Leveraging PlantwisePlus to Support Sri Lanka's Climate and Agriculture Development Goals: A Scoping Study

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Summary

This study brief presents the findings of a scoping study conducted in Sri Lanka between October 2023 and March 2024. The main purpose was to explore how, through the PlantwisePlus programme, CABI can support Sri Lanka in achieving some of its climate and development priorities, as outlined in the key national policies and frameworks on climate change, particularly within the agriculture sector. The study identified areas of alignment, existing gaps, and opportunities to integrate and enhance PlantwisePlus priority actions in the country. Additionally, this study can also be used to identify potentially new opportunities for project development and partnerships in Sri Lanka, strategically aligning with the national and local stakeholders' priorities for inclusive, sustainable and low-emission trajectory towards a climate resilient agriculture sector.

Highlights

- Sri Lanka's plant health system faces the usual challenges of reliance on agrochemicals, difficulty in pest identification, and limited access to information and extension services for farmers. Additionally, the system needs to adapt to climate change impacts, improve biosecurity measures, and enhance the use of digital tools for plant health management.
- The country has made notable progress in mainstreaming climate change considerations into the agriculture sector through its Nationally Determined Contribution commitments. Key interventions include the development of technical guidelines and national inventories for climate smart agriculture (CSA), promotion of CSA technologies via the Sri Lanka Good Agricultural Practices program, and provision of climate-informed agro-advisory services, mainly through the extension networks.
- Development programmes, such as PlantwisePlus play important roles in supporting the efforts of aligning, scaling, and strengthening climate-resilient plant health solutions across the country. Leveraging on the crucial and well-established networks of plant doctors, the programme can further support extension departments to promote good agriculture practice and CSA advisories to farmers through the increased use of the CABI digital tools.
- Despite CSA and integrated pest management being key strategies in the national climate policies, uptake is relatively low, and more evidence is needed on their effectiveness. Strengthening the evidence base will support policy decisions and help develop viable markets for low-risk alternatives and biopesticides further supporting Sri Lanka in achieving its national climate commitments.

Background

Sri Lanka’s agriculture sector forms the backbone of rural livelihoods, food security, and the national economy. Approximately 2.2 million ha, which is equivalent to 35% of the country’s total land area, is used for agricultural purposes. This key sector also employs over 2 million people, or roughly 30% of the workforce. At the same time, at least 30% of the population also suffers from acute food insecurity. A large extent of this land is owned by smallholder farmers (70% own less than 0.8 ha of land), contributing to a major share of annual crop production. Tea, rubber, coconut with sugarcane, and oil palm plantations can be found mainly in the wet and intermediate zones of the country, making up a significant portion of export income (NDC, 2021). Key food crops include rice, maize, pulses, and vegetables. Rice, the staple crop, is grown by both small- and large-scale farmers, mainly using intensive, irrigated, and input-dependent methods, with over 98% of rice areas planted with high-yielding, self-pollinating varieties. (World Bank & CIAT, 2015).

Sri Lanka, as a tropical island nation, is highly vulnerable to the impacts of climate change. The country’s climate is undergoing three major transformations - a gradual rise in air temperature, shifts in rainfall patterns, and an increase in the frequency and intensity of extreme weather events, including floods, droughts, and strong winds (Menike, & Arachchi, 2016). The agriculture sector is currently feared to be suffering from stagnation, and encountering several challenges from the changing climate, increased plant pests and diseases, declining agro-biodiversity, economic instability and others (NDC, 2021;

Gunasekera et al., 2024). In 2022, for instance, the country experienced a 42% drop in rice production triggered by prolonged periods of limited rainfall, rising energy costs, and lack of access to chemical inputs. Pest attacks and fungal diseases on vegetables, fruits and rubber crops were also commonly reported by farmers and district authorities (FAO & WFP, 2022). A situation analysis conducted by CABI in 2024, further confirmed the whitefly challenge, reported by 22% of the surveyed farmers, that led to high levels of plant damage and meant that tomato farmers applied unregulated doses of pesticides. The excessive use of and reliance on pesticides has also increased several pesticide related health and environmental risks, further indirectly contributing to climate change challenges.

