DEMOCRATIC SOCIALIST REPUBLIC
OF SRI LANKA

IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Country Programme Framework

2019-2025

This Country Programme Framework for the Democratic Socialist Republic of Sri Lanka 2019-2025 was signed on behalf of the Government of the Democratic Socialist Republic of Sri Lanka and the International Atomic Energy Agency

On behalf of the Government	On behalf of the International Atomic Energy Agency
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Date	**Date**

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ANSTO	Australian Nuclear Science and Technology Organisation
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CKDu	Chronic Kidney Disease of Uncertain Aetiology
CPF	Country Programme Framework
CRP	Coordinated Research Project
CSSI	Compound Specific Stable Isotopes
DSRS	Disused sealed radioactive source
DWC	Department of Wildlife Conservation
EIB	European Investment Bank
EPREV	Emergency Preparedness Review
EPRIMS	Emergency Preparedness and Response Information Management System
FAO	Food and Agriculture Organization
FRN	Fallout Radionuclide Analysis
FSQAL	Food Safety and Quality Assurance Laboratory
GDP	Gross Domestic Product
GIS	Geographical Information System
GNSSN	Global Nuclear Safety and Security Network
HORDI	Horticultural Crop Research and Development Institute
HRD	Human Resources Development
IAEA	International Atomic Energy Agency
IARC	International Agency for Research on Cancer
IBRD	International Bank for Reconstruction and Development
ICBA	International Centre for Bio Saline Agriculture
IDA	International Development Association
IDB	Islamic Development Bank
IFAD	International Fund for Agricultural Development
INSSP	Integrated Nuclear Security Support Plan
ISPM	International Standards on Phytosanitary Measures
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
KAERI	Korea Atomic Energy Research Institute
MARLIFA	Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation, Fisheries and Aquatic Resources Development
MCPWSHE	Ministry for City Planning, Water Supply and Higher Education
MHCCA	Ministry of Housing, Construction and Culture Affairs
MHNIM	Ministry of Health, Nutrition and Indigenous Medicine
MIC	Ministry of Industry and Commerce, Resettlement of Protracted Displaced Persons and Co-operative Development
MMDE	Ministry of Mahaweli Development and Environment
MoE	Ministry of Education
MoSTR	Ministry of Science, Technology and Research
MPEBD	Ministry of Power, Energy and Business Development
MPI	Ministry of Plantation Industries
NCDs	Non-Communicable Diseases
NCI	National Cancer Institute
NDCWS	National Department for Community Water Supply
NDT	Non-Destructive Testing
NLO	National Liaison Officer
NPP	Nuclear Power Plant
NSSC	Nuclear Security Support Centre
NSSL	Nutrition Society of Sri Lanka
NWSDB	National Water Supply and Drainage Board
OFID	OPEC Fund for International Development
OIE	World Organisation for Animal Health
ORPAS	Occupational Radiation Protection Appraisal Service
PACT	Programme of Action on Cancer Therapy
PET	Positron Emission Tomography
PMO	Programme Management Officer
PUCSL	Public Utilities Commission of Sri Lanka
QA	Quality Assurance
QC	Quality Control
RASIMS	Radiation Safety Information Management System
RCF	Regulatory Cooperation Forum
SDGs	Sustainable Development Goals
SIT	Sterile Insect Technique
SLAB	Sri Lanka Accreditation Board
SLAEB	Sri Lanka Atomic Energy Board
SLAERC	Sri Lanka Atomic Energy Regulatory Council
SLCARP	Sri Lanka Council for Agricultural Research Policy
SLGC	Sri Lanka Gamma Centre
SME	Small and Medium Enterprise
SSDL	Secondary Standards Dosimetry Laboratory
SUN	Scaling Up Nutrition
TC	Technical Cooperation
TEES	Texas A&M Engineering Experiment Station
TLD	Thermo-Luminescence Dosimeter

TRI	Tea Research Institute
TSA	Thematic Safety Area
UICC	Union for International Cancer Control
UN	United Nations
UNCT	United Nations Country Team
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNOPS	United Nations Office for Project Services
UNSDF	United Nations Sustainable Development Framework
WFP	World Food Programme
WGCI	The Women Global Cancer Initiative
WHO	World Health Organization
WRB	Water Resource Board

EXECUTIVE SUMMARY

The Country Programme Framework (CPF) set out in this document is a short and medium-term planning document for IAEA Technical Cooperation (TC) between the Democratic Socialist Republic of Sri Lanka and the International Atomic Energy Agency (IAEA) and constitutes the frame of reference for the formulation of technical cooperation projects during the period 2019-2025.

The proposed technical cooperation programme under the CPF aims to support socio-economic development and poverty reduction in Sri Lanka and contributes to Sustainable Development Goals (SDGs) 2 - Zero Hunger, 3 - Good Health and Well-being, 6 - Clean Water and Sanitation, 9 – Industry, Innovation and Infrastructure, 13 - Climate Action, 15 – Life on Land, and other relevant SDGs of Sri Lanka for the period 2019-2025.

The CPF is aligned with the Government's main strategic document Vision 2025 – A Country Enriched, which sets out national priorities in reforming the country, eliminating burdens from the past and transforming Sri Lanka into a dynamic modern economy and export-oriented economic hub in the Indian Ocean. The CPF is also linked with other national strategies and policy documents as well as the United Nations Sustainable Development Framework (UNSDF) 2018-2022.

