



# **National Research Priorities in Natural Resources Management, Sustainable Agriculture and Climate Change 2017-2021**

National Committee on Natural Resources Management,  
Sustainable Agriculture and Climate Change

National Research Priorities  
on  
Natural Resources Management, Sustainable Agriculture and Climate  
Change  
2017-2021

**National Committee on Natural Resources Management, Sustainable Agriculture and  
Climate Change**

**Ministry of Agriculture**

**Sri Lanka Council for Agricultural Research Policy**

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## **Message from the Chairman**

I am sending my greetings to the Chairperson and the members of the National Committee on Natural Research Management on the occasion of the launch of the Document of National Research Priorities on Natural Resources Management, Sustainable Agriculture and Climate Change which is a distinguished milestone in our march towards excellence in the Sri Lanka Natural Resources Management sector. By having achieved this milestone the Sri Lanka Council for Agricultural Research Policy (SLCARP) has proved its commitment towards discharging the mandated responsibility assigned to it by the Act No. 47 of 1987. This feat also facilitates monitoring of the agricultural research programmes under the National Agricultural System (NARS). All in all I consider this as a great achievement on the part of the National Committee on Natural Research Management Sustainable Agriculture and Climate Change.

Development of sustainable agriculture systems is the key for achieving food security. In this aspect, use of effective and environmentally sound natural resources management strategies are very important to overcome the threats caused by various constraints and plays an important role in determining the quantity and quality of agricultural production and productivity. To achieve the targets, strengthening of the research and development in relation to national priorities on natural resources management is very vital.

The Natural Resources Management, Sustainable Agriculture and Climate Change Committee has been primarily engaged in identifying national priorities in natural resources in developing strategies to solve natural resources management issues. I hope that this committee along with the stakeholders will extend their assistance and fullest co-operation in the future to enhance R& D capabilities in Natural Resources Management, Sustainable Agriculture and Climate Change discipline which will always be treated as a priority area in the agricultural sector.

I take this opportunity to appreciate the untiring effort of the Chairperson and the members of the National Committee on Natural Resources Management, Sustainable Agriculture and Climate Change and to congratulate on their achievement.

Dr. S D G Jayawardena  
Chairman  
Sri Lanka Council for Agricultural Research Policy

**Message from the Secretary**  
**Sri Lanka Council for Agricultural Research Policy**

The Sri Lanka Council for Agricultural Research Policy (SLCARP) was established to steer the agricultural research programmes in Sri Lanka with a mandate to focus/priorities, manage research and disseminate the outputs effectively to achieve value for money of the scarce resources spent. The SLCARP has organized itself into 12 National Committees of various disciplines and the Council supported by a cohort of skilled and dedicated staff. Though SLCARP is not mandated to deal directly with application aspect of research outputs either in the field or in end users, it's our responsibility to ensure that every single rupee spent on research is put to the best use. The National Committee of Natural Resources Management has truly demonstrated its commitment to SLCARP's mandate by compiling the Document of Natural Resources Management Research Priorities to guide the institutions in the National Agricultural Research System (NARS) on how to formulate research programmes.

This document itself is not an end; we continually explore, create and adopt new innovations to keep the national priorities updated every year. This process will keep SLCARP at the forefront in the arena of agricultural research. Leadership has been provided by HE the President, Hon. Minister of Agriculture and the Secretary of the Ministry of Agriculture, the strength of our staff and the support we receive from the eminent scientists who tirelessly work in our different national Committees will be instrumental in delivering the results.

The "Document of Natural Resources Management, Sustainable Agriculture and Climate Change Research Priorities" is no doubt a valuable guidance for the researchers in the whole NARS and I take this opportunity to congratulate the Chairperson and the members of the Committee on Natural Resources Management Sustainable Agriculture and Climate Change on the occasion of the launch of this important document.

Dr. J D H Wijewardena  
Secretary  
Sri Lanka Council for Agricultural Research Policy

## FOREWORD

Sri Lanka Council for Agricultural Research Policy (SLCARP) is the apex body for formulating policies and priorities for agricultural research. It also financially supports national research institutes and universities for conducting prioritized research projects. The Council formulates national policies on agricultural research to address the current issues with particular reference to human resources development and technology generation to modernize the agricultural sector. The main objective of these policies and strategies is to develop agriculture, increase its contribution to the national economy and utilize available natural resources in an effective manner.