The country's plant health system faces familiar challenges, including reliance on agrochemicals, difficulties in pest identification and monitoring, and limited access to timely information and extension services for farmers. In addition, the system needs to urgently adapt to the impacts of climate change, strengthen biosecurity measures to increase its competitive edge in domestic and export markets, and expand the use of digital tools to improve plant health management. As part of the commitments under the Nationally Determined Contribution (NDC) and National Adaptation Plan (NAP), the government has clearly prioritized GAP and CSA, backing it with substantial policies and programmes. At the same time, even if farmers may not be aware of climate change terminologies, they are increasingly more aware of the risks and impacts on crop production and are willingly starting to adopt more sustainable and CSA practices (Menike & Arachchi, 2016).

Led by CABI, PlantwisePlus is assisting the country in enhancing its plant health system in the face of the emerging climate risks. The programme is working across 27 countries globally, including Sri Lanka, to enhance pest prediction, preparedness and prevention pathways, and delivering actionable plant health advice to national and local governments, and extension networks. PlantwisePlus aims to empower 75 million men and women farmers to make informed decisions that improve yields and reduce losses and plays a critical role in promoting sustainable, good and climate smart agriculture through the safe use of plant protection products and the adoption of climate-smart farming practices. To better understand the opportunities for PlantwisePlus to support the implementation of the relevant agriculture and climate priorities, as part of the NAP and NDC commitments, this scoping study was undertaken to determine targeted actions. There is a common understanding that smallholder farmers need timely, science-based, and climate-smart advice for managing crop pests and diseases, but this will also need more concerted emphasis on empowering plant health communities to address and adapt to climate-related risks. By identifying synergies, gaps, and opportunities for collaboration, the study aims to inform future programming and partnerships between CABI, national institutions, and other key stakeholders in Sri Lanka.

What we did

The scoping study employed a mixed methodological qualitative approach. Information was collected primarily through desk reviews and key informant interviews. The desk study included analyses of the NDC and NAP, the National Guidelines for Climate Smart Agricultural Technologies and Practices and rapid review of the National Climate Change Policy. Research reports and journal papers were also reviewed mainly for background and context. Additionally, during this scoping study, CABI also co-organized two regional workshops with the Food and Agriculture Organization of the United Nations (FAO) and partners in Asia and Pacific countries on advancing their climate ambitions in the agriculture

and land use sectors. These were organized in October 2024 and March 2025. During these two workshops, CABI co-led sessions on:

- Identifying the common priorities for the agriculture and land use for a joint Asia-Pacific regional submission to the United Nations Framework Convention on Climate Change; and
- Taking stock of NDC 2.0 implementation and needs assessment for NDC 3.0 formulation in the participating countries.

Discussions during these workshops have guided this scoping study through valuable insights from the participants into current gaps and priority areas for NDC and NAP implementation in Sri Lanka, enabling the study to focus on actionable recommendations. Key informant interviews were conducted with stakeholders representing the Department of Agriculture (DoA), Ministry of Environment, Ministry of Agriculture, key experts from the technical working group from the agriculture sector for NDC formulation and the national coordinator for PlantwisePlus in Sri Lanka. In addition, the author also had the opportunity to engage with plant health system experts during a CABI organized Pest Management Decision Guideline writeshop in Sri Lanka, where challenges of biocontrol behaviours and thresholds under changing climatic conditions were also discussed.

Findings

At policy and national levels of governance

PlantwisePlus interventions in Sri Lanka are strategically aligned to the broader NDC agriculture priority on the *'promotion of IPM and Integrated Plant and Nutrition Systems (IPNS) in most vulnerable areas/districts/crops***.** More specifically, the NDC mentions the need to,

- *Identify priority areas of vulnerability to resurgence and emergence of pests/disease, weeds and wild animal attacks due to climate change.*
- *Develop and introduce appropriate IPM and IPNS programmes for the priority areas.*
- *Increase SL GAP Certified products by 25% from areas that are highly vulnerable to climate change.*

Advancing CSA as a national priority

Findings from the scoping study suggest:

- The country has made notable progress in mainstreaming climate change considerations into the agriculture sector through its NDC commitments. Key interventions include the development of technical guidelines and national inventories for CSA, promotion of CSA technologies via the Sri Lanka Good Agricultural Practices (SL GAP) program, and provision of climate-informed agro-advisory services, mainly through the extension networks.
- The implementation of the current NDC has led to the execution of several key activities such as the adoption of improved agricultural planning processes to minimize seasonal production surpluses, reduction of post-harvest losses in fruits and vegetables, facilitation of technology transfer and innovation, operationalization of the National Agriculture Policy, expansion of productive livestock populations, improvement of animal

housing infrastructure, reduction of disease incidence, and promotion of renewable energy technologies within agricultural operations as means of tackling current and emerging climate risks.

