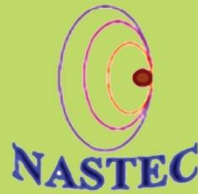




Ministry  
of  
Education



National Science  
and  
Technology Commission

# Technical Report on Climate Change, Agriculture and Food Security



## 9<sup>th</sup> SRI LANKA BIENNIAL CONFERENCE ON **SCIENCE & TECHNOLOGY** **2023 (BICOST IX)**

23<sup>rd</sup> & 24<sup>th</sup> March 2023

Waters Edge, Battaramulla

# **STRATEGIC INTERVENTIONS PROPOSED BY THE NASTEC FOR AGRICULTURE, CLIMATE CHANGE AND FOOD SECURITY**

9<sup>th</sup> Sri Lanka Biennial Conference on Science and Technology  
(BICOST-IX)

23<sup>rd</sup> and 24<sup>th</sup> March, 2023

Waters Edge, Battaramula.

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**ISBN 978-955-8630-28-0**

National Science and Technology Commission (NASTEC)  
6th Floor, Wing D, Sethsiripaya Stage II,  
Battaramulla

Tel: 011-2186711/12

Fax: 011-2186713

Email: [nastecoffice@gmail.com](mailto:nastecoffice@gmail.com)

Website: [www.nastec.gov.lk](http://www.nastec.gov.lk)

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## **Strategic Interventions Proposed by the NASTEC for Agriculture, Climate Change and Food Security**

This document is an outcome of extensive consultation carried out with the technical experts in the state and private sector and Universities to seek short- and medium-term solutions to the issues faced by Agriculture, Climate Change and Food Security sectors. The strategic interventions provided in this document are categorized under 8 thematic areas.

### **1. Agriculture and Food Security – Food crops**

Relatively lower productivity of crops, land, labour, and inputs have negatively affected the efforts to achieve food security in Sri Lanka. Further, most of the producers settle with primary production with no or minimum value addition leading to low returns to their investment.

*Note: A Draft Overarching Agriculture Policy (OAP) identifying eight sectors related to agriculture, and Draft National Agriculture Policy (Food and Feed Crops) have been prepared and currently being finalized*

#### **Proposed strategic interventions:**

1. Strengthen research and technology transfer system for development of novel varieties and production technologies, mechanization, monitoring food safety, and dissemination of the same with the engagement of the recognized universities and private-public partnerships.
2. Promote climate smart good agricultural practice (CSGAP) as total solution for each and every crop.
3. Promote adoption of integrated farming systems and agroforestry/homegardens in all agro-ecological regions.
4. Introduce cropping systems for different agro-ecological zones (more specific).
5. Enhance productivity, production and resilience of the agriculture-based ecosystems through climate-smart good agricultural practices (CSGAP).
6. Enhance the production of certified seeds and planting materials of priority food crops produced in Sri Lanka in partnership with government and private sectors, including farmers' production.
7. Strengthen mechanization in production and product processing.

8. Strengthen the evaluation process of Fertilizers and Crop Protection Products by establishment of an accredited system with the support of other state and private sector agencies, including Universities.
9. Develop real-time production information system/Crop Control System with accurate production forecasts covering all major crops especially focusing on short term crops having high demand with high post-harvest losses during the glut periods.
10. Popularize agro-met advisory services, and crop forecasting.
11. Develop mega-farming models converting scattered unplanned cultivation systems into planned and production potential based clustered production systems.
12. Develop mechanisms to plan and regulate food imports to Sri Lanka and encourage agricultural product exports especially after value addition to support achieving food security of the country.
13. Develop and declare a price policy for farm gate food items based on production forecasts to minimize unnecessary competition and wastage while upgrading the economy of the producer.

## **2. Agriculture and Food Security – Plantation and Export Crop Sector**

*Note: A Draft Overarching Agriculture Policy (OAP) identifying eight sectors related to agriculture*

Plantation and export crop sector industry is one of the oldest industries in Sri Lanka and plays a pivotal role in bringing foreign exchange earnings to the country. Once a flourishing industry, is now facing a decisive period ahead regarding its long-term viability as it demands a great deal of capital expenditure in the next five to ten years.