Recognizing the importance of food and water security and relevance of green economy to agriculture, the National Committee on Natural Resources Management has developed a document on “research priorities on the broad disciplinary of Natural Resources Management Sustainable Agriculture and Climate Change.

Availability of basic foods is a prerequisite to achieve the food security, at all times. Among them population growth and distribution, income changes due to socio-economic factors, urbanization and industrialization, agro-technology employed, acceptance of local foods at the market, unsecured income of farmers, change of life styles due to the open economy, ecological and environmental problems related to food production, national planning and government policies with long term goals towards the prevention of looming famine, gender inequity in agricultural and food technological activities and food losses due to improper post harvest handling.

Climate variability has a tremendous impact on food security, agriculture and livelihood of people of the global scale. Water availability and pest proliferation are several affected by the climate change. Many other related issues like food security, resource competition with other sectors like energy for water, increase the social and economic vulnerability, unless adaptation is incorporated to long term agricultural policies.

Other than that, rapid economic growth increases pressure on environmental sustainability. Environmental impacts due to usage of agrochemicals, machineries, unsustainable production

and consumption are posing unprecedented challenges to earth. The crises, especially in the context of climate change, energy, water and food provide a unique opportunity for a fundamental restructuring of the economic development model that could encourage and sustain a Green Economy.

Identifying the Global challenges, the United Nation (UN) also has introduced 17 Sustainable Development Goals (SDGs), which are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These Goals aim areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another. The SDGs help to improve life, in a sustainable way, for future generations. They provide clear guidelines and targets for all countries to adopt in accordance with their own priorities and the environmental challenges of the world at large.

With this background the committee solicits the fullest cooperation of all stakeholders to consider this as a guideline when designing research programmes for their respective institute

Chairman and Members

National Committee on Natural Resources Management, Sustainable Agriculture and Climate Change

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# **National Research Priorities on Natural Resources Management, Sustainable Agriculture and Climate Change**

## **Introduction**

Agriculture sector in Sri Lanka plays a key role in the country's economic development and its future role has now been redefined in the light of the new development vision and the future aspirations of the nation. At present, agriculture contributes about 13% to the country's GDP and employs about 33 % of its workforce.

Sri Lanka's agricultural output per hectare or per agricultural worker is significantly lower than that of the neighboring Asian countries. The low level of productivity and over-employment are the key issues for this unfavorable outcome. About 44 % of the agricultural lands are sparsely used but have a huge potential for development.

The Government's agricultural policy aims at realizing multiple goals including (a) achieving food security of people (b) ensuring higher and sustainable income for farmers (c) ensuring remunerative prices for agricultural produce (d) uninterrupted access to competitive markets both in Sri Lanka and abroad (e) farm mechanization (f) expanding the extent under cultivation (g) reducing wastage in transit (h) ensuring environmental conservation (i) introducing efficient farm management techniques and (j) using high yielding seeds and improved water management. In this context, high priority is placed in achieving a broad based shift from low value to high value added agriculture products accompanied by sustained improvements in productivity and competitiveness in international markets.

Main issues in the country are; Low productivity of land, insufficient technological innovation and transfer, inadequate credit flows, poor access to international markets and inadequate use of quality seeds and planting materials etc. The total cultivable land is 2.9 mn ha, and 65 % (1.9 mn ha) is cultivated with agricultural crops. Majority of rural farmers are not interested in modern scientific agricultural methods. Improper use of water, fertilizer and agro chemicals lead to degradation of natural resources. Due to this condition, agronomic practices and water management strategies implemented are not good enough to achieve promising potential yields of the improved genetic materials.

Natural resources management is vital for the economic development of the country. Major challenges that have to address are continuous increase in demand of food due to population growth, issues in climate change and scarcity of resources such as water, soil fertility etc.

Therefore, multi-disciplinary research and collaboration between social and the natural sciences are important to manage the available natural resources in the country. The objectives of the research priorities of natural resources management are:

- To sustain the productivity of the arable lands to harness the maximum output from the growing crops.
- To generate new incomes and viable employment opportunities
- To raise agricultural output significantly (during the next decade) maintaining its contribution to GDP at a satisfactory level
- To increase the growth of agriculture sector 10% in next decade
- To utilize the arable land that was brought by the end of conflict, appropriately.
- Manage water effectively to supply agriculture while safeguarding the requirements of other sectors from the society.

