks, rehabilitation of small-scale irrigation schemes and construction of market facilities. Such improvements contribute significantly to the overall development and success of agricultural endeavors within the targeted areas.

Table 4.2: Clusters Developed in Different Districts under ATDPs

District	Clusters of ATDPs
Kandy	Hass avocado production
	Dry chilli production
	Vegetable seeds production
Kilinochchi	Jumbo peanut production
	Passion fruit production
	Chilli production
	Pomegranate production
Vavuniya	Dry chilli production
	Maize seed production
	TJC mango production
	Papaya production
Badulla	Maize seed production
	Hass avocado production
	Seed potato production
	Vegetable production
Ampara	Soursop production
	Dry chilli production
	Jumbo peanut production

Source: ASMP Unpublished, 2023.

The implementation of ATDPs is overseen by technical service providers (e.g. International Service Provider - ISP). These providers are expected to boast high international repute, employing modern technological approaches in agricultural production. Their primary responsibility is to transfer technology and knowledge to local stakeholders, including local extension services and staff at the agrarian development centres (ASCs).

The ASMP has strategically integrated government extension staff and ASCs with the Innovation Subproject (ISP). This strategic incorporation aims to facilitate the transfer of technology and knowledge to the public extension service. By fostering collaboration between these entities, the project ensures effective dissemination of modern agricultural practices and expertise to local stakeholders.

4.1.5 Some Activities Implemented in the Project Areas

- Passion fruit project
    - Distribution of drip irrigation system, water pump, plastic basket, G.I. pipes, pruning equipment and seedlings in Buttala area in Monaragala district. Development of road system and agro-wells as production and marketing facilities of passion fruits
- Pineapple Project
    - Distribution of sprinkler irrigation system, water pumps, seedlings, plastic buckets for farmers in Madagama area in Monaragala district
- Mango Project
    - Distribution of budded plants of TJC with high industrial potential, drip irrigation and sprinkler irrigation systems, water pumps, chemicals for flower induction during off-season, pruning equipment for rehabilitation of old plats in Matale, Jaffna and Monaragala districts
- Cavendish Banana project
    - Cavendish banana cultivation in Sevanagala area in Monaragala district with the participation of 500 farmers.
- Seed Potato Project
    - Production of seed potato with the participation of 400 farmers in Badulla district.
- Green Chilli Project
    - Chilli production in Anuradhapura district with 300 farmers participation
    - Installation of sprinkler system for about 100 Green chilli farmers in Batticaloa District as a pilot project
- Dry chilli Project
    - Production of high-tech dry chilli with the participation of 200 farmers in Monaragala district
- Passion fruit Project
    - Cultivation of passion fruit with 75 farmers by providing drip irrigation system, seeds, GI pipes

4.1.6 Climate Smart Agriculture Practices under ASMP

The ASMP aimed at transferring the technologies that are not practiced by the small-scale farming communities in the lagging areas in Sri Lanka. These technologies are comprised mainly of the modern initiatives practiced at the international level and distributed as a whole package from land preparation to marketing. Hence, the ASMP

has made an effort to shift the agriculture sector through modernization structurally. One of its prime concerns is about contributing to improved flood and drought management through the project's linkages to the water and irrigation sectors and a CSA approach. Therefore, this technology package is consisted CSA practices as below.

I. Crop Diversification: Growing a variety of crops such as banana, mango, ground nut, pomegranate, chilli, potato, passion fruit etc., suitable for each districts. This helps to enhance resilience against climate variability, reduce vulnerability to pests and diseases and mitigate risk.

II. Application of Improved Irrigation Methods: Implementing efficient irrigation techniques such as drip irrigation and sprinkler irrigation systems to increase water use efficiency and reduce water wastage.

III. Use of Climate-Resilient Crop Varieties: Selection and introduction of crop varieties that are tolerant to drought, floods, or heat stress. It helps to enhance resilience to changing climate conditions.

IV. Integrated Pest Management (IPM): There is a separate Pest Management Plan (PMP) developed based on the IPM principles in the project to distribute among farmers under a technology package. It specifies a range of non-chemical methods and a training and monitoring programme to control pests and diseases.

V. Soil Conservation: Implementing techniques like terracing, contour planting, land levelling, and cover cropping to prevent soil erosion and maintain soil health.

VI. Composting: The project has established composting facilities for managing crop residues, offering the opportunity for their reuse in subsequent crop cultivation.

4.1.7 Farmers' View on ASMP – A Success Story of Chilli Farmer in Jaffna

I am very satisfied with the ASMP project as it stands out as the most successful agriculture project implemented in our village area thus far. Prior to this, I had not participated in such programmes. I own half an acre of land dedicated to chilli cultivation. Previously, I used traditional methods for growing chilli, but now I have adopted modern techniques. Consequently, my earnings from cultivation have significantly increased, surpassing what I used to make earlier.

Before commencing my chilli cultivation venture, I joined a farmer company. This company granted me access to comprehensive instructions and cultivation information provided by agriculture officers. Moreover, through this farmer company, I am able to sell my chilli at favourable prices without the interference of intermediaries.

Before initiating the cultivation process, I actively participated in numerous meetings held by Farmer Company. Their guidance was instrumental in kick-starting my cultivation journey. Initially, they provided comprehensive training to the members of our farmer company, focusing on land preparation and nursery management. We opted for the MICH HY 1 local hybrid chilli variety for cultivation. The project offered invaluable support by providing all necessary inputs and equipment, including polythene for mulching, a drip irrigation system, protective netting, fertilizers, and chilli seeds—all at no cost. Personally, I lacked the financial resources to adopt this new technological approach to chilli cultivation. The installation of a drip irrigation system and the establishment of protective netting around the crop are usually expensive activities. However, the project provided all these essentials. Presently, I can efficiently apply water with minimal effort. Moreover, the occurrence of pests and diseases in my cultivation has been reduced. Our successful chilli cultivation inspired other local farmers to start growing chillies, even those not in the project. They saw what we did and felt motivated to try it themselves. This project has really inspired and motivated others. The ASMP project has been an incredible journey, transforming my chilli cultivation and significantly boosting my earnings. Its value and potential for agricultural growth are truly remarkable.