### **Proposed strategic interventions:**

1. Promote adoption of climate smart good agricultural practices (GAP) and good management practices (GMP) to increase productivity and quality and reduce cost of production.
2. Ensure timely provision of good quality agricultural inputs at affordable prices.
3. Strengthen research and technology transfer at all levels.
4. Promote and facilitate value added products of Sri Lankan origin using scientific evidence-based information.

5. Ensure adoption of a system approach concept for appropriate mechanization, energy optimization, and smart agriculture (AMEOSA), along with precision farming including data-driven and IoT (Internet of Things).
6. Introduce appropriate traditional and indigenous methods/techniques of cultivation and processing.
7. Facilitate the preparedness of the farmers for climate change adaptation and mitigation.
8. Strengthen the evaluation and certification process covering the entire value chain.
9. Strengthen export markets and explore non-traditional markets with production and marketing forecast.
10. Ensure sustainability through Environmental, Social and Corporate Governance (ESG) and social welfare.

### **3. Agriculture and Food Security – Livestock, Poultry and Fisheries Sectors**

Low productivity that exists in the livestock, poultry and fisheries industries, is mainly due to the poor exploitation of existing genetic potential and unavailability of quality breeding materials. Inadequate feed supplements (quantity and quality) in terms of roughages and concentrate feed, and drinking water especially under small holder conditions have also negatively affected the dairy animal productivity. Industry also suffers from multiple issues leading to the inadequacy of feed one of which is underutilization of existing resources and inadequacy of good quality forages.

#### **Proposed strategic interventions:**

1. Improve the livestock, poultry and fisheries sectors through appropriate selection, breeding and technological interventions to facilitate the availability of high quality animals suitable for diverse production systems.
2. Promote year-round production of high quality feed in adequate quantities by facilitating the un-interrupted supply in raw materials/inputs.
3. Strengthen the regulatory framework for, and ensure the continuous supply of veterinary pharmaceuticals and other necessary technological inputs to safeguard animal husbandry and aquaculture.
4. Promote Livestock, poultry and fisheries operations as sustainable and market-oriented ventures by using smart technologies.

5. Ensure continuous supply of human resources with up-to-date knowledge, develop infrastructure and institutional capacity to cater to the requirement of different aspects of value chain of livestock, poultry and fisheries commodities.
6. Encourage long-term investments in the livestock, poultry and fisheries sectors by creating safe and enabling environment, and strengthening preparedness for market shocks.
7. Facilitate technological innovations in livestock, poultry and fisheries through capacity building required for research and development.
8. Seek opportunities to expand export markets for fresh/value-added, quality-assured livestock and fisheries products.
9. Promote green energy in value chain operation of livestock, poultry and fisheries.
10. Ensure the implementation of timely stock assessments of fisheries for management measures.
11. Introduce climate smart production practices for livestock, poultry and fisheries industries leading to climate proofing of each industry through private-public-producer partnerships (PPPP).
12. Improve postharvest, handling, curing and processing practices with respect to all steps in the value chain.
13. Strengthen aquaculture and promote mariculture.
14. Develop and establish a sound regulatory framework to minimize IUU (irregular, unreported and unregulated) fishing.
15. Ensure the supply of fish seeds to freshwater fisheries in engagement with public and private sector.

#### **4. Agriculture and Food Security – Water resources management**

Sri Lanka's economic transformation has been made possible mainly by its water resources. The historical and cultural links between water and the Sri Lankan populace can be seen from the country's agricultural economy. Despite many achievements, challenges such as impacts of climate change, financial uncertainty, ageing infrastructure and water quality issues among others remain. Major investments are needed to overcome these challenges.