**Policy directions of these research priorities are:**

- Achieving food security of the people in the country in the light of climate change
- Ensuring higher and sustainable income for farmers
- Ensuring remunerative prices for agricultural produce
- Uninterrupted access to competitive markets
- Ensuring environmental and ecosystem conservation
- Introducing efficient farm management techniques and
- Increasing yields using high yielding seeds and improved water and soil management

## **2. Rationale of National Research Priorities on Natural Resources Management, Sustainable Agriculture and Climate Change**

Adequate domestic availability of basic foods is a primary condition to satisfy the requirements of food security, a state in which the population, at all times, have the material and financial income to obtain the basic foods they need. Supply of balanced nutrition through the diet also has been identified as national priority to reduce the level of non-communicable diseases of the nation.

Food security depends either directly or indirectly on a wide range of factors; population growth and distribution, income changes due to socio-economic factors, urbanization and industrialization, agro-technology employed, acceptance of local foods at the market, unsecured income of farmers, change of life styles due to the open economy, ecological and environmental problems related to food production, national planning and government policies with long term goals towards the prevention of looming famine, gender inequity in agricultural and food technological activities and food losses due to improper post harvest handling. Food insecurity and climate change challenges are increasingly seen as being interdependent.

The biggest challenge of the 21st century is feeding of nearly 21 million people in the country without detrimental to planet earth under a changing climate and in the context of growing competition for land and natural resources. Utilization of arable lands in rational manner utilizing available water sources rationally and sustainable agricultural intensification to reduce the demand for land and reduces pressure on forest and other natural ecosystems. Unavailability of healthy food is another issue in food insecurity. Fauna and flora are increasingly threatened by agriculture expansion. The threat can increase from many avenues such as forest clearance, introduction of invasive and alien plant species and over use of chemicals, which destroy beneficial soil fauna. There must be a fine balance between agriculture and ecosystems in terms of sustaining productive agriculture to meet

demand without damaging or encroaching valuable eco-systems. There are many eco-systems services that sustainability of agriculture depends on.

Agricultural climatology is the study of climate as it relates to the agricultural sector. Characterization of the climate that analyzes benefits and risks with regard to producing crops and livestock in a given location is paramount to the growth of the sector.

Variations in the mean state and other climate statistics refer as climate variability. Climate variability can have a tremendous impact on agriculture and livelihood of farmers in short term. Climate change refers to any change in climate over long time (minimum 30 yrs time). Climate change effects agriculture in many different ways such as changes in crop yield, water scarcity and pest proliferation. Many other related issues like food security, resource competition with other sectors like water for energy, increase the social and economic vulnerability, unless adaptation is incorporated to long term agricultural policies.

Crop zoning aims to separate areas with similar characters based on potentials and constraints for development. Once separated areas are characterized, specific management programmes can be formulated to provide the most effective support to each zone. Rapid economic growth increases pressure on environmental sustainability. Environmental impacts due to usage of agrochemicals, machineries, unsustainable production and consumption are posing unprecedented challenges to earth. The crises of crisis, especially in the context of climate change, energy, water and food provide a unique opportunity for a fundamental restructuring of the economic development model that could encourage and sustain a Green Economy. Environment and economic policies should be complementary. We need to regulate market mechanisms to promote new and innovative investments in green technology.

Pollution is the contamination of the natural environment that causes adverse effects for the humans, animals and plants. Pollution can take the form of chemical substances or energy, such as noise, heat or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. Pollution is often classed as point source or nonpoint source pollution.

The fast growth of developments in Sri Lanka has led to resource degradation, with adverse impact on sustainability. The major source of environmental damage associated with land degradation, particularly soil erosion on the steeply sloping lands of central hills. At present, 44% of Sri Lankan agricultural lands are facing the problem of soil erosion due to malpractices of machineries and other in proper land management. Low cost appropriate soil conservation methods need to innovate and introduce to reduce soil erosion.

The purpose of land use planning is to select and put into practice the land uses that will best meet the needs of the people while safeguarding resources for the future. The key is the management of those land uses with a focus on improvement in the face of changing circumstances. This involves adopting new smart practices and preventing unwanted practices. In this context, identifying smart agricultural practices and promoting them are important. It is also important to understand the wants and needs of farmer communities and blend the identified smart practices with those wants and needs.