4.1.8 Key Insights and Lessons Learned from ASMP Implementation

The ASMP is an initiative to address the prevalent issues within Sri Lanka's agricultural sector. It focuses on introducing modern technologies to small-scale farmers predominantly living in the country's lagging regions. Consequently, this programme offers several key benefits, as outlined below.

- The establishment of farmer companies under the form of PUCs, ASMP plays a pivotal role in fostering business-oriented agricultural practices. These entities can function as independent economic units, significantly uplifting production levels and strategically accessing markets.
- The ATDPs has helped farmers to significantly improve the productivity and output of crops by applying industry best practices and cutting-edge technologies.
- Incorporating highly efficient practices has created a platform to mobilize trained farmers and support them throughout the entire process, from production to post-harvest handling.
- ATDPs have played the role of demonstrators to steer small-scale farmers towards growing selected high-value crops.
- Small-scale farmers have received benefits from investment opportunities for product processing and value chain development.

- The project has decided to select the most suitable farmers based on their capability in cultivating the relevant crop, following specific selection criteria, which is crucial to ensure the sustainable progression of the project.
- The selection of crops with strong potential and market trends, both in the local and export markets has played a pivotal role in facilitating substantial income generation
- The project has offered farmers opportunities to transition from producing low-value goods to cultivating high-value commodities.
- Participating communities have received guidance on domestic high-value markets in addition to the export and niche markets after completion of the production phase which is an important strategy applied with the aim of increasing the income of smallholder farmers.
- The project's provision of modern technology and comprehensive input packages to farmers who lack access to these resources represents a significant and positive initiative.
- The smallholder farmers were able to obtain hands-on experience in organic production, integrated pest control management, good agriculture practices standards and on-farm water saving technologies and climate smart agriculture.
- The establishment of strong market-farmer linkages, encouraged by contractual agreements with companies for product sales, has signified the development of a sustainable agricultural ecosystem.
- The project has enabled farmers to be involved in activities such as canning, jam making and juice making, opening new avenues for lucrative ventures.
- The upgrade and rehabilitation of existing small-scale irrigation structures, including water tanks and irrigation systems has significantly contributed to increasing agricultural production of the area.
- The development of access roads within village clusters, aligned with crop production, holds significant importance in enhancing market access efficiency.
- Investment in storage and product handling facilities such as drying platforms, shelves, composting facilities of crop residues and storage areas has supported value addition.
- Capacity building and training programmes have offered farmers a better understanding of the modern technologies on crop production and dynamic market opportunities and help them prepare in advance to predict and respond efficiently.
- The project activities have provided employment opportunities to the rural community.

4.2 Climate Smart Irrigated Agriculture Project (CSIAP)

4.2.1 Project Overview

The Climate Smart Irrigated Agriculture Project (CSIAP) aims to provide assistance to farmers facing vulnerability due to climate change with a particular focus on extreme weather events such as droughts and floods in designated hot spot areas across 11 administrative districts, namely Anuradhapura, Polonnaruwa, Kurunegala, Puttalam, Kilinochchi, Mullaitivu, Trincomalee, Batticaloa, Ampara, Monaragala and Hambantota. The selected areas cover 18 sub-watersheds within 10 river basins, namely Modaragam Aru, Yan Oya, Mee Oya, Kala Oya, Peru Aru, Mandakal Aru, Hada Oya, Karanda Oya, Kirindi Oya and Manik Ganga. The primary objective of the project is to enhance the productivity and climate resilience of the smallholder agriculture sector within identified hotspot areas. Enhancing water productivity at the farm level, improving agricultural productivity for crops, expanding the catchment area through water conservation practices and promoting crop diversification practices are specific objectives of this project (CSIAP, 2024b). The implementation of the project will be organized into four components which span a duration of six years from 2018 to 2024. Amongst them, two major components are agriculture production and marketing and water for agriculture.

Over 470,000 smallholder farmers who own below 2 ha of farmlands and residing in aforementioned districts covering 375,000 hectares were the main beneficiaries of this project. They will acquire knowledge through the transfer of technology and gain access to infrastructure assets to strengthen climate resilience in farming leading to heightened revenue through crop diversification and participation in emerging value chains. The overall project expenditure amounts to US$ 125 million, with financing sourced from a US$ 110 million transitional credit provided by the International Development Association (IDA) (CSIAP, 2024a).

4.2.2 Project Components

The project was implemented under four components including sub-components.

Component 1: Agriculture Production and Marketing

The objective of this component is to enhance agricultural productivity and promote crop diversification by embracing CSA practices. This involves refining both off-farm and on-farm water management strategies and establishing robust commodity markets.

Sub-component 1.1: Climate Smart Agriculture and Water Technology

This sub-component aims to facilitate the adoption of CSA with a dual focus: (a) showcasing the efficacy of CSA practices in farmers' fields through Farmer Business Schools (FBSs) and utilizing information and communication technology (ICT) for peer-

to-peer learning and (b) promoting the integration of CSA practices by establishing Producer Societies (PSs).

Key activities of these components are as follows:

- Provide technical assistance (TA) to implement appropriate technologies pertinent to each mini-watershed.
- Provide TA with the ability to create and conduct training programmes on climate-resilient practices and technologies, encompassing the necessary conditions for adoption.
- Provide agronomic extension services to Producer Groups (PGs) through efficient extension approaches such as field demonstrations and training events along with ICT to streamline the adoption of climate-resilient practices and technologies.
- Enhance the capacity of PSs and provide support for pilot investments related to technology transfer to PGs (CSIAP, 2024a).

Sub-component 1.2: Marketing

This sub-component seeks to enhance the connections between PSs and agricultural commodity markets through upgrading and/or rehabilitating essential market infrastructure and assisting farmers in market access, while fostering sustainable links with agri-businesses.

Key activities of these components are as follows:

- Constructing common infrastructure for agricultural commodity marketing, including markets, storage facilities and access roads as well as building or upgrading Common Service Centres (CSCs).
- Provide TA to assist PGs in commercializing their activities and establishing links with agribusinesses (CSIAP, 2024a).