**Proposed strategic interventions:**

1. Ensure water resources development, conservation and management plans are prepared for each of the larger river basins or collective group of smaller river basins.
2. Ensure adequate surface water storages are developed in each basin to cater to basin water requirements including the development of trans-basin diversions where applicable.
3. Ensure groundwater development, conservation and management plans are prepared on the basis of one or more aquifers.
4. Ensure regulatory arrangements to sustainably extract groundwater through scientific investigation of sustainable groundwater yields especially in areas where groundwater is extensively used.
5. Strengthen mechanisms to promote watershed management practices to arrest the degradation (erosion, desertification) of agricultural lands.
6. Strengthen mechanisms to promote soil moisture retention practices on agricultural lands to minimize water loss through evaporation especially in the dry and intermediate areas.
7. Promote the adoption of renewable energy, especially solar energy for groundwater extraction through proper regulation, knowledge transfer and financial support.
8. Promote the use of “nature-based solutions” for water resources management, disaster risk reduction and the maintenance of ecosystem services while engaging in agricultural endeavors.
9. Strengthen mechanisms for timely action to prevent and rectify damages to water infrastructure due to natural disasters.
10. Ensure financial/technical resources to enhance water productivity and reduce losses in each water use sector (e.g., irrigation, drinking water).
11. Promote new technologies in irrigation supply (e.g., drip irrigation, pipe irrigation) where applicable. Promote interventions to minimize impacts due to salinity intrusion to cultivation areas and drinking water extraction points especially during drought periods.
12. Ensure financial/technical resources to improve and rehabilitate irrigation structures and facilities, especially village tank cascades/anicuts, catchment areas and water canals.
13. Identify mechanisms to maintain water quality standards required for each crop type.
14. Ensure water resources planning is focused on both climate extremes: floods and droughts.
15. Ensure mechanisms for seasonal planning of crop types depending on water availability.
16. Promote rainwater harvesting techniques especially in water scarce areas.
17. Promote water reuse in different sectors under applicable quality standards.

## **5. Food Safety**

Food safety is increasingly being recognized as an important matter for public health, nutrition, agriculture and food systems of Sri Lanka. It affects local and international trade, economy, purchasing power, productivity, and consumer confidence. Moreover, it also possesses emerging new challenges to all stakeholders involved in food systems. Hence, food safety in the future will require closer coordination among all relevant stakeholders in food systems such as primary producers, processors, retailers, wholesalers, transporters, health professionals, researchers, policymakers and consumers.

### **Proposed Strategic Interventions:**

1. Facilitate education and awareness programs targeting all value chain actors of the food system on production, harvesting, transportation, value addition, storage, marketing and consumption of food commodities with assured quality and safety.
2. Strengthen food safety information and monitoring systems, considering the different segments and actors of the food value chains in a food system.
3. Facilitate and provide support for production and processing domains of the food systems with Climate-Smart agriculture practices, Good Agricultural Practices (GAP), Good Hygienic Practices (GHP), Good Veterinary Practices (GVP) and Good Manufacturing Practices (GMP) and Food Safety Management Systems (FSMS).
4. Ensure the existence of Food Safety Policy and establishment of an independent Food Safety Authority to coordinate and handle all food safety-related activities based on risk assessment and risk quantification in the entire value chain from farm to fork.
5. Strengthen the surveillance of food systems through appropriate and regular inspection and accredited testing services, including fully pledged reference labs, to ensure that all agents in the food value chains are compliant with policies and regulations.
6. Introduce an integrated approach/one health approach consisting multidisciplinary research covering agriculture, economics, socio-economic, nutrition, and health to identify the total costs and extent of food safety issues to develop cost-effective measures to mitigate or eliminate hazards in food supply chains.
7. Ensure a mechanism for research findings commercialization/ dissemination in relation to food safety.
8. Ensure the availability of MRL levels for registered pesticides and permissible levels of food additives, mycotoxins, and heavy metals in Sri Lanka.

9. Formulate a regular reviewing mechanism to amend / update the relevant Acts and Regulations.

## **6. Climate Change**

Sri Lanka is especially vulnerable to climate change effects such as temperature rise, rainfall variability, and sea-level rise affecting its key sectors that include agriculture, fisheries, water, human health, coastal and marine, ecosystems and biodiversity, infrastructure and human settlements.