The CPF is the result of close consultations with and involvement of relevant stakeholders from a broad range of sectors ensuring nuclear science and technology can further contribute to the achievement of national development objectives.

The proposed programme which builds on the achievements of the previous three CPFs, since 2001, focusses on the following areas:

- Nuclear and Radiation Safety and Security,
- Food and Agriculture,
- Health and Nutrition,
- Water Resources Management,
- Energy and Industry,
- Human Resources Development for Nuclear Applications

The outcomes of this CPF will be equally beneficial for both men and women of Sri Lanka, and programme planning will incorporate a gender perspective. The participation in the proposed programme activities will be gender-balanced, with the particular attention of both the Government and the IAEA on participation of qualified female candidates.

The CPF is also part of a dynamic process, and the present document will be reviewed as deemed necessary. Discussions on the update and preparations for the next medium term should take place not later than 2024.

1. INTRODUCTION

The CPF contains the frame of reference for the near-and-medium-term planning of technical cooperation between Sri Lanka and the IAEA for the period 2019-2025. The document identifies the sectoral priorities for socio-economic development of the country and provides a basis for the design and formulation of viable and sustainable technical cooperation projects. The objective of this CPF is to further contribute to the national socio-economic development goals by using nuclear science and technology in the areas where they have clear advantages over other technologies.

The CPF considers the current status of nuclear science and technology applications in the country and the growing need for various uses of these applications in respect of the development priorities and needs of the Government of Sri Lanka.

The CPF has been developed in a participatory approach and in close consultation with stakeholders from a broad range of appropriate socio-economic sectors. These stakeholders include experts of Sri Lanka Atomic Energy Board (SLAEB), Sri Lanka Atomic Energy Regulatory Council (SLAERC), Ministry of Power, Energy and Business Development (MPEBD), Ministry of Science, Technology and Research (MoSTR), Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation, Fisheries and Aquatic Resources Development (MARLIFA), Ministry of Health, Nutrition and Indigenous Medicine (MHNIM), National Water Supply and Drainage Board (NWSDB) and Water Resource Board (WRB).

The objectives of the proposed programme under the CPF are the following:

Sri Lanka shall continue to develop its radiation safety infrastructure based on the Atomic Energy Act No. 40 of 2014 through the established regulatory body - the Sri Lanka Atomic Energy Regulatory Council (SLAERC), which needs further support in establishing regulatory practices and training its scientific and legal staff. The technical services provider – Sri Lanka Atomic Energy Board (SLAEB) will also be complementary supported to ensure effective technical aspects of radiation protection.

In Food and Agriculture, the focus will be placed to support the country's main commodity – tea, sustainable livestock husbandry and management practices to mitigate climate change effects.

Health and Nutrition area will be supported through further combating vector-borne diseases and strengthening of radiation medicine practices, both in radiotherapy and nuclear medicine, where substantial government investment in cyclotron facility for Positron Emission Tomography (PET) tracers production is expected. Further development of nutrition practices to combat undernutrition as well as overweight and obesity will be pursued.

IAEA will support water management practices in Sri Lanka and the use of isotope hydrology to ensure equitable access to the fresh water in all regions of the country.

While expecting the decision of the Government on the prospective embarking on nuclear power, further support to enhance the energy planning and industrial capacities (non-destructive material testing, NDT) will be provided.

The priorities emerging from this CPF will require over three programme cycles a total budget estimate of about €11.9 million, of which €9.2 is secured via TC Fund and Government funding, through investments and in-kind contributions of about €3.75 million.

The endorsement of the CPF document by Sri Lanka and the IAEA represents a common commitment and reflects a shared responsibility to implement in a sustainable manner, subject to Sri Lanka's Government and IAEA's Board of Governors approval, the technical cooperation opportunities identified for the period 2019-2025.

2. SITUATION ANALYSIS

Sri Lanka is an island country located in the Indian Ocean. It has a population of approx. 21.44 million (2017 World Bank estimates). The island consists mainly of flat-to-rolling coastal plains, with mountains rising only in the south-central part of the country. The climate is tropical and warm with rainfall patterns influenced by monsoon winds from the Indian Ocean and Bay of Bengal.

Sri Lanka is a middle-income country with a per-capita GDP of US $4,102 in 2018. Sri Lanka has adopted market oriented open economic policies since 1978 and is well known for the production and export of tea, rubber and coconut. The market friendly, outward oriented economic policy implemented by the Government has encouraged the private sector to play a leading role in the development process through providing incentives to increase investment, upgrading infrastructure, improve technology and enhance productivity. Sri Lanka is emerging as a suitable place for investments due to the high literacy rate of its population and the improving peaceful environment of the country.

Sri Lanka became a member of the United Nations on 14 December 1955 and is the founding member of the IAEA in 1957.

The United Nations Country Team (UNCT) in Sri Lanka is comprised of 22 UN Funds, Programmes and Specialized Agencies (resident and non-resident), including FAO, UNDP, UNEP, UNIDO, WHO, UNESCO, the World Bank and the IAEA. The work of the UNCT is being coordinated through the Office of the UN Resident Coordinator and guided by the United Nations Sustainable Development Framework (UNSDF) 2018-2022 representing the strategic, programmatic and financial basis for the development partnership between the United Nations and the country.