Water is the least regulated natural resource in Sri Lanka. Water security implies accessibility of water for agriculture, food and for other utilities. Water security should also entail an equitable distribution of water for all stakeholders in the country to prevent social, political and civil unrest. In Sri Lanka, almost 96% of available water from the hydrological cycle is used up in agriculture and food production. Per capita water availability expected to decrease over time, water security should become a key element in national planning in Sri Lanka in time to come.

Toxic substances and high populations of certain microorganisms can cause a health hazard. These conditions may affect to humans, those who use the water for drinking or as a habitat. Modern water quality laws generally specify protection of fisheries and recreational use and require, as a minimum, retention of current quality standards. Availability of sufficient volumes of clean freshwater for human life and development and for agricultural and forest ecosystems is the quantity of water in water security. Productive use of water to get higher yield of crops that is more crops per drop of water.

Natural disasters are also major adverse event resulting from natural processes include floods, earth slips and drought relative to water. Natural disasters can cause loss of damage to

agriculture and typically leaves some economic damage in its wake, the severity of which depends on the affected population's resilience, or ability to recover.

#### **Four main thrust areas**

1. Food insecurity
2. Green economy
3. Land, water and biodiversity
4. Climate change, adaptation and mitigation

## **Thrust area: Food insecurity**

Def : A situation that exist many people when lack **secure** access to **sufficient** amounts of **safe** and **nutritious** foods for normal growth and development and an active and healthy life (FAO)

### **Current status of Food insecurity**

Affordability, Availability, Quality&Safety, Sri Lankan - Score 54.4 and Rank 55<sup>th</sup>

### **Issues in Food insecurity**

1. Production insufficiency
2. Lack of supplies
3. Poor dietary diversity
4. Food quality – Nutritional balance
5. Food safety - Pollution of natural resources
6. Affordability - Climate change – household level
7. Coordination of related institutions – No holistic approach, reviewing *Apiwawamu Rata Nagamu*
8. After harvest effects – post harvest, storage, marketing , value addition
9. Loss of arable lands for urbanization & industrialization
10. Food sovereignty

### **Gaps / Constraints in Food insecurity**

1. Excess production of certain crops or insufficient production. – Rice that use more water resources unnecessarily
2. Decision making system of regulation of over production – hydro power & food production
3. Knowledge are not diffusing to top or bottom , Capacity of policy implementers in communication – who is responsible
4. Organic agriculture : capability of maintaining self sufficiency, standards of organic fertilizers, bulkiness, supplies, labour, Marketing of products
5. Multidisciplinary approach -- postharvest losses , marketing , storage

6. No monitoring of opportunity cost of non-agricultural developments
7. Top to bottom approach of decision making – reduction of chemical use, Fertilizer subsidies reduction, cash for fertilizers
8. Planning for a policy change in advance rather than swift implementation – sudden removal of fertilizer subsidy
9. Decision of crop production is just by farmers
10. Perception of younger generation farming / agriculture

### **Strategies to overcome food insecurity**

1. Export of excess production, value addition, processing  
Storage and distribution system for products
2. Targeted capacity building & technology transfer – farmers, researchers, policy makers, plant breeders  
development of drought/ weather resistance cultivars, alternative techniques
3. Transformation of renewable biomass to safer organic manure with certification and nutrient content
4. Substitution of chemical inputs with organic orderly with government support – diminishing dependency on synthetic inputs
5. Land tenure or ownership issues for conservation farming
6. Bottom up approach for policy making – climate smart agriculture the feasibility  
Impact of organic crop production , quality of organic foods/ inputs
7. System approach – more ministries and institutions, hence a coordination body of implementation
8. Production of essential minimum quantities or sufficient quantities
9. Training of professional younger generation for farming

### **Research Priorities in Food insecurity**

1. Crop Zoning --- Optimum regionalization on agro ecology -- saving resources
2. Certified organic manure production—substitution of synthetic inputs by using renewable resources



3. System approach – global examples for coordinated implantation eg. Presidential task force / national food security committee -- like USDA
4. Climate smart agriculture, sustainable agriculture, mechanization
5. Precision agriculture
6. Reviewing of policies

### **Thrust Area:Green economy**

An economy that results in improved human well being and social equity while significantly reducing environmental risks and ecological scarcities UNDP 2011