### **Proposed Strategic Interventions:**

1. Strengthen mechanisms for International, National, Sub-national, and Institutional level coordination at all levels to mainstream climate change concerns for agriculture and food security related matters.
2. Ensure an integrated approach for incorporating climate change considerations in planning, implementing and developing strategies concerning agriculture (crop, livestock, poultry and fisheries) & food industries.
3. Ensure climate financing especially through external sources to achieve the ambitious adaptation and mitigation targets set in Nationally Determined Contributions and National and Provincial Adaptation Plans.
4. Ensure access to external climate finance for establishment of an enabling environment to minimize the bottlenecks in government system, and capacity development of the sectoral agencies to seek climate finance sources.
5. Strengthen research and development to identify vulnerable areas to climate impacts tolerant varieties (fish, crops, livestock) for potential pest outbreaks due to climate change.
6. Strengthening the capacity of key research institutes and scientists to undertake research and build innovative solutions for addressing climate change impacts.
7. Ensure the right mix of access, affordability and scale of technologies pertaining to climate smart agriculture, modern crop management methods, improved varieties (crops, livestock, fisheries), climate forecasting and early warning, water and irrigation conveyance, green energy, coastal resilience improvement, etc.

8. Strengthen bilateral and multilateral partnerships, including private sector, to transfer appropriate technologies and enabling environment for climate action related to food safety.
9. Strengthen mechanisms for inter-ministerial and inter-institutional coordination at various levels of the Government, agencies and other authorities for implementation of national climate actions and targets.
10. Strengthen observation networks, climate forecasting, early warning systems, and Agro-met advisory production, and dissemination to the induces in timely and understandable manner.
11. Establish, strengthen and adopt appropriate social security scheme including insurance schemes.
12. Recognise the impact of climate change on all vulnerable groups (women, child, youth, differently able person, etc...) through a comprehensive study, and develop recommendations to address these.
13. Develop training and awareness programmes for all levels to support adopting low-carbon lifestyle, and provide such training in collaboration with research bodies and universities.
14. Promote community base adaptation planning and implementation through participating approaches.
15. Ensure greater public access to climate-related information.
16. Ensure sustainability ecosystem services provided by the forestry sector.

## **7. Private-public Partnership**

At present, there is a healthy system of production of seed paddy in collaboration with the Department of Agriculture (DOA) and the private sector. Large companies in corporate sector who own seed production farms, companies who have large out grower networks of farmers and even individual farmers are in this system and collaboratively satisfy the national demand. However, with the current economic downturn and particularly with the reduction of the government expenditure the above system is now at a risk. This situation thus, warrants more partnership agreements and operations between private and public sector agencies with the involvement of other actors in the food system.

### **Proposed Strategic Interventions:**

1. Ensure enactment of “Plant Variety Protection Act”
2. Ensure seed multiplication process and produce Foundation, Registered and Certified Seeds under the supervision and certification of Department of Agriculture.
3. Facilitate establishment of one-stop service centers/facilities to provide supporting services to agricultural production.
4. Facilitate collaborative R&D work along the agricultural value chain
5. Develop and adopt a mechanism for SMSE to access international markets
6. Facilitate establishment of a network of independent testing facilities to evaluate/accredit technological advancements by amending relevant acts and regulations.
7. Develop and operate a network of sustainable and environmentally friendly warehouse/cold storage.
8. Develop and operate mechanisms to facilitate need based/tailor made continuous professional development in emerging agriculture technologies.
9. Strengthen the Sri Lanka Institute of Agriculture and other Professional Associations to accredit/license agriculture experts/consultancies.
10. Empower producers with streamlined markets and impartial farmer-participatory value chain management
11. Streamline agriculture extension services through private sector participation to promote market-oriented agriculture.

### **8. Institutional Structures/Mechanisms**

Despite agriculture accounting for around 7 % of GDP and employing 25% of the workforce, the two million farmers have languished in the realm of subsistence farming for the past two decades. Despite the benefits from the Green Revolution initiatives, provision of input subsidies and stated policies to promote crop diversification and value addition, the agriculture sector has not transformed into sustainable commercial agriculture that would effectively address food security, climate change and prosperity.