Based on the results and experiences gained from the IAEA technical cooperation projects carried out under the first three CPFs (2003-2008/2009-2013/2014-2018), the cooperation between the Government and the IAEA focused on food and agriculture, human health, water resources management, environment protection, industry, sustainable energy development and radiation safety. The key achievements of past TC support include establishment of the Nuclear Medicine Unit at the University of Peradeniya, National Centre for Non-Destructive Testing at Kelaniya, Sri Lanka Gamma Centre (SLGC) at Biyagama and Gamma Cell for Horticultural Crop Research and Development Institute (HORDI) at Gannoruwa. In addition, the IAEA supported development of the analytical capabilities of SLAEB and energy planning capacities of the Ceylon Electricity Board (CEB) by providing appropriate software tools.

Building further on the results and achievements of previous TC assistance, the CPF 2019-2025 will focus on the following priority sectors: Nuclear and Radiation Safety and Security, Food and Agriculture, Health and Nutrition, Water Resources Management, Energy and Industry and Human Resources Development for Nuclear Applications.

Proposed TC support will contribute to the national development objectives defined in the national strategies such as the Vision 2025 – The Changing Face of a Dynamic Modern Economy, United Nations Sustainable Development Framework 2018-2022, 2018 Voluntary National Review on Sustainable Development Goals, National Health Policy 2016-2025, Sri Lanka National Agriculture Policy and other relevant sectoral policies.

The expected outcomes of the CPF will be effective provided favourable socio-economic environment to enable continuous Government support to the proposed interventions and establishments. This includes political and social stability and sustaining the Government policies set out in Vision 2025 as the key strategic document that this CPF addresses.

2.1. Nuclear and Radiation Safety and Security

Development of national infrastructures for radiation safety is important and essential in order to protect radiation workers, general public and environment from the harmful effects of ionizing radiation.

The aim is to cover all aspects of radiation safety in a comprehensive and consistent manner and ensuring country's focus on the completion of following Thematic Safety Areas (TSAs) that are derived from the IAEA's Safety Standards:

- Regulatory Infrastructure (TSA 1)
- Radiological Protection in Occupational Exposure (TSA 2)
- Radiological Protection in Medical Exposure (TSA 3)
- Public and Environmental Radiological Protection (TSA 4)

- Emergency Preparedness and Response (TSA 5)
- Education and Training in Radiation, Transport and Waste Safety (TSA 6)
- Transport Safety (TSA 7)

The current status of the country's infrastructure and technical capacities in TSAs 1-4 is extensively provided and regularly updated in the IAEA's RASIMS database. Regarding Emergency Preparedness and Response (TSA 5), information on the status and country arrangements is included and tracked in the IAEA's EPRIMS database.

Sri Lanka will continue to avail itself of IAEA legislative assistance in its efforts to establish a comprehensive national nuclear legal framework and to join and effectively implement the relevant instruments, particularly, should a future decision be made to introduce nuclear power.

In the perspective of possible decision of the Government of Sri Lanka to embark on nuclear power and pursue towards building its first nuclear power plant, a whole new set of activities would be open to build a national nuclear safety infrastructure, starting from the Atomic Energy Act, regulatory framework and all other safety areas. The IAEA's Statute provides for the elaboration and adoption of IAEA Safety Standards, in particular for nuclear safety of nuclear power plants. The TC programme is the prime IAEA's mechanism to build capacities in Member States for the implementation of IAEA standards and guidelines, in particular the IAEA Safety Standard No. SSG-16, which focuses on developing nudear safety infrastructure for nuclear power in all safety areas. If the nuclear power option is finally pursued, the IAEA and Sri Lanka would ensure that the country would have full understanding of nuclear safety infrastructure and institutional building requirements. The actions will be undertaken to start building such infrastructure from the very onset of the nuclear power project.

The national nuclear security regime is being developed to cater the requirements of the country in compliance to the IAEA security guidelines. Sri Lanka and the IAEA Division of Nuclear Security have jointly developed an Integrated Nuclear Security Support Plan (INSSP) in 2013 which was officially approved by the Government of Sri Lanka in 2014 and reviewed in August 2017. Sri Lanka's INSSP provides a customized framework for coordinating and implementing nuclear security activities conducted by Sri Lanka, the IAEA, and potential partners, in a systematic manner. The INSSP covers all aspects related to nuclear security: legislative and regulatory framework, threat and risk assessment, physical protection regime, detection, response, and sustainability. Sri Lanka's INSSP contains activities from 2018 to 2020 and is planned to be updated and reviewed in 2021. The Division of Nuclear Security is the lead division within the IAEA responsible for the implementation of nuclear security activities.