- Other targeted significant achievements include the development and dissemination of heat tolerant, drought tolerant, and pest-tolerant crop varieties, developments in seasonal climate forecasting capabilities, and higher adoption rates of resource-efficient agricultural practices such as fertigation and rainwater harvesting. Additional initiatives, such as the restoration of traditional tank cascade systems and promotion of crop diversification, contribute to enhancing the sector's resilience to climate variability and change.
- The country is widely promoting climate risk management frameworks, strengthened through the expansion of agricultural insurance schemes and early warning systems.
- Greenhouse gas (GHG) emissions in Sri Lanka's agricultural sector are predominantly attributed to enteric fermentation, rice cultivation, and agricultural soil management practices. Achieving the intended mitigation outcomes require robust monitoring frameworks, effective follow-up programmes, and enhanced institutional coordination which is currently still work in progress.
- Despite these progress, full realization of NDC targets will require increased and targeted financial investment and technological support, particularly to scale up CSA adoption including integrated pest management (IPM) strategies, which is a key NDC priority.

At programme and local levels of governance

- Addressing climate change is currently a priority of the DoA. However, there is a lack of coordination among the agriculture and environment related ministries and departments, leading to fragmentation and duplication of efforts. Part of it is also attributable to DoA, historically, not having the mandate to work on climate change issues in the agriculture sector.
- Given Sri Lanka's subsistence scale farming and increasing exposure to climate risks, discussions with DoA highlighted the need for support to scale up biotechnology for crop production. This is critical to address the current challenges around lowering and/or stagnation of yields, loss of nutritional value of crops, and increasing susceptibility to plant pests and diseases. At the moment, a lot of research is being conducted on this topic by national research organizations. However, dissemination of the results/products at the scale appropriate to address the needs of the farmers is not possible using current resources.
- The challenges of high and unregulated use of pesticides were also discussed with the key informants. More targeted training and capacity strengthening of local agricultural authorities on practical and hands on approaches is needed, to apply and promote *climate smart pest management* measures, particularly for the horticultural crops (this is consistent with the findings from the CABI situation analysis report on pesticide use in tomatoes).

- The market for biocontrol and biopesticides remains fairly limited in the country. Understanding of the usage, application methodologies and benefits of biopesticides for a transition to low emission and resilient agriculture pathway is still poor among agriculture stakeholders including smallholder farming communities.
- When promoting biocontrol and biopesticides, there is a need to determine the effectiveness in the face of current and rapid climate change. Based on discussions with plant health experts in Sri Lanka, increasingly biocontrol agents are reaching temperature thresholds, and their behaviour and efficiencies are changing based on the three climatic zones. More research and understanding are needed to determine the most appropriate biocontrol/biopesticides for plant pest and disease management.
- The rural agricultural sector is still largely reliant on traditional practices with limited knowledge of advanced technologies and practices that can help increase yield without affecting the environment.
- Despite being a priority in the NDC, there is still a lack of understanding of appropriate IPM approaches for key food and horticultural crops.
- Despite ongoing efforts to increase the uptake of CSA technologies and practices (including AI powered digital agriculture tools for climate and agriculture advisories) achieving meaningful behaviour at farmer levels is still a major challenge that also affects scalability and replicability of the practices. More low cost and participatory training models are needed for both farmers and extension networks.

Recommendations and way forward

IPM and CSA are key national priorities for addressing climate and agriculture challenges in Sri Lanka. While the country has introduced a range of CSA practices, scaling these up effectively remains a challenge due to limited financial, technical and human resources. The ongoing PlantwisePlus interventions in Sri Lanka are actively supporting the crucial plant health communities to tackle some of the emerging and underlying systemic challenges. A functioning plant health system with strong capacities to monitor new SPS risks posed by climate change is crucial for the international trade markets, which is a priority for the government. For this, there is currently a stronger need to understand the relevant climate risks and strengthen current institutional capacities with regular foresight and screening tools, an area that PlantwisePlus can continue to explore during the remaining project timeline. Uptake of IPM strategies remain low in the country despite this being a priority in the NDC. There is an increasing need for stronger evidence, supported by data and analysis, to demonstrate the role of CSPM in advancing the resilient growth pathway.

Ensuring that interventions are tailored to the specific needs and vulnerabilities of different climate hotspots is essential for success. PlantwisePlus has an important role to play in supporting this effort by helping to align, scale, and strengthen climate-resilient plant health solutions across the country. Leveraging on the crucial and well-established networks of plant doctors, the programme can support extension departments to promote GAP and CSA advisories to farmers.