Component 2: Water for Agriculture

The objective of this component is to facilitate the planning of water and other infrastructure essential for supporting climate-resilient irrigated agriculture, construction of the designated infrastructure and collaborative management of this infrastructure involving central/provincial governments and the local community.

Sub-component 2.1: Rehabilitation of Irrigation Systems

This sub-component will aid in the restoration of irrigation systems using plans formulated from hydrological modeling that considers anticipated climate changes in the project areas.

Key activities of these components are as follows:

- Provide TA to facilitate hydrology modeling at three levels: hot spots (covering approximately 25,000 hectares), mini-watersheds within the hot spot areas (covering about 4,000 hectares) which include tank cascade systems, stand-alone irrigation systems and rain-fed agriculture systems.
- Restore, modernize and overhaul existing cascade tanks and individual village tanks; construct recharge wells in the tank beds and develop drainage and flood protection infrastructure.
- On-site execution of watershed treatment and water harvesting initiatives (CSIAP, 2024a).

Sub-component 2.2: Operation and Maintenance of Irrigation Systems

This sub-component seeks to guarantee the enduring operation and maintenance (O&M) of irrigation systems both at the individual tank level and across the entire system.

Key activities of these components are as follows:

- Form Cascade Management Committees (CMCs) for each cascade of minor irrigation tanks within the watershed-based boundaries of the designated hot spot areas.
- Enhance the capacity of Farmer Organizations (FOs) established to oversee the management of each tank.
- Develop and implement a monitoring system for tracking water usage and availability (CSIAP, 2024a).

Component 3: Project Management

The objective of this component is to guarantee effective project management and ensure seamless co-ordination of activity implementation among diverse agencies and strategic partners at both national and sub-national levels.

Component 4: Contingent Emergency Response

This component enables swift redirection of project funds in the event of a natural disaster or crisis that has resulted in or is anticipated to cause significant adverse economic and/or social repercussions.

4.2.3 Project Outcomes

Five Key Performance Indicators (KPIs) at the outcome level were established during the project design phase to evaluate the project development objective.

KPI 1: Increase in water productivity at farm level (kg/m^3)
KPI 2: Increase in agriculture productivity of crops (%)

KPI 3: Increase in the catchment area with water conservation practices (%)
KPI 4: Crop diversification index (%)
KPI 5: Direct project beneficiaries, segregated by gender (No.) (CSIAP, 2024a).

4.2.4 Project Implementation Setup

The Ministry of Mahaweli, Agriculture, Irrigation and Rural Development (MMAIRD) was responsible for overseeing the comprehensive implementation of the project. Collaborative efforts involve the Department of Agriculture (DOA), Department of Agrarian Development (DAD) and Irrigation Department (ID) with additional external expertise including consulting services were enlisted as needed. The Project Management Unit (PMU), led by a Project Director (PD) along with provincial-level Deputy Project Directors (DPDs) offices, is entrusted with the day-to-day management and operation of the project.

4.2.5 Ongoing Programmes

Under this CSIAP, the following programmes are functioning at the implementation level.

1. **Climate Smart Nutritional Sensitive Home Garden Programme (CSNSHG)**

The Climate Smart Nutritional Sensitive Home Garden (CSNSHG) programme seeks to enhance the nutritional status of farming families and improve household food security. It was implemented across all 11 districts and this programme aims to create sustainable home gardens by adopting climate smart practices. This initiative ensures the consistent availability of a variety of vegetables, fruits and yams in farmer households. It was planned to set up 2,695 home gardens across 11 districts benefiting a total of 4,920 farm families (CSIAP, 2024c).

This programme exclusively involves the participation of women farmers. This initiative aims to empower women farmers by offering increased access to agricultural knowledge and fostering their involvement in local cultivation planning and decision-making processes. This programme will include single women, women-led households, widows, and socially excluded women. In this initiative, women are motivated to engage in the cultivation of vegetables, fruits and condiments in their home gardens. This not only ensures household food security but also creates sustainable sources of income for the households. Active participation in this home gardening programme enables women to play a significant role in meeting the food and nutrition needs of their families. By cultivating home gardens, they can enhance the family's food consumption patterns and reduce the overall cost of meeting the family's food requirements.

The Climate Smart Nutritional Sensitive Home Garden (CSNSHG) field showcased several CSA practices aimed at promoting sustainable farming. These practices included the application of organic manure and organic pesticides, reducing reliance

on chemical inputs. Mulching techniques were employed to conserve soil moisture and suppress weeds, while live fences were used to provide natural barriers and enhance biodiversity. Additionally, soil construction bunds were initiated to prevent erosion and improve water retention, reflecting efforts to enhance land productivity and resilience to changing climate conditions (CSIAP, 2024c).

2. Farmer Training Schools (FTS)

The CSIAP has started to establish a comprehensive Farmer Training School (FTS) named "*Govipole Iskole*" or "*Wivasaya Patashala*" in Mannakkulama Village, located in the Thirappane region of the Anuradhapura District. This FTS will serve as a practical platform for farmers to gain hands-on experience in CSA technologies and practices. The initiative is targeted at farmers in climate-vulnerable hotspot areas across 11 districts within six provinces. The FTS design aligns with the local agricultural environment while emphasizing environmental sustainability.

The FTS covered a variety of CSA technologies, including soil and moisture conservation, crop and variety selection, integrated pest management, organic manure preparation, and efficient crop establishment techniques with the onset of rains. Additional areas of focus include irrigation and weed control, water-saving techniques, nutrition management, self-seed production and storage, as well as pre- and post-harvest practices (CSIAP, 2024a).

Further, CSIAP has partnered with the Field Crops Research and Development Institute (FCRDI) to develop the Mannakkulama farm within the Thirappane ASC division as a model CSA farm. This farm will also function as the FTS to provide comprehensive training not only to farmers but also to agricultural officials.

Moreover, the FTS will support training on farm planning, marketing, and value addition under the Farmer Business School initiative. This aspect of the training aims to equip farmers with entrepreneurial skills, empowering them to pursue agri-business opportunities and enhance their economic resilience.