2.1.1. Regulatory Infrastructure

The Sri Lanka Atomic Energy Regulatory Council was established on 1st January 2015 under the Sri Lanka Atomic Energy Act No. 40 of 2014. This act authorizes the Council to develop and implement a regulatory regime to ensure protection of personnel and the environment from the harmful effects of ionizing radiation and to ensure the security of radioactive sources. The regulatory function was started by the SLAERC with 10 scientific staff in 2015. Another 6 new scientific officers were recruited in 2017 and are under the training period. Nevertheless, with the limited resources, scientific and legal staff, the SLAERC was able to make two regulations and one order which were essential for the establishment of the licencing and inspection programme. However, due to the lack of trained and experienced personnel, the preparation of subsidiary legislative documents, guidance documents and conducting inspection programmes were significantly delayed. Most of regulatory activities are presently performed without formal procedures and guidance. Based on the above, the SLAERC expects to prioritize the activities to establish regulations, rules, policies and guidelines for the regulation of activities on the use of ionizing radiation and to establish comprehensive licencing and inspection programme by providing training and fellowships to the scientific and legal staff and scientific visits for senior level officers. During the past TC programmes Sri Lanka received technical assistance through regional projects in order to train its radiation safety staff. In the near term SLAERC expects to train their newly recruited staff through the proposed new project to be implemented in 2020/2021 TC cycle.

Strengthening the national radiation and nuclear safety and security infrastructure will continue in the near term by developing subsidiary legislative instruments, strengthening the institutional framework and regulatory infrastructure for the effective control of the application of radiation sources (TSA 1), and occupational exposure control (TSA 2). In nuclear security, the emphasis will be placed on building the legislative and infrastructural framework for an operational nuclear security system. Continuation of the IAEA assistance will be needed in the medium term to support Government commitment in establishing and developing other elements of radiation safety infrastructure concerning medical exposure control (TSA 3), public exposure control (TSA 4), emergency preparedness and response capabilities (TSA 5), and education and training in radiation, transport and waste safety (TSA 6). In emergency preparedness and response (TSA 5), support for development of capabilities was provided in the frame of a recently completed TC Project SRL/9/009. To identify areas where further actions would be needed, conducting of an Emergency Preparedness Review (EPREV) mission would be helpful. Regarding the TSA 6, priority will be given to the establishment of a national strategy on education and training in radiation, transport and waste safety, in line with IAEA safety standards, to ensure appropriate competencies are available in due time to support the strengthening radiation safety infrastructure.

2.1.2. Technical Services Provider

Under the Sri Lanka Atomic Energy Act No. 40 of 2014, Sri Lanka Atomic Energy Board (SLAEB) has been identified as the radiation protection technical services provider to meet national regulatory requirements.

There are more than a thousand of radiation operators island-wide working in medicine (radiologists, radiotherapists, oncologists etc.), industry (radiographers, irradiator operators, NDT personnel etc.) and research. Following the national and international guidelines, the SLAEB provides them with radiation monitoring services by using thermo-luminescence dosimeters (TLDs) as accredited by Sri Lanka Accreditation Board (SLAB) to be compatible with the ISO/IEC 17025:2005 standards.

The Secondary Standard Dosimetry Calibration Laboratory (SSDL) of SLAEB provides calibration services for the radiation measuring equipment and dosimeters in the country. The SSDL is also accredited and complies with the ISO/IEC 17025:2005 standards. Its irradiation standards are inherited from the IAEA and French Bureau International des Poids et Mesures (International Bureau of Weights and Measures) primary standards. One of the SSDL's main responsibilities is to maintain the secondary standard gamma beam irradiator for gamma calibration, comprising of Cs-137 (662 keV) and Co-60 (1250 keV) gamma sources. The SSDL also sustains the gamma beams of these sources to be compatible with the primary standards at the IAEA. A narrow spectrum medical X-ray device, in compliance with the ISO 4037 standard, is also being maintained by SLAEB and used for calibration of X-ray measuring and generating instruments in diagnostic radiology.

In addition, SLAEB provides technical services for workplace monitoring, emergency response, disused sealed radioactive source (DSRS) management and other radioactive waste management, environmental monitoring and human resource development in radiation protection. It is expected to further expand and develop the above services to improve the radiation protection culture in the country. There is a positive trend among the end users in medical, industrial, agriculture and research fields to develop their radiation protection culture and acquire additional education and training in this field.

To fulfil and improve its legal function of the radiation protection technical services provider in the country, SLAEB would in the medium term need further enhancement of its technical capabilities and human resources, relying on the IAEA's national and regional technical cooperation programme.

The assistance of the IAEA will be sought with respect to the use of radioactive sources, particularly in the design and implementation of sustainable pre-disposal and disposal solutions as well as the inculcation of a safety culture at all levels. In addition, Sri Lanka would also need IAEA's advisory services in its intention to replace and repatriate depleted

Co-60 radioactive sources used in radiotherapy machines, and to replace it with modern, highly focused and less healthy tissue damaging radiotherapy sources.

The present individual monitoring programme of the country is limited only to the external gamma and X–ray whole body dose measurements. SLAEB is working on implementation of extremity dosimeter services (eye dosimeters finger dosimeters) following the present requirements of the country, especially in interventional radiology. Also, the requirement of developing infrastructures for a comprehensive internal dosimetry service for monitoring of intake of radionudides and assessing its internal dose has been identified. SLAEB is expecting the technical support from IAEA for infrastructure development and human resources development.

In order to maintain the quality of services, the process undergoes a rigorous routine audits, both internal and external. The external assessments are conducted as verification tests with IAEA accreditation laboratories. SLAEB is in coordination with IAEA to conduct an Occupational Radiation Protection Appraisal Service (ORPAS) mission at end of year 2019 and expects to implement the recommendations of international experts to fulfil the possible gaps.