#### **Issues in Green economy**

1. Policies
2. Regulating the use of mix fertilizers
3. Quality of inputs
4. Intensives for organic fertilizers users
5. Monitoring and certification of organic fertilizers products
6. Price premium

#### **Gaps / Constraints in Green economy**

- 1.Youth hesitate farming – labor scarcity
- 2.Tillage – minimum tillage
- 3.Diversification of machinery
- 4.Crop diversification

#### **Strategies for Green economy**

1. Awareness of farmers
2. Research on sustainable crop production technologies
3. Research on technology transfers
4. Need integrated research frame work
5. Agriculture solid waste management -Need to asses demand and supply
6. Policy to control use of mixed inorganic fertilizer

7. Quality control of both organic and fertilizers
8. Increasing awareness on organic manure
9. Research and government policies should go together
10. Peoples' economy should match with green economy
11. Government policy should not be changed time to time

### **Prioritization of strategies of Green economy**

1. Misuses of agrochemicals - type, amount , time, methods
2. Assessing the current pollution and soil fertility- can help to prioritize
3. Contamination natural resources
4. Best management practices to reduce greenhouse gas emission
5. Crop residue management
6. Increase N fertilizer use efficiency
7. Economic aspects of green economy
8. Impacts of agriculture on GHG emissions- need data
9. New technology to improve fertilizer use efficiency
9. Research on effective microorganisms and bio fertilizers
10. Assessing impact of agriculture on soil quality
11. Research current status productivity, demand, consumption and waste
12. Market information for farmers
13. Supply chain analysis
14. Integration of traditional knowledge
15. Research on post harvest losses

### **Research Priorities in Green economy**

1. Impact of Agro chemical use on soil quality
2. Industrial / MC /agriculture waste disposal management
3. Quality assurance of waste materials used in agriculture
4. Impact of Acid rains for soil quality,
5. Remediation of contaminated soil
6. Management of wastage throughout the supply chain

- a. Land stability mapping
- b. On farm/ off farm soil conservation, land use management
- 7. Traditional knowledge
- 8. Market economics of natural resources management
- 9. Supply chain analysis of agriculture products
- 10. Developing right indicators to measure environmental sustainability

## 1. Thrust area: Land, water and biodiversity

### Issues in Land for agriculture

- 1. Diminishing trend in land availability for agriculture
- 2. Underutilization/misuse of arable lands
- 3. Inappropriate allocation of lands among uses(within and among sectors)
- 4. Degradation of land productivity
- 5. Land fragmentation/Uneconomical land holding size
- 6. Land rights
- 7. Encroachment of reservation and riparian areas
- 8. No proper spatial data base on land resource

### Issues in Water for agriculture

- 1. Temporal and spatial variation of availability of water
- 2. Insufficient water for agricultural productive areas
- 3. Low water productivity
- 4. Lack of preparedness for extreme events of flood and droughts
- 5. Water quality deterioration
- 6. Lack of policy/regulations for ground water extraction
- 7. Lack of policies on water allocation among sectors (agriculture, domestic use, industries, hydropower, environment)
- 8. Insufficient storage structures and conveyance systems
- 9. Lack of evidence based decisions on usage of water
- 10. Lack of coordinating mechanism between different water sector organization

11. Lack of overarching water policy
12. Lack of data base on water resources (quality and quantity)
13. Lack of funds to modernize diversion structures to address climate change impacts
14. Lack of Post review of seasonal planning, decisions making and issues related to water issues
15. Drainage measurements

### **Strategies in Land for agriculture**

1. Diminishing trend in land availability for agriculture
  - Development of proper land use policy and effective implementation
  - Identification of prime agricultural lands (development of valuation system)
  - Use/conversion of land based on land suitability assessment
  - Urban and Peri- urban agriculture
2. Underutilization/misuse of arable lands
  - Identification of root causes for underutilization of existing lands
  - Management improvement of proper utilization
  - Development of guideline for effective management of lands
3. Inappropriate allocation of lands among uses (within and among sectors)
  - Development of data bases on supply national demand for agricultural commodities
  - Research for seasonal zoning crops/crop combinations and development of relevant data base
  - Development of new policies on allocation of lands among sectors based on national priorities
4. Degradation of land productivity
  - Mapping of degraded lands under different land uses/Research on land use change on soil productivity
  - Research on land restoration techniques
5. Land fragmentation/Uneconomical land holding size
  - Research and policies on potential and constraints for land consolidation
  - Studies on cooperate farming systems