3. Modernization of Agrarian Services Centers

The primary objective of modernizing ASCs was to transform the community center into a comprehensive one-stop service center that addresses the genuine needs of the local farming community. This project was engaged in implementing the following key interventions aimed at transforming ASC into a One-Stop Service Centre. The objective was to offer modern services to farmers enabling them to build resilience against the changing climate conditions and overcome challenges that impede their productivity. The following major interventions will be made under this sub-project:

- Restoring, expanding, and renovating the current 47 office buildings of ASCs within the CSIAP areas to operate as appealing and efficient One-Stop Service Centers.

- Setting up a fully equipped ICT unit within each of the 47 ASCs complete with trained personnel and necessary equipment. This unit aims to offer essential data related to weather forecasts, market trends and new agricultural technologies as part of the digitalization process of ASCs.
- Establishing a Farm Machinery Hub (FMU) in each of the 47 ASCs overseen by the Agrarian Development Committee (ADC) of the ASC. This initiative aims to safeguard farmers from exploitation by intermediaries while also providing an avenue for the Agrarian Committee to strengthen the Agrarian Fund (CSIAP, 2024a).

4. Organic Fertilizer Production Programme

Initiating a novel programme in alignment with the National Policy Framework 'Vistas of Prosperity and Splendor' aimed at producing organic fertilizer in the hot spot areas of Northwestern, North, North Central, Eastern, Uva and Southern Provinces where the CSIAP is underway. The implementation of this programme was primarily done by the Provincial Departments of Agriculture and the Inter-Provincial Departments of Agriculture. It is scheduled for initiation in specific Grama Niladhari Divisions within the 47 ASC in the Kurunegala, Puttalam, Mullaitivu, Kilinochchi, Anuradhapura, Polonnaruwa, Trincomalee, Batticaloa, Ampara, Monaragala and Hambantota districts. Under CSIAP, farmers in these regions were expected to receive assistance, including essential inputs for preparing solid compost and compost tea along with the requisite training for organic fertilizer production.

As a part of this programme, CSIAP has planned to manufacture 55,000 metric tons of solid compost and 8.0 million liters of compost tea. In collaboration with the Department of Agriculture and Provincial Departments of Agriculture to establish six laboratories in the Northern, Eastern, North Central, Northwestern, Uva and Southern Provinces to evaluate the quality of the compost (CSIAP, 2024a).

Under the Organic Fertilizer Production Programme, 45,000 metric tons of compost fertilizer and 200,000 liters of liquid fertilizer were set as production targets. The programme successfully achieved 86 percent of the compost fertilizer target, while liquid fertilizer production exceeded expectations, reaching 104 percent of the initial goal (CSIAP Unpublished, 2024).

4.2.6 Programmes Completed

1. Cluster Village Development Programme

As cited in the CSIAP (2024a), a cluster village is an agricultural area where farmers cultivate the same crops or crop combinations while adhering to climate smart practices. These villages serve as exemplary models for climate smart agriculture in hotspot areas functioning as hubs for information exchange and feedback reception on climate smart agriculture among farmers. The primary goal of each cluster village was to enhance farmer income by implementing a comprehensive range of CSA practices. Currently, Cluster Village Development Projects (CVDPs) have been

successfully established in 11 districts covering a total of 530 acres and benefiting 630 farmers. The total project expenditure amounts to LKR 43.0 million. During the implementation phase, CSAIP will supply essential inputs required for the initiation of CSA farming activities among the chosen beneficiaries. The requisite technical support for project beneficiaries will be facilitated through the Provincial Department of Agriculture.

2. *Yala* 2020 Season

This programme aligned with the initiatives of the Ministry implementation, specifically aimed at promoting the cultivation of food crops during the *Yala* 2020 season to address potential food shortages arising from the COVID-19 pandemic. The focus of this programme is on promoting the cultivation of other field crops employing CSA practices in hotspot areas across 11 districts. Currently, within the food crop sector, other field crops account for the largest share of imports. The project aims to cover a total cultivable area of 4,029.4 acres, benefiting over 7,074 beneficiaries. The Provincial Department of Agriculture (PDoA) serves as the primary implementation agency for this programme across all six provinces where the CSIAP is being executed. The projected overall cost of this programme amounts to LKR 392.8 million (CSIAP, 2024a). Farmers selected for this programme are organized into PSs. The primary objective behind establishing these PSs is to coordinate farming activities and agronomic practices, essential for boosting productivity and enhancing profitability through cost reduction. The formation of these societies also aims to conserve water usage, implement climate smart agricultural practices and fortify the bargaining power of the farming community. These PSs are designed to operate as cohesive groups, fostering improvements in production and productivity as well as post-harvest and marketing activities among farmers.

4.2.7 Physical Progress of the CSIAP

Component 1: Agriculture Production and Marketing

Sub-component 1.1: Climate Smart Agriculture and Water Technology

The project has identified six CSA practices that are eligible for implementation using the funds allocated under CSIAP. They are climate smart home garden developments, climate smart agronomic improvements, introduction of micro irrigation with solar pumps, crops diversification, climate smart seeds production and promoting inter-seasonal cultivation.

1. CSA Practices Adopted by the Beneficiaries

The project aimed to adopt CSA practices across 35,000 hectares, encompassing all project areas. By the end of 2022, the project successfully attained 70% of the target. Crop diversification has been specifically implemented in areas where both paddy and Other Field Crops (OFCs) are under cultivation. Furthermore, selected beneficiaries have received drip irrigation systems and solar powered water pumps, fostering the adoption of micro-irrigation as a CSA practice. Under the Agro-Well Programme, a

total production target of 3,700 metric tons (Mt) was set, encompassing vegetables, green chilli and other field crops. An actual production of 2,938 Mt was achieved, reaching a significant portion of the initial goal. The cost-benefit ratio (CBR) of the programme was recorded at 1:1.37, while the return on investment (ROI) stood at 36 percent, reflecting its economic viability and positive impact (CSIAP Unpublished, 2024). Farmers are encouraged to cultivate during inter-season, too, as a climate smart practice with a low water consumption field crops such as black gram, cowpea and soya beans under this project. The CSIAP has been advocating for the development of home gardens since its inception, recognizing it as a key intervention that has proven to be highly beneficial to the community. Table 4.3 provides information on the progress of cultivation expansion based on various identified CSA practices.