### **Proposed Strategic Interventions:**

1. Facilitate setting up of a mechanism to steer all key agriculture and related institutes to facilitate implementation of an overarching national agriculture policy.
2. Facilitate adoption and diffusion of ICT across all sectors in agri-food system to guarantee efficient technology use in agriculture and promotion of agriculture extension and marketing.
3. Build partnerships amongst all key stakeholders in agriculture, including farming communities, entrepreneurs, finance institutions and donor agencies etc., to provide blended financial products comprised of concessionary loans, grants, advances and equity.
4. Ensure establishment of a national database to strengthen the process of registering farmer and community-based organizations supporting agriculture.
5. Develop sustainable business models to facilitate integration of farming communities with others in the agri-food value chain.
6. Ensure establishment of mechanisms to promote urban and metro agriculture.
7. Ensure a centralized agriculture extension service for efficient and effective technology dissemination and transfer.

## **9. Science and Technology Approach**

Achieving national food security will be a major challenge in the near future due to multi-faceted reasons, namely, climate change, land degradation, water scarcity and pollution, over-population urbanization and new trade barriers due to emerging geo-political developments. Hence, national agricultural developments goals backed by international efforts to achieve the national food security needs a paradigm shift in Science and Technology (S&T) approaches in addressing the four pillars of the food security, namely, availability, access, utilization/use and stability. Moreover, this multi-dimensional nature of the technologies that required in ensuring national food security, provide an excellent opportunity for S&T to address the issue of national food security. Following are some of the illustrative examples, but not comprehensive, which provide a window into some of the new and emerging science and technologies that can be used in the Sri Lankan agriculture to ensure the national food security under a changing and variable climate.

**Proposed strategic interventions:**

1. Promote investment on science and technology development, and innovations to play a vital role in producing high quality nutritious and healthy food in adequate quantities with a focus on domestic and international markets, with an assured input supply
2. Strengthen S&T efforts to minimizing food losses and improving food quality during production, storage and transport, and quality deterioration and waste of food by retailers and consumers with a special focus on changing and variable climatic conditions
3. Strengthen S&T efforts to minimize malnutrition and under-nutrition in Sri Lanka especially among the vulnerable groups in both rural and urban settings.
4. Strengthen S & T efforts to minimize health hazards posed by food contaminated with chemicals, etc. with special focus on the use of pesticides.
5. Promote the development and use of modern ICT tools in achieving food stability, especially by ameliorating the impacts of climate on farm productions including food crops, livestock & poultry, and fisheries
6. Encourage data sharing among and within sectors relevant for agriculture, climate change and food security

## **BICOST Committee members of “Agriculture, Climate Change and Food Security” committee**

- Prof. Buddhi Marambe – Senior Professor – Department of Crop Science, University of Peradeniya (Chairman of the committee)
- Prof. Pradeepa Silva – Senior Professor – Department of Animal Science, University of Peradeniya
- Dr. Ranjith Punyawardena – Retired Principal Agro-climatologist - Department of Agriculture
- Dr. WMW Weerakoon - Food and Agriculture Organization of the United Nation
- Mr. Rizvi Zaheed – Chairman - Agripreneurs Association Sri Lanka
- Ms. Dakshini Perera – Climate Change Secretariate - Ministry of Environment
- Mr. Senarath Kiriwattuduwege – Director- Hayley's Agriculture Holdings
- Prof. Gamini Pushpakumara – Senior Professor - Department of Crop Science, Faculty of Agriculture, University of Peradeniya
- Prof. Janak Vidanarachchi – Professor - Department of Animal Science, Faculty of Agriculture, University of Peradeniya
- Prof. Chamari Dissanayake – Professor of Fisheries – University of Sri Jayawardenapura