The SSDL, which provides island-wide calibration services to the radiation measuring instruments needs an update of the existing capabilities with high activity gamma beams to provide higher quality calibration services. SLAEB has identified the requirement to expand the SSDL services for therapy level calibrations and to establish quality assurance / quality control (QA/QC) services for therapy and diagnostic facilities. The technical capability and capacity of SSDL should be improved to introduce therapy level calibrations, intercomparisons and audits to the radiation generators, measuring instruments used in therapeutic and interventional radiology.

The SLAEB currently provides technical, scientific and human resource support for the activities regarding the national nuclear security regime. It is also expected to implement the Nuclear Security Support Centre (NSSC) under the SLAEB to further strengthen-up the nuclear security regime and to sustain the nuclear security culture of the country.

Thematic Area Outcome:

Strengthened national nuclear and radiation safety infrastructure, technical capacities and human resources for the protection of people and the environment of Sri Lanka.

2.2. Food and Agriculture

Currently this sector is considered as the most important field to be further developed during next five years.

Sri Lanka has a diverse natural resource base on which the country heavily relies upon to reduce rural poverty and ensure food security.

Agriculture, including fisheries, is a major contributor to economic growth, the only source that provides adequate food to prevent hunger and starvation, and has continued to play a pivotal role in the Sri Lankan economy, providing employment to 26.1 percent of the labour force as of 2017. The shares of the agriculture sector are around 6.9% of the GDP and 25% of export earnings in the year 2017. About 32.8% of the rural population of the country are employed in agriculture for their livelihood, although around 70 percent of the country's population live in the rural areas and are indirectly affected by the sector. Sri Lankan agriculture largely comprises a food crop sector and a plantation (tea, rubber and coconut) sector. The food crops sector is largely made up of small-scale farmers growing rice, vegetables, fruits and field crops. Agricultural productivity of the food crop sector had been stagnated over the last two decades. Farming in Sri Lanka is dominated by scattered small holdings, i.e. average size of a holding is below 1.0 hectare resulting problems of dis-economies of scale and difficulty of mechanization in the face of increasing wages. Further, low profitability coupled with high cost of production (mainly due to high wage rate associated with scarcity of labour during cropping season and migrating of labour to industry and service sectors), low productivity coupled with low level of using modern technology in proper way due to lack of capital as well as not owning machinery which is not economical due to small farm size, and marketing problems also are major constraints. Another serious disadvantage faced by the farmers in the country is the heavy dependence on rain-fed agriculture (only 39% of the arable land is under irrigation).

In this context, the enhancing productivity and competitiveness of the food crops has become the major challenge in increasing food production in a sustainable manner and improving farm family income in order to ensure household food and nutritional security, and agriculture export revenues, while at the same time conserving the natural resource base. Diversification and modernization of agriculture by introducing innovative technologies and linking to the value chain through backward and forward linkages (agro based industries) can boost productivity and help generate farm employment opportunities and increase export revenues.

The Government implemented several programmes targeting the UN SDG 2 on zero hunger, to ensure food security and sustainable agriculture. In the context of this broad policy framework, the government's agricultural policy encouraged the sector through specific policies consistent with its key objective, while allowing a greater role to the private sector. Further, the Government launched programmes to redesign policies, grant tax concessions on machinery and fertilizers, rehabilitate tanks, provide new technology and modernize agricultural research and training to encourage higher youth participation in agriculture. Emphasis has also been placed on the development of aquaculture and poultry sectors in view of export earnings and increasing potential for more employment in these two sectors.

In past TC assistance, soil degradation and its impact on agricultural productivity was also of concern to the farming community and identified as a priority issue. Under TC project SRL/5/038 *"Application of Isotope Techniques for Soil Erosion Studies"* (2005-2010) the IAEA provided assistance in the form of fellowship training, expert mission, scientific visit and procurement of an HPGe detector which is vital for the fallout radionuclide (FRN) analysis. This work complemented the studies that were already carried out on soil erosion under regional project RAS/5/043 *"Sustainable Land Use and Management Strategies for Controlling Soil Erosion and Improving Soil and Water Quality"*. The combined use of FRN together with a new innovative approach using Compound Specific Stable Isotopes (CSSI) to apportion soil erosion and identify critically degraded areas is being explored.

Under the activities of IAEA regional TC project RAS/5/055, and National Technical Cooperation Project SRL/5/038, Sri Lanka Atomic Energy Board, Department of Agriculture and Department of Irrigation have jointly implemented three case studies in the Central Highlands of Sri Lanka from 2006-2015. The aim of these case studies was to assess soil erosion status of major agricultural land uses in sub catchments of Dolosbage in the Mid Country Wet Zone, Uma Oya and Hanguranketha in the Mid Country intermediate zone of Sri Lanka.

The techniques used for these studies were combined use of Fallout Radionuclide (FRN - ^{137}Cs and ^{210}Pb) and CSSI technique to assess soil erosion status of the catchment and to identify and apportion soil sources from land uses and to integrate FRN with CSSI in establishing a comprehensive soil redistribution study.

The results of soil erosion and sedimentation studies conducted using this novel technique impressed the decision makers of the Government and provided funds for three projects to continue the study in five other watersheds in central highlands and low country dry zones of Sri Lanka. This technique was included in training schedules of Natural Resources Management Centre and Sri Lanka Atomic Energy Board and training programmes for University staff, students, Government officers and farmers were conducted. The work carried out on soil erosion assessment was published in the web page of Joint IAEA/FAO programme as a success story (http://www-naweb.iaea.org/nafa/resources-nafa/IAEA-success-Stories-3.pdf). This work was also selected as one of the IAEA TC best practices.