Table 4.3 Progress of the CSA Practices (by 31st Dec. 2022) Introduced by CSIAP

CSA Practice	Target (ha)	Progress (ha)	Achievement %
Crops diversification	1,880.0	1,286.6	68
Micro irrigation systems establishment	376.0	194.8	52
Inter-Season cultivation	1,800.0	1,213.3	67
Climate Smart Home Gardens	6500.0	6353.9	98
Agronomic interventions	23,500.0	17,545.2	75
CS seeds production	1,410.0	809.1	57

Source: CSIAP, 2024b

To enhance understanding of CSA practices, it is necessary to set up demonstration plots in chosen villages. In these areas, a significant number of farmers will be given the opportunity to participate in establishing and demonstrating CSA practices on their farmlands. Furthermore, the project successfully organized beneficiaries into clusters to implement CSA practices specifically for seed production. Thus, production villages were established and promoted CSA practices via them since 2019 and this initiative is linked to investments in the application of technology, agricultural assets and services during cultivation seasons (CSIAP, 2024b).

2. Conducting CSA and Technical Training for Officers and Project Beneficiaries

As cited in the CSIAP (2024b), initially, the project aimed to conduct approximately 1,400 technical training sessions for beneficiaries and relevant officers of stakeholders. By the end of 2022, the Southern Province, Northern Province and North-Central Province successfully reached their targeted number of programmes. Key training themes involved soil, moisture and water conservation methods for climate change adaptation. Additionally, technical training sessions are conducted on improved crop management practices for climate change adaptation and productivity enhancement. Moreover, these training courses are conducted based on Good Agricultural Practices (GAP), resource conservation techniques, soil health and integrated plant nutrient management. Training sessions are also provided on Integrated Pest Management (IPM), on-farm water management systems, protected

agriculture, crop diversification, Climate Smart Home Gardening, post-harvest technologies and value chain development among other themes.

3. Training of Trainers (TOT) on Climate Smart Agriculture Practices

The project established the Climate Smart Farmer Training School (CSFTS) in Anuradhapura district, marking the pioneering establishment of such a training school in the South Asia region. The primary objective in establishing this school was to strengthen the capabilities of officials from support organizations and farmer leaders. This aimed at empowering them to effectively promote CSA technologies and practices within their respective villages. This initiative aimed to provide training on CSA practices via (CSFTS) to Agriculture Instructors (AIs) affiliated with the Department of Agriculture, Provincial Departments of Agriculture and Lead Farmers representing Farmer Organizations. The training programme scheduled for three days, covered a total of 74 sessions. By the end of the project implementation, it was aimed to conduct these sessions for 1,850 farmers and officers (CSIAP, 2024b).

CSFTS has served as a platform to train farmers, by providing hands-on experience CSA practices. It aimed at addressing challenges related to building strategies for climate change mitigation, adaptation and ensuring food security, particularly in terms of crop productivity. The focus is on minimizing potential negative impacts through the impartation of relevant technologies to beneficiary farmers in hot spot areas across 11 districts spanning six provinces. Furthermore, the project engages trained leader farmers to coordinate training activities and share knowledge on CSA practices within their peer groups.

4. Establishment of Demonstration Plots

CSIAP (2024b) stated that the establishment of demonstration plots in selected villages aims to provide visibility and illustrate CSA practices. This initiative was designed to attract and promote CSA-based farming among the project beneficiaries in the hot spot areas. The plan included establishing 687 demonstration plots over the project duration. By December 2021, 303 demonstration plots had been set up and various farmers established an additional 88 plots in 2022. This brings the cumulative total to 391 plots, achieving 58% of the project target by 2022, as detailed in Table 4.4.

Table 4.4: Progress of the Establishment of Demonstration Plots

Province	Number of Targeted Plots	established on CSA practices from 2019 to Dec 2021		Demonstration plots established on CSA practices in 2022		Cumulative number of Demonstration plots established on CSA		Overall progress as %
		plots	No of farmers	No of plots	No of farmers	No of plots	No of farmers	
EP	182	26	26	52	52	78	78	**43**
NCP	225	106	106	9	9	115	115	**51**
NP	168	77	77	6	6	83	83	**49**
NWP	60	48	48	27	27	75	75	**125**
SP	34	34	34	-	-	34	34	**100**
UP	18	12	12	-	-	12	18	**67**
Total	**687**	**303**	**303**	**88**	**88**	**397**	**397**	**58**

Source: CSIAP, 2024b

5. Establishment of Cluster Villages

CSIAP (2024b) stated in the annual report for 2022, that the development of cluster villages is a key strategy for encouraging the adoption of CSA practices in project areas. It aims to address climate variability by showing mitigation and adaptability measures implemented by farmers. The development of cluster villages includes the integration of climate smart technologies, the provision of climate smart information services, the reinforcement of supportive institutions and local-level planning and management. This comprehensive approach considers various aspects, including weather, water, soil and other agricultural inputs such as seeds, bio-fertilizers, IPM methods for pest and disease control and protection of crops from wild animals. Every intervention within the cluster villages undergoes a rigorous assessment to identify potential impacts on both society and the environment through a thorough social and environmental screening process.

6. Scaled-up Home Garden Programme

Amidst the COVID-19 pandemic, a significant portion of vulnerable individuals in the hot spot areas experienced food shortages and a decline in income sources particularly among wage labourers. Hence, the government launched a home garden development programme to create an additional income source for households, simultaneously ensuring household food security. Aligned with this effort, the project has implemented a Nutritional Home Garden Development Programme (NHGDP) to assist project beneficiaries in initiating the cultivation of fruits, spices, cereals, and vegetables during the COVID-19 period. This involves providing planting materials and technical assistance to enhance and improve their home gardens. By the end of 2021, a total of 5,375 home gardens had been established, achieving 81% of the targeted households (CSIAP, 2024b). This project has designed an expeditious scaling-up programme to assist approximately 66,000 households. This involves distributing seed packs, 25 kg organic fertilizer bags and 50 grow bags to all the households. Additionally, 50% of the households will receive tools for home garden development and 10 chicks that will be provided to initiate poultry farming addressing the protein

needs of the household especially for children, pregnant mothers and elderly individuals.