## **BICOST Committee members of “Agriculture, Climate Change and Food Security” session participants**

- Dr. Geevika J. Ganegama Arachchi - Actg. Deputy Director General (R&D) - National Aquatic Resources Research and Development Agency
- Dr. P N R J Amunugoda - Director - Food Technology Section – Industrial Technology Institute
- Ms. Harshani Abayawardhana – Environmental Officer - Centre for Environmental Justice
- Dr. Sumith Abeysiriwardena - Senior Research Consultant - CIC Agribusiness Pvt Ltd
- Dr. GG. Bandula - Director/CEO - Hector Kobbekaduwa Agrarian Research and Training Institute
- Mrs. R.M.T. Chathurika - Technical Officer - Department of Agrarian Development
- Mrs. Gothami Chandraratne - Director Operations – Janathakshan



- Dr. Pavani Dulanja Dissanayake - Senior Research Officer - Coconut Research Institute
- Mrs. Madara Dissanayake - Senior scientist - National Building Research Organization
- Ms.Chandani Dissanayake - Research Assistant - Institute of National Security Studies
- Mrs. Chandika V Ethugala - Additional Secretary - Land and Legal, - Ministry of Irrigation
- Dr. Shiromani Edirimanna - Additional Secretary (Agri Tectnology) - Ministry of Agriculture
- Dr. Nishadi Eriyagama - Regional Researcher – Engineer - International Water Management Institute
- Mr. B.A.P. Kapila Bamunuarachchi – Director - Ministry of Fisheries
- Ms. Viginu Gunawardena - Deputy Director - Department of National Planning
- Prof. Ilmi Hewajulige - Additional Director General R&D - Industrial Technology Institute
- Mr. Mohan Heenatigala - Deputy Conservator of Forests - Forest Department
- Mr. Chandana Hewawasam – Programme Manager - European Union
- Dr. I.W.M.I.W.T.K. Illangakoon - Assistant Director of Agriculture (Research) - Horticultural Crop Research and Development Institute
- Mrs. Chamani Kumarasinghe - Assistant Director - Ministry of Environment
- Mrs. G.S. Kannangara – Director – Ministry Of Education
- Mrs. K.L.G.A. Kariyawasam – Statistician - Department of Census and Statistics
- Dr. Lasantha Kulathunga – Assistant Director of Agriculture (Research)- Fruit Research and Development Institute
- Mr. Mahesh Karunarathna - Assistant Director - National Fertilizers Secretariat
- Dr. E.S. Munasinghe - Principal Research Officer - Rubber Research Institute
- Mrs. J. P. Marasinghe - Principal Agriculture Scientist (Toxicology) - Office of the Registrar of Pesticides
- Mr. C.S.I. Pathirana - Assistant Director - National Aquaculture Development Authority
- Mr. B.W.I.C. Perera - Chief Coordinator - Centre for Defences Research & Development
- Dr. Chandra Padmini - Deputy Director Research Management - Sri Lanka Council for Agricultural Research Policy
- Dr.K.M.H.G. Sarath Priyantha - Chief Livestock Economist - Dept. of Animal Production and Health
- Mrs. K.K.S.D. Pradeepika - Deputy Director - Seed Certification Service

- Ms. Toyesha Padukkage - Research Assistant - Lakshman Kadirgamar Institute
- Dr. Chandrajith De Silva - Deputy Director (R&T) - Sugarcane Research Institute
- Mrs. Rohini Singarayer - Agriculture Specialist – World Food Programme
- Dr. Samantha N.P.G. - Senior Researcher - Hector Kobbekaduwa Agrarian Research and Training Institute
- Dr. Buddhika Sudasinghe - Consultant Community Physician - Ministry of Health
- Senior Prof. P. Vinobaba – Dean – The Faculty of Science – Eastern University
- Mrs. Anusha Warnasooriya – Director - Department of Meteorology
- Dr. Nilanthi Wijewardane – Principal Research Scientist - National Institute of Plantation Management
- Dr. M.A.Wijeratne – Head - Tea Research Institute
- Mrs. Nadeeka Wickramasinghe - Director (Water Resources Planning) - Irrigation Department
- Mr. Rohitha Wickramaratna – Director - Department of National Planning
- Mrs. Tharangani Wickramasinghe - Additional Secretary - Ministry of Plantation
- Dr. W.M.P.B. Weerasinghe - Principal Scientist - Veterinary Research Institute