The Food Safety and Quality Assurance Laboratory (FSQAL) of the Department of Veterinary Public Health and Pharmacology of the Faculty of Veterinary Medicine and Animal Sciences, University of Peradeniya was established in early 2000 with the financial and technical support received from the IAEA (TC projects SRL/5/035 and SRL/5/039). At the time of establishing the FSQAL, there was a high demand from the industry, especially from the exporters of fisheries products for veterinary drug residue testing services which was not available in the country. In addition to providing services to the industry, the laboratory trained many researchers and technical personnel of the University of Peradeniya and other institutions to implement a national level residue and contaminant monitoring and control

programme. From the inception, the FSQAL was committed to assure the quality and accuracy of test results and it became the first laboratory in the Sri Lankan university system to obtain ISO 17025 accreditation. The FSQAL is engaged in developing and validating new methods to offer better and cost-effective testing solutions while providing postgraduate training opportunities. Cost effective analytical testing solutions encouraged animal food manufacturers and processors targeting domestic markets also to voluntarily comply with the international chemical safety standards (e.g. poultry processors). Current service recipients of the FSQAL includes private and state sector organizations such as shrimp exporters, poultry and milk processors, Ministry of Fisheries Quality Assurance Division, Sri Lanka Standards Institute etc. FSQAL received the first place in livestock and fisheries sector of the National Awards for Excellence in Agricultural Research 2017 organized by the Sri Lanka Council for Agricultural Research Policy (SLCARP) of the MARLIFA in recognition of the research conducted on "Establishment of Methods to Ensure Chemical and Microbial Safety of Food of Animal Origin." Currently, FSQAL takes part in a regional and inter-regional IAEA technical cooperation project with the objective of further improving the quality and accuracy of analytical services offered using nuclear and complimentary techniques (RAS/5/078 and INT/5/154). Further, FSQAL collaborates with SLAEB in another TC project (SRL/5/048) on strengthening national capability for food and feed safety and several other IAEA CRPs, geared towards enhancing the quality and authenticity of food.

Under the activities of the ongoing national project SRL/5/045 *"Establishing National Centre for Nuclear Agriculture,"* a gamma cell was established at the Horticultural Research and Development Institute (HORDI) of the Department of Agriculture in 2017. It provides gamma irradiation service free of charge for plant breeders as a national irradiation service. A rice variety development programme is being implemented by the Rice Research Development Institute of the Department of Agriculture. The main objective of this rice improvement programme is to develop quality rice varieties through mutation plant breeding using gamma irradiation. During 2018 the observational yield trials are in progress from the selection of M7 generation.

Variety improvement of Mung bean is also being implemented by the Field Crop Research and Development Institute of the Department of Agriculture with the aims of drought tolerance, short duration (less than 60 days) and synchronized maturity under the plant mutation programme of the TC project SRL/5/045.

Establishment of stable Isotope analytical facility with the Government cost sharing of Sri Lanka is an important activity which is in progress under the SRL/5/045 and SRL/7/005 project at the new laboratory building of SLAEB.

In the forthcoming planning period in Food and Agriculture the CPF priorities will directly respond to the national priorities defined in the Vision 2025 as follows:

- The Government will facilitate efficiency in agricultural markets.

- The Government will help smallholders in the tea, rubber and non-traditional export sectors.
  The Government will promote the investment in the livestock sector.
- The Government will promote investment in the fisheries sector.
- The Government will encourage nutritious farming practices.

Sri Lanka continued to play its role as the leading "orthodox black tea" exporter in the world by exporting 307 million kg made tea in 2015. It constitutes 61% of the nation's Agricultural Export Revenue, contributing 0.7% to the GDP in 2016. Hence, the sustainable production of this export-oriented commodity is vital to the countries' economy. To sustain the tea industry, it is imperative to use high yielding tea cultivars, which also possess other desirable traits. The proposed project under the near term priority in the 2020/21 cycle "Use of radiation induced mutation in genetic improvement of tea (Camellia sinensis L.)" is aiming at integration of radiation induced mutation breeding to speed-up the on-going conventional tea crop improvement programme in order to develop elite tea cultivars, which possess wider regional adaptability and tolerance to biotic and abiotic stresses to sustain the tea industry in Sri Lanka. Ensuring the quality, authenticity and traceability of high-value export products such as tea, using nuclear and related analytical testing techniques, is also essential to protect the tea industry's export reputation and potential.

Goat is a prominent small ruminant category and contributes to both meat (1400 tons in 2016) and milk production, specifically carried out as a family income generating source. Gastrointestinal nematodes have been identified as the most important threat for goat health and production in many developing countries, including Sri Lanka. Haemonchus contortus is a stomach worm of small ruminants commonly affecting goats. While the acute form of the disease causes sudden death, the chronic form decreases production. Due to increased resistance to commonly used drugs and chemical residues, development of vaccines has been in the focus for a longer period of time throughout the world. Another near-term programme priority is therefore the development and field application of an effective irradiated larval vaccine against Haemonchus contortus in goats. This will improve sustainable increase in goat production and will increase meat quality to meet export standards.