Under the Home Garden Programme, a total production target of 4,750 metric tons (Mt) was set, including 1,400 Mt of vegetables, 1,850 Mt of tuber crops, 300 Mt of leafy vegetables and 1,200 Mt of fruits, along with a goal of 3 million eggs. The actual production achieved was 4,316.3 Mt, along with 2.272 million eggs, reaching 90 percent of the initial target. The total income generated by the beneficiaries amounted to LKR 831.8 million, with a return on investment (ROI) of 27 percent. Additionally, the cost-benefit ratio (CBR) of the programme was recorded at 1:1.3, indicating a positive economic impact (CSIAP Unpublished, 2024).

7. Implementation of Seasonal Cultivation Programmes using CSA Technology

Cultivations have been carried out seasonally including *Yala* season, Inter-season and *Maha* season across the six project provinces. As stated in the CSIAP (2024b), this was followed by the implementation of CSA practices such as crop diversification, micro irrigation, climate smart seed production, climate smart home garden development, inter-season cultivation and climate smart agronomic interventions. As per Table 4.5, a total of 40,506 beneficiaries were engaged in cultivating 14,610 hectares of paddy and other field crops resulting in a combined production of 33,734 metric tons.

Table 4.5 Cumulative Production from the Seasonal Cultivation Programme

Crop	Extent (ha)	No. of Beneficiaries	Production (MT)
1. Paddy	408.5	668	911.7
2. Maize	6,456.6	10,263	19,427.9
3. Legume crops (Black gram/ Green gram/ Ground nut and Soya bean)	6,217.8	21,160	6,401.6
4. Sesame	1,060.1	3,055	647.9
5. Onion	258.3	1,476	5,322.4
6. Chili	79.9	791	762.5
7. Tuber crops	128.9	3,093	259.5
Total	**14,610.0**	**40,506.0**	**33,733.4**

Source: CSIAP, 2024b

The chosen beneficiaries of this programme received benefits in the form of seeds, other planting materials, agricultural equipment and necessary technical training among other supports. Inter-season cultivation takes place between the *Yala* and *Maha* seasons focusing on the cultivation of drought-tolerant crops. This cultivation programme is executed as practice of CSA. The project promotes harnessing residual moisture for cultivating specific leguminous crops such as green gram, black gram, groundnut and non-leguminous crops such as sesame, finger millet and maize. The aim of this initiative was to optimize the utilization of soil moisture in crop production thereby enhancing water use efficiency and agricultural productivity.

8. Cumulative CSA Cultivation Extent for *Yala* 2024

The cultivation efforts have been categorized into two primary sections: (1) cultivation done using seeds provided by CSIAP and (2) cultivation supported by agricultural equipment and technical knowledge provided by CSIAP, where seeds were procured by farmers themselves. Additionally, an aggregated summary of total cultivation details for the season has been included.

In the first category, where seeds were supplied by CSIAP, a total cultivation extent of 1,811.4 hectares was recorded, yielding a total production of 3,972.9 metric tons. The number of farmers who participated in this initiative was 5,544. Among the provinces, the Eastern Province recorded the highest cultivation extent (477 ha) and production (1,095 MT), whereas the Southern Province had the lowest recorded production (287.5 MT). In contrast, the North Central Province recorded a substantial production of 1,225 MT over a cultivated area of 400 ha, indicating relatively high output in comparison to other regions.

Under the second category, CSIAP provided only agricultural equipment and know-how while farmers used their own seeds, and a total of 1,596 ha was cultivated. The overall production from these efforts was 4,048.3 MT, involving 5,174 farmers. The highest production under this category was observed in North Central Province (2,147 MT), while Southern Province had the lowest (145 MT). This highlights a disparity in production efficiency, possibly influenced by climatic conditions, soil fertility and access to irrigation facilities.

The total cultivation extent across both categories amounted to 3,407.6 ha, yielding an overall production of 8,024.2 MT. The total number of farmers engaged in these cultivation activities was 10,718. Notably, the Eastern Province emerged as the highest producer, with a total output of 1,858.6 MT, while the Southern Province recorded the lowest (432.5 MT). The North Central Province contributed significantly to total production, with 3,372 MT of output, accounting for a substantial share of the overall cultivated yield.

The data highlights the effectiveness of CSIAP interventions in enhancing agricultural productivity across different regions. The significant difference in production between the two categories suggests that access to CSIAP-supplied seeds played a crucial role in increasing yields. However, the higher production figures recorded under the second category in some provinces, particularly in North Central Province, indicate that farmers' own seed selection, when combined with CSIAP's technical support, may also been a viable approach. These findings emphasize the importance of both direct material support and knowledge-based interventions in improving agricultural outcomes.

Overall, CSIAP has demonstrated a considerable impact on supporting farmers through seed distribution and agricultural advancements. These achievements provide insights into regional disparities in agricultural performance and can inform

future policy decisions on optimizing resource allocation to achieve maximum agricultural productivity.

The total extent of CSA farming increased by 1,596 hectares, representing a 46 percent growth compared to previous cultivation practices. Additionally, the number of farmers engaged in CSA farming expanded by 5,174, reflecting a 48 percent rise in participation. Furthermore, the total CSA production during the *Yala* 2024 experienced a significant increase of 4,048 metric tons (MT), marking a 50.4 percent improvement. These figures indicate a substantial adoption of CSA practices, contributing to enhanced agricultural productivity and sustainability (CSAIP Unpublished, 2024).

4.2.8 Key Insights from Hambantota District

The CSIAP is being executed in the Hambantota district, encompassing 14 Grama Niladhari Divisions (GNDs) in the Lunugamwehera Divisional Secretariat (DS) division, one GND in Hambantota DS division and seven GNDs in Tissamaharama DS division. In this district, the project has initiated the development of eight cascades and the rehabilitation of 74 tanks out of the total 84 tanks planned under this project. In the Hambantota district, the implementation of the CSIAP involves eight Cascade Management Committees, each associated with specific Divisional Secretariats: one in Hambantota DS, three in Lunugamwehera DS, and four in Tissamaharama DS. The project has deliberately chosen beneficiaries with landholdings below 5 acres to ensure the inclusion of smaller-scale farmers in its initiatives. Additionally, the promotion of the Farmer Business School concept is actively ongoing in selected GNDs aiming to empower farmers with entrepreneurial skills and business acumen.