6. Land rights
  - Formulation of proper policies
  - Encroachment of reservation and riparian areas
    - i. Formulation of proper policies
7. Proper spatial data base on land resource
8. Research on new techniques on digital land resources mapping (soil, land use, topography)
9. Development of detailed (1:10,000 or larger) land resource inventory, web based user friendly land resource information

### **Strategies in Water for agriculture**

#### **1. Temporal and spatial variation of availability of water**

- Updating of vulnerability maps
- Investigation of adaptation strategies
- Research on improvement of catchment hydrology (watershed conservation)

#### **2. Insufficient water**

- New strategies on water conservation farming
- New strategies to increase water use efficiency

#### **3. Low water productivity**

- Studies on Improvement of on farm water management system
- Studies on crop modeling for different farming systems
- Studies on drainage measurement
- Low cost methods for sea water purification and application to agriculture
- Research on precision farming

#### **4. Lack of preparedness for extreme events of flood and droughts**

- Updating and up scaling of drought and flood vulnerability maps
- Development of drought and flood tolerant varieties
- Development of suitable land management techniques

## **5. Waterquality deterioration**

- Detailed mapping of surface and ground water quality
- Remediation techniques on water pollution
- Study on impact of excess use of agrochemicals on water resources
- Development of water quality goals for identified water resources
- Studies on use of waste water for agriculture

## **6. Lackof policy/regulations for ground water extraction**

- Development of database for ground water use and monitoring

## **Research Prioritiesin Land, Water and Biodiversity**

1. Proper land use planning based on national priorities
2. Restoration plans and methods to arrest degradation
3. Use of traditional knowledge
4. Market economics of natural resources management
5. Supply chain analysis of agriculture products
6. Analyze to identify smart and negative agricultural practices.
7. Management of water quality and quantity
8. Water allocation and water rights at watershed scale (within irrigation with other sectors)

## **Thrust area: Climate Change, Adaptation and Mitigation**

### **Current status of Climate Change, Adaptation and Mitigation**

1. Current increasing trends;
  - Ambient temperature, especially the nighttime minimum temperature
2. Increasing Extreme events (Recent trends);
  - Significant increase in consecutive dry days and heavy rainfall events and rainfall intensity

- Number of cold nights – decreasing
- Number of warm nights – increasing
- Diurnal temperature range reduced
- Daily intensity of rainfall – increasing
- Extreme rainfall events (droughts and flood occurrence) - Increasing with frequency and intensity of them

3. Climate projections next 100 years under low and high emission scenarios

### **Issues in Climate Change, Adaptation and Mitigation**

1. Lack of skills in climate forecasts
2. Variations in quality and quantity of total production and services(crop, Livestock, Aquaculture, Forestry.etc.) (In Crop Production; Establishment, growth and yield)

### **Direct effect (temperature and rainfall)**

- Reduced yields due to extreme weather events
- Irrigation water availability issues
- Pest and diseases
- Pollination
- Increase cost of production
- Water quality
- Changes in land use
- Impact on livelihood
- Soil degradation
- Natural disaster
- Ecosystems and biodiversity
- Urban migration
- Loss of inputs

### **Gaps / Constraints in Climate Change, Adaptation and Mitigation**

- Lack of adequate adaptation of technologies
- Resources constraints
- Lack of awareness

- Lack of data/records/observations availability
- Uncertainty in climate forecast
- Poor social acceptance/attitudes
- Lapses in government policies
- Lack of research use of ICT decision support
- Lack of collaborative works
- Lack of prioritized research in climate change

## **Strategies for Climate Change, Adaptation and Mitigation**

### 1. Climate forecast

- Improving climate forecasting and early warnings
- Improving observation networks
- Rapid dissemination of climate forecast to end users
- Strengthen agro-met services for farmers
- More research on climate variability and their impacts on agriculture

### 2. Variations in quality and quantity of total production

- Varietal Development
- Improve crop, livestock and soil management practices
- Development of climate resilience crops
- Reduce post-harvest losses
- Identification of crop and livestock considering soil and climate
- Improve traditional agriculture systems/ underutilized crops

### 3. Increase cost of production (COP)

- Introducing cost saving technologies

### 4. Water availability

- Rainwater harvesting and moisture conservation
- Proper water management
- Increase water use efficiency
- Increase conveyance efficiency
- Mapping of water productive areas