In the medium term, it is proposed to gather all current information available in Sri Lanka on blood born parasites in dogs including Trypanasoma and the potential vector.

Other relevant organizations such as anti-malaria and anti-filaria campaigns and Epidemiology Unit in the MHNIM, 14 universities in the country, medical and veterinary research institutes and the Institute of Fundamental Studies will be involved, and information will be gathered in this regard. Available international information will be perused and lessons will be drawn. The vectors, both day time and night time, will be collected, dissected and parasite identified. If Trypanasoma is found, species identification

and molecular characterization will be done, so that the information can be effectively compared with global information to early detect this potential zoonosis.

Greenhouse gases from human activities are the most significant driver of observed climate change since the mid-20th century. Agricultural greenhouse gas emissions are likely to increase largely due to continuing expansion in livestock production; fertilizer use and land cover change. It is proposed to develop and adopt climate smart agricultural practices to overcome such issues. The medium-term project will introduce sustainable agricultural management practices to improve productivity of farming system while building resilience to climate change and mitigating greenhouse gas emission. Livestock can make a large contribution to climate-smart food supply systems. Improved quality of food, increasing resource use efficiency, including soil and water; develop mitigation technology for greenhouse gases and adaptation techniques to overcome the effect of climate change and protect the environment, use of nuclear applications for soil, water and crop nutrition management, enhance and strengthen the use of nuclear techniques for improving the productivity of farm animals through improved breeding and reproduction and better feeds and feeding are expected outcome of the future cooperation.

Circulation of arboviruses transmitted by mosquitoes of the genus Aedes, including Zika, dengue, chikungunya and yellow fever were detected in Sri Lanka. The Sterile Insect Technique (SIT) package for mosquitoes of the genus Aedes is currently being developed at the IAEA and pilot projects have been initiated in some Member States. The SIT has been proven a cost-effective technology to control and, under certain conditions, eliminate populations of insects for some agricultural and livestock pests (fruit flies, tsetse flies, and others).

Regarding plant pests, a number of species of fruit flies are causing serious damage to fruit production and commercialization. This represents a major constraint to Sri Lanka fruit production. The use of an integrated pest management approach against these pests, including capacity building in the implementation of International Standards on Phytosanitary Measures (ISPM), would assist Sri Lanka's agricultural sector in meeting its goals.

Thematic Area Outcome:

Enhanced productivity, competitiveness and climate change resilience of food, agriculture, and animal production and health sector for the benefit of the people and economy of Sri Lanka.

Food and Agriculture interventions will respond to the UNSDF Driver 4 - Enhancing resilience to climate change and disasters and strengthening environmental management and will contribute to the attainment of SDG 2 – Zero Hunger, SDG 13 – Climate Action and SDG 15- Life on Land.

2.3. HEALTH AND NUTRITION

The Government continues its efforts to improve access to quality health-care for the general public in order to ensure healthy lives and promote well-being for all, at all ages, which is important to build a prosperous society.

The Government is committed to achieve universal health coverage and the SDGs. In 2017, a Vision 2025 document is launched by the Government, underscoring priority reforms to make the country more competitive and lift the standards of living of all Sri Lankans. It also recognized the need to address unequal socio-economic development across provinces and the rapidly aging population. As part of this vision, the Government passed the Sri Lanka Sustainable Development Act, No. 19 of 2017 to accelerate the achievement of SDGs, and to adopt multi-sectoral and integrated approaches in ensuring the health and well-being of the population.

Moreover, the Sri Lanka National Health Policy, 2016-2025 envisions "a healthier nation that contributes to its economic, social, mental and spiritual development" and a health care guided by principles of people-centred care, equity, quality of services and financial protection. The policy of free health care delivered by a network of state health institutions, including traditional providers has significantly contributed to the improvement of the nation's health that contributes to its economic, social, mental and spiritual development status of the population.

The public sector provides 95% of in-patient care and about 50% of out-patient care. A comprehensive preventive care package is provided through an island-wide network of 344 health units, healthy lifestyle centres and well-women clinics.

Moving forward, the Government aims to strengthen the public health system through Public Health Centres reorganization, improve its health management and monitoring and evaluation systems, and develop a national strategic approach to quality. The health sector will forge strategic partnerships, "think outside the box", and ensure that no one is left behind.

Chronic Kidney Disease of unknown aetiology (CKDu) continues to receive high-level attention from the Government, health-care providers, academics and policy-makers due to its adverse socioeconomic impact, especially on low-income households. The Vision 2025 commits the Government to support programmes combating CKDu. Research work continues, aiming to identify the causes for CKDu, although conclusive results have not yet been obtained. Provided that nuclear techniques may contribute to the identification of CKDu aetiology, the support of the IAEA would be indispensable.

2.3.1. Vector-Borne Diseases Control

Being a tropical country, Sri Lanka has very conducive environmental conditions for vector borne infections like dengue. These infections pose significant threat to the lives of people and consume a major portion of health budget of the country in terms of treatment and the prevention. Of these infections, dengue has emerged as the most important problem of Sri Lanka currently. Since its emergence in the early 1980s, the dengue infection is a major life threatening, widely distributed infectious disease in Sri Lanka. All dengue viral serotypes have been identified locally. During last 2 decades, the epidemiology has changed, that the incidence of dengue haemorrhagic fever began to increase since 1989. The worst recorded outbreak in the island occurred in 2009 with reported 24,629 cases and 245 deaths striking the western, northern and eastern part of the country.