The selection of Hambantota for this project is based on its vulnerability to climate changes, emphasizing the need to address and mitigate the potential impacts of climate-related challenges in this specific district. Moreover, the Hambantota district grapples with critical issues such as water scarcity, poverty and challenges related to land ownership, contributing to its heightened vulnerability. In response, PSs have been established and PAs have been formulated in conjunction with these societies. Notably, two PAs are identified in Tissamaharama DS and Lunugamwehera DS.

As part of a sub-component of this project, efforts are underway to modernize of ASCs, focusing on the repair of Weerawila, Yodhakandiya and Bandgiriya ASCs. This initiative aims to enhance the infrastructure and efficiency of these centers to better serve the agricultural needs of the local community. Within the framework of CSIAP, the inter-seasonal crop cultivation programme in Hambantota district emphasizes the promotion of groundnut, mung bean, finger millet and sesame. This targeted agricultural approach is designed to address the multifaceted challenges faced by the district fostering sustainable practices and resilience in the face of climate-related vulnerabilities.

Table 4.6: Activities Implemented by the CSIAP in Hambantota District (2019-2023)

Types of Activities Implemented	**Hambantota District**			
Providing Materials	**ASC**	**No of Units/ Programmes**	**No of Female Beneficiaries/ Participants**	**No of Male Beneficiaries/ Participants**
Efficient irrigation systems (drip, sprinkler systems)	Yodhakandiya Weeravila Bandagiriya	231	693	1,617
Plastic mulching		10	4	6
Polytunnels		10	5	5
Nets		59	25	34
Seeds and planting materials		31,830 kg seeds	1800	2,300
Seeders		8		8
Rehabilitation of village tanks and irrigation systems		39	860	1,993
Construction of agricultural roads		5.99 km	860	1,993
Construction of agro-wells		39	20	19
Conducting Awareness/Training Programmes				
Agronomic practices		369 ha	860	1,993
Home gardening		2,857	860	1,993

Source: CSIAP Unpublished, 2023.

Table 4.6 presents information on the distribution of materials and conducted awareness programmes under the CSIAP for the year 2023 in Hambantota district.

Successful Farmer Woman of the CSIAP in Hambantota

Ms. J.A. Sudarshani, a female farmer residing in Lunugamwehera DS division, Hambantota, stands as a successful beneficiary of the CSIAP. Demonstrating her agricultural expertise, she has cultivated red onion for seeds on a land extent of 0.25 acres. Throughout her farming journey, she has benefited from valuable advice and information provided by field assistants associated with the project.

Ms. Sudarshani received essential resources free of charge from the project, including insect nets, sprinklers, red onion seeds, fertilizer, and fungicides. Additionally, she has a tube well at her disposal, ensuring a consistent water supply for her cultivation. Despite facing a labour shortage and having to provide daily wages of LKR 2,500 without food, Ms. Sudarshani persistently continues her farming activities.

With the support and insights offered through the CSIAP, Ms. Sudarshani has gained the knowledge and confidence to independently manage her farming activities. This empowerment underscores the transformative impact of the project in enabling farmers like Ms. Sudarshani to overcome challenges and thrive in their agricultural pursuits.

Farmer Woman in Lunugamwehera DS
(20.09.2023)

4.2.9 Key Insights from Monaragala District

In the Monaragala district, the CSIAP has implemented a range of initiatives aimed at diversifying crops, promoting micro-irrigation, introducing new agricultural technologies, encouraging inter-seasonal crop cultivation, fostering Climate Smart Home Gardening and facilitating Climate Smart Seed Production. As part of the Climate Smart Home Gardening programme, 40 families were selected from each GND covering a total of 28 GNDs in the district. This programme serves as a pivotal step toward ensuring nutritional security among household members by empowering families to cultivate a diverse range of crops in their home gardens. The approach aligns with the broader objectives of the CSIAP, contributing not only to agricultural sustainability but also addressing the crucial aspect of nutrition security at the household level.

Farmers groups were identified and provided with expertise in various aspects of crop cultivation. Subsequently, they were motivated to apply this knowledge into practice, aiming to improve their living standards. Additionally, these acquired skills were disseminated among other farmers encouraging widespread adoption. Selected farmers received valuable field visits to enhance their understanding and knowledge.

In Monaragala, specific demonstration villages were established to demonstrate new cultivation methods and technologies. These villages served as platforms for selected farmers to implement and demonstrate these innovations. The success stories from these demonstration villages were shared with other farmers to inspire and motivate them. It is noteworthy that many farmers, considering farming as an additional source of income connect with the CSIAP primarily to receive freely provided planting materials and equipment. This strategic approach not only supports farmers economically but also facilitates the broader dissemination of innovative agricultural practices. Table 4.7 presents information on the distribution of materials and awareness programmes conducted under the CSIAP for the period of 2019 - 2023 in Monaragala district.

Table 4.7: Activities Implemented by the CSIAP in Monaragala District (2019- 2023)

Types of Activities Implemented	**Monaragala District**			
Providing Materials	**ASC**	**No of Units/ Programmes**	**No of Female Beneficiaries/ Participants**	**No of Male Beneficiaries/ Participants**
Efficient irrigation systems (drip, sprinkler systems)	Thelulla Wellawaya Buttala	520	1560	3640
Plastic mulching		30	14	16
Polytunnels		9	5	4
Nets		212	80	132
Seeds and planting materials		19201 kg seeds	1750	3380
Seeders		6		6
Rehabilitation of village tanks and irrigation systems		1	1755	4095
Construction of agricultural roads		2.31 km	1755	4095
Construction of agro-wells		28	10	18
Conducting Awareness/Training Programmes				
Agronomic practices		1484 ha	1755	4095
Home gardening		19500	1755	4095

Source: CSIAP Unpublished, 2023.