Targeted and participatory training for plant health practitioners on climate change risk management

National Plant Protection Organizations (NPPOs) require targeted training to better understand the risks of climate change to trade, plant pests and diseases, crop yields, and overall biosecurity. While training on these topics is increasingly being developed and delivered through various development initiatives, there is a strong case for CABI and PlantwisePlus, given their central role in strengthening plant health systems in Sri Lanka, to integrate more climate change-related capacity-building into planned trainings and workshops where appropriate. Strengthening pest preparedness and response systems is particularly urgent, as these systems remain fragile both in Sri Lanka and across the wider region and enhancing knowledge on climate change as a cross-cutting challenge is still a key gap among these stakeholders.

At the same time, PlantwisePlus is currently delivering capacity strengthening initiatives for agricultural extension personnel and the plant doctor networks in Sri Lanka and several other countries in the region. The training focuses on enhancing their understanding of climate change risks and their implications for the agriculture sector. To ensure consistency and long-term impact, these training efforts should be institutionalized and integrated into the national agricultural training curriculum, thereby strengthening the knowledge base and adaptive capacity of frontline advisory services, and eventually smallholder farmers.

Develop and roll out CSPM practices with targeted SL GAP certification approaches in climate vulnerable districts

Given the government's priority to advance IPM and GAP as key strategies to address climate change, it is essential for PlantwisePlus to identify the best ways to align and integrate these approaches for maximum impact. The programme aims to develop IPM guidelines for tomato production and design pesticide risk reduction campaigns that effectively reach both male and female smallholder farmers. To strengthen these interventions, it is recommended that they explicitly integrate climate change risks to plant health management and focus training efforts on parts of the country that are highly vulnerable to climate change, particularly in the dry and intermediate zones. There is also a clear need to identify and prioritize crop-specific CSAs and promote localized climate-smart, low-risk plant protection products that both comply with SL GAP standards and contribute to achieving national climate goals. More support for projects and programmes integrating national guidelines on CSA will be prioritized by the government. This is also relevant to improving SL GAP certified products to meet international trade regulations.

Generate evidence on effectiveness of CSA and IPM as key climate change adaptation and resilience strategies.

Both CSA and IPM are embedded in the national climate and development policies of not only Sri Lanka but also Bangladesh and Pakistan (two other countries part of a similar scoping exercise). Yet, the scoping exercise reveals that despite the acknowledgement of the importance of both these approaches for long term sustainability of the agriculture sector, challenges remain around their prioritization, uptake, and effective implementation. Knowledge gaps persist at both extension and grassroots levels. There seems to be a pressing need for stronger data and evidence to support and justify these priorities as key

adaptation of climate change and resilience building efforts for smallholders. Generating such evidence is also essential for ensuring sustainable plant health systems in the long run, an aspect PlantwisePlus should actively explore through undertaking more action research on these topics.

Promote digital tools for precision agriculture and advisory

The embedding of CABI's digital tools within the DoA provides a strategic opportunity to intensify and streamline efforts aimed at improving farmer access to timely, data-driven agricultural advisory services. Efforts can now be strategically directed towards increasing the uptake of these digital solutions, with a focus on extending their reach to farmers in climate vulnerable and high-risk agro-ecological zones of the country. In parallel, it is recommended to explore the use of targeted plant health advisories delivered through AI-powered platforms and WhatsApp channels to enhance the impact, reach, and long-term sustainability of programme interventions in the country. These efforts should be grounded in the agro-ecological diversity of Sri Lanka's three major agro-climatic zones, enabling more precise, and climate smart plant health support.

Assess the technical and market suitability for scaling low risk pesticides and biocontrol solutions

The domestic market for biocontrol agents and biopesticides remains underdeveloped, constrained by limited awareness and technical knowledge regarding their application, efficacy, and long-term agronomic and environmental benefits. Among key agricultural stakeholders, particularly smallholder farmers, understanding of biopesticides as a viable alternative to synthetic inputs is minimal. To unlock market potential and drive demand, targeted interventions are required, including robust cost-benefit analyses that clearly demonstrate the economic and environmental advantages of biopesticide use. Establishing clear value propositions for agribusinesses and input suppliers, supported by policy incentives and extension services, is essential for stimulating market growth and promoting adoption at the local levels. Such efforts are critical to positioning biopesticides as a commercially viable and scalable solution for transitioning toward low-emission, climate-resilient agricultural systems.

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