## 5. Changes in land use

- Develop proper land use policies/GIS, land suitability classification and mapping
- Identification of crop and livestock considering soil and climate

## 6. Impact on livelihood

- Crop insurance scheme
- Subsidies and incentives
- Agriculture diversification (Eco tourism, energy plantation, spice garden, home garden)

## 7. Providing market information (Using ICT)

- Soil degradation
- Improvement soil health
- Improving land use policies

## 8. Natural disaster

- Early warnings
- Vulnerability mapping
- Mitigation measures

## 9. Development of agriculture policies

10. Enhance the resilience of natural and agro-ecosystems against climate change impacts

11. Monitor climate change impacts

12. Capacity development of relevant sectors

## **Research Priorities in Climate Change, Adaptation and Mitigation**

1. Studies on climate prediction techniques and climate variability vulnerability mapping, short, medium and long term forecasting
2. Variations in quality and quantity of total production
  - Improve crop, livestock and soil management practices
  - Development of climate resilience crops
  - Identification of crop and livestock considering soil and climate
  - Improve traditional agriculture systems/ underutilized crops

### 3. Water availability

- Rainwater harvesting and moisture conservation
- Proper water management
- Increase water use efficiency
- Research on hardwater usage and effluent disposal

4. Agriculture diversification (Eco tourism, energy plantation, spice garden, home garden)

5. Natural disaster, Vulnerability mapping and Mitigation measures

6. Irrigation system management

7. Water management of extreme events (Drought, floods )

8. Climate change impacts and recovery plans on ecosystems and biodiversity

**List of Participants of the Stakeholder Workshop to Formulate of National Research Priorities Natural Resources Management**

No	Name	Institute
01	S.A.Eriyagama	NamukulaPalntation
02	D.M.D.Dissanayeke	University of Rajarata
03	E.R.H.S.Yomkubura	Central Environment Authority
04	Wasana Wijesinghe	Rubber Research Institute
05	A.L.M .Salman	Agriculture Farmer
06	Renuka Silva	Horticultural crop research Institute
07	I.K.Atapattu	Fruit Research and development Institute
08	M.A Wijerathne	Tea Research Institute
09	Mahesh Subasinghe	Department of Agriculture (Sothern Province)
10	H.M.P.A. Subasinghe	Department of Export Agriculture
11	ParakramaWeligamage	University of Peradeniya
12	R.S.K. Keerthisena	Rice Research and Development Institute
13	M.C. Wickrmasinghe	Department of National Botanic Gardens
14	Prof.AshaKarunarathne	University of Sabaragamuwa
15	K.G.S.Senevirathne	Department of Agriculture
16	K.Pirapaharan	Central Environment Authority
17	I.M.S.P Jayawardana	Department of Meteorology
18	B.Gajanayake	University of Wayamba
19	M.K Ranasinghe	University of UvaWellassa
20	Priyangi Jayasinghe	Munasinghe Institute for Development (MIND)

No	Name	Institute
21	M.M.M Aheeyar	International Water Management Institute
22	I.Kamalanathan	Batticaloa
23	K Logarajah	Trincomalee
24	Prof. Mowjood	University of Peradeniya
25	P.R Weerakkodi	Hector Kobbakaduwa Agrarian Research and Development Institute
26	S.V Dias	National Building Research Organization
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29	R Jayarathne	Disaster Management Centre
30	W. G. W. Gunarathne	National Building Research Organization
31	Prasad Neelawardane	Asia Pacific Institute of Technology
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33	H.W Shyamaliee	Tea Research Institute
34	ChamindaEgodawatte	University of Rajarata
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37	K. G. U. Wijewardena	Horticultural Crop Research and Development Institute
38	W.M.U.K. Rathnayake	Rice Research and Development Institute
39	V.W Weerabahu	KahawattePlantaion
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44	H.A.S. Jayasinghe	University of Uvawellassa
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48	W A U Witharana	University of Peradeniya
49	M. A. K. Munasinghe	Natural Resources Management Centre Department of Agriculture
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4.	Mr. Lalith Chandrapala, Director. Department of Meteorology
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9	Mr. R M S Bandara, Senior Scientist, National Building Research Organization (NBRO)
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11	Mrs. Wasantha Samaraweera, Additional Secretary, Ministry of Disaster Management
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