Successful Farmer of the CSIAP in Monaragala

A successful farmer from Monaragala, who joined the CSIAP, has actively participated in mid-season green gram cultivation for the past four years. In addition to his engagement in this project, he cultivates a diverse range of crops including moringa, papaya, banana and okra. As part of the project, he received a sprinkler irrigation system free of charge for growing groundnuts. He mentioned that using sprinklers helped him to achieve a better yield compared to his previous attempts at groundnut cultivation without irrigation. Moreover, using sprinklers not only shortened the time for water supply but also helped to reduce pest and disease outbreaks in the field. The application of sprinkler irrigation systems made other farming tasks easier by preventing excess water retention.

He has harvested 600 kg of groundnuts from a 0.25-acre field using the sprinkler system. After finishing the groundnut cultivation, he planted okra in the same field. However, the sprinkler system is not appropriate for cultivation of okra. During previous seasons, he endeavored to cultivate green gram as a third seasonal crop, but it was not successful. However, after receiving training under this project, his green gram cultivation became successful. Farmers now have a positive outlook on newly introduced irrigation techniques. He said that the project staff was very friendly and supportive, always ready to help them. This year almost all the farmers have tried cultivating green gram as a third seasonal crop.

Even though farmers were not provided seeds free of charge for green gram cultivation, many were willing to invest their own funds for this cultivation due to low maintenance costs and ease of recovering expenses from previous paddy cultivation through green gram cultivation. Farmers selected for this project, received training in financial literacy and the use of newly introduced mobile applications, contributing to the success of their cultivation.

Farmer in Buttala DS
(07.09.2023)

CHAPTER FIVE

Policy Implications

The increasing challenges posed by climate change necessitate a shift toward sustainable agricultural practices to ensure food security and resilience. Climate Smart Agriculture (CSA) seeks to address these challenges by integrating climate adaptation, mitigation, and sustainable agricultural growth. However, effectively adopting CSA in Sri Lanka requires an enabling policy environment, coordinated institutional efforts, and targeted interventions to address existing barriers. This chapter explores the policy implications, key challenges, notable successes, and strategic recommendations for enhancing CSA in Sri Lanka, focusing on how various stakeholders—government agencies, NGOs, and private sectors—can collaboratively support long-term agricultural sustainability.

5.1 Key Policy Implications

The transition to Climate Smart Agriculture (CSA) requires comprehensive policy strategies that address immediate challenges while ensuring long-term sustainability. This involves strengthening institutional and regulatory frameworks by strengthening policy and regulatory frameworks, enhancing financial and incentive mechanisms, strengthening research and extension services and enhancing multi-stakeholder engagement, investing in agricultural infrastructure and providing technical and financial support are fundamental to fostering effective CSA adoption. Current national policies, such as the National Policy on Climate Change and Draft Agriculture Policy, emphasize climate resilience, but their implementation remains limited, especially in rural regions. Barriers encountered for limited implementation are institutional and policy gaps, limited financial and technical resources, inadequate climate knowledge and farmer awareness, poor infrastructure and market access and socio-economic constraints and gender inequalities.

This underscores the urgent need for increased investment in rural and agricultural development to empower farmers in making location-specific, and long-term decisions. Further, to enhance climate resilience in rural Sri Lanka, policymakers must prioritize the integrating localized action plans, increasing financial support, expanding farmer training, improving infrastructure and ensuring inclusive participation. A multi-stakeholder approach - bringing together government entities, the private sector, NGOs and international agencies - will be essential to overcoming existing barriers and driving sustainable progress.

Autonomous adaptation, where farmers independently respond to climate risks, has often proven inadequate. Collaborative efforts involving government agencies, NGOs, and the private sector are essential to support rural communities in transitioning from short-term coping strategies to sustainable, long-term adaptation measures. Prioritizing initiatives such as asset accumulation, livelihood diversification, and the

adoption of climate-resilient technologies can significantly enhance the resilience and overall well-being of vulnerable farming communities.

Capacity-building on CSA practices, climate risk management and adaptation strategies and financial literacy and access to climate finance at the community level is critical for the success of CSA. Key capacity gaps identified are limited knowledge and adoption of CSA practices, weak extension services and technical support, lack of financial access and risk management, gender and social inequality in CSAP participation and weak community and institutions and policy implementation gaps. Localized knowledge hubs can promote region-specific CSA practices, while participatory training programmes can equip farmers with essential skills in areas such as sustainable irrigation and climate-resilient cropping. Supporting farmer-led innovations through field demonstrations and peer-to-peer learning fosters knowledge sharing and wider adoption. However, accurately identifying the right beneficiaries is crucial to ensuring the effectiveness and sustainability of these programmes. Selecting farmers with genuine need and strong motivation to adopt CSA practices enhances the impact of investments and reduces resource wastage.

Improved access to climate smart technologies is also vital. Introducing subsidies or partnerships with the private sector can make technologies like precision irrigation, solar-powered pumps, and resilient seed varieties more affordable and accessible. By requiring partial investment from farmers, such mechanisms ensure participation by those genuinely interested in adopting these technologies. Additionally, digital platforms offering real-time weather updates, market prices, and advisory services can further empower farmers to make informed decisions and manage risks effectively.

Strengthening market linkages and agricultural value chains is another priority. Investing in infrastructure for value-added agriculture, such as processing and storage facilities can encourage farmers to adopt CSA practices by ensuring fair and consistent market prices. Public-private partnerships can help establish robust market networks, reduce post-harvest losses and improve access to niche markets through certification programmes for CSA-compliant products.

Investing in research and monitoring is essential for evidence-based policymaking. A centralized platform with a clear governance and institutional setup, key components and functions, data flow and decision-making process, stakeholder roles, initial setup costs and long-term financial sustainability should be established to evaluate the long-term impacts of CSA initiatives on productivity, resilience, and livelihoods. Research should explore the scalability of CSA practices, considering the socio-economic and cultural factors influencing adoption. Collaborations between academic institutions, government agencies, and international organizations can further enhance the quality and relevance of research.

Finally, financial support tailored to the specific needs of small-scale farmers is critical. Low-interest loans, crop insurance, and community-driven funding for sustainable practices such as irrigation and soil health improvements can promote CSA adoption.

Performance-based incentives to farmers, agri-businesses and cooperatives that reward sustained use of successful CSA practices further encourage long-term engagement. Collectively, these strategies can help build a resilient, sustainable, and equitable agricultural sector in Sri Lanka.

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