The eradication of dengue is a challenging issue in Sri Lanka. Mosquito species Aedes aegypti and Aedes albopictus are the principle vectors responsible for the dengue transmission in Sri Lanka. Many of the currently employed vector control methods were not operationally feasible as most of the vector breeding sites are difficult to be reached. In such occasions Sterile Insect Technique (SIT) has its specific advantages in bringing down the vector populations which will in turn reduce the transmission of dengue in the high risk areas. More importantly, SIT can be incorporated in to the existing integrated dengue vector management strategy in Sri Lanka. SIT is a species-specific and environmentally friendly method, and its efficiency increases with the decline of the target population. Therefore, an ongoing TC project aims to enhance the capacity of Sri Lanka to control vector borne diseases at the national level. The IAEA support is expected in the medium term for strengthening of a National Centre for Research, Training and Services in Medical and Molecular Entomology for vector-borne disease control.

2.3.2. Cancer Control

Cancer control encompasses all actions that reduce the burden of cancer in the community. It includes every aspect of care, from prevention and early detection to treatment and palliative care based on best scientific evidence available. The national cancer prevention and control policy aims to provide a comprehensive programme of cancer control in Sri Lanka, by integrating evidence-based strategies and improving health systems, by focusing on primary prevention, early detection, diagnosis and treatment, rehabilitation, survivor ship and palliative care, taking into account the cancer morbidity and mortality pattern and the current health care infrastructure in the country.

The translation of this policy into action, allocation of adequate resources and administrative capacities will result in a system of cancer control in Sri Lanka which will reduce its incidence, morbidity and mortality rates. Sri Lankan people will know and practice health promoting and cancer-preventing behaviours and will have increased awareness and access to early cancer detection and adequate care in a network of equitably accessible

state-of-the-art cancer diagnosis and treatment facilities. Sri Lanka will evolve as a well-recognized location for education, services and research in all aspects of cancer control.

The National Health Policy 2016-2025 prioritizes addressing the leading causes of preventable cancers in Sri Lanka by emphasizing appropriate evidence-based strategies to reduce the burden of such cancers. It aims to ensure that all cancers are managed in an evidenced-based and responsive manner by improving the quality of cancer care across the country. The document also outlines the useful linkages with other national programmes and service delivery structures in the national strategic framework that can facilitate cancer control.

The Government, *inter alia,* aims to:

- Advocate for early detection of cancers by improved public awareness and relevant service providers, particularly primary care providers, through opportunistic screening of asymptomatic populations and, if clinically suspicious, ensure prompt referral of individuals with symptoms and signs suggestive of cancer in symptomatic populations leading to early clinical diagnosis.
- Ensure sustained and equitable access to diagnosis and treatment facilities for cancers.
- Ensure rehabilitation, survivor-ship and palliative care facilities for cancer patients and support to their care givers at all levels.
- Strengthen cancer information systems and surveillance to monitor the progress and to evaluate the outcomes of cancer control actions.
- Promote professional education of doctors, nurses, technicians and health workers to augment trained human resources.

Past achievements of technical cooperation between Sri Lanka and the IAEA include the general improvement in the quality of radiotherapy. Amongst others, a fully equipped laboratory with basic equipment for biological dosimetry was established. The Nuclear Medicine Unit at the University of Peradeniya has been significantly upgraded with a new modern double-head SPECT gamma camera along with other major equipment coupled with the training of nuclear medicine physicians and technologists. A Brachytherapy Centre was established at the Cancer Unit of Tellippalai, Jaffna. Medical staff at the major hospitals of Sri Lanka – the General Hospital at the University of Ruhuna - received training in radiation therapy technology, radiation physics, radiation biology and clinical radiation oncology. These trainees will in turn train other medical staff and ensure the sustainability of the project outcomes.

Current ongoing technical cooperation focuses on enhancing the institutional capacities of the University of Colombo to manage cardiovascular diseases in adolescents at risk with the goal to reduce cardiometabolic risk by addressing adolescent health and nutrition;

In the coming cycles, technical cooperation between the Government and the IAEA will continue to focus on supporting the Government to expand access of the people in Sri Lanka to quality and early cancer diagnosis and treatment, strengthening Sri Lanka's radiation protection capacities for medical staff and patients, strengthening of radiotherapy for cancer treatment, upgrading nuclear medicine diagnostic imaging facilities as well as enhancing national capacities in medical physics.

One of the specific objectives is to establish a cyclotron-based radiopharmaceutical production facility at the National Cancer Institute (Apeksha Hospital) to produce PET tracers (18F-FDG) required for PET/CT scanning. It is considered as one of the most important, viable as well as sustainable projects, which is to be implemented over the forthcoming planning period. The Government has already earmarked the funds to invest into the infrastructure, laboratory equipment and quality assurance and quality control.

An important role in planning future interventions in cancer control and management will have the imPACT advisory mission to Sri Lanka, organized and led by the IAEA Technical Cooperation's Programme of Action on Cancer Therapy (PACT) Division in October 2019. It will be hosted by the Ministry of Health of Sri Lanka and will respond to the specific national priorities such as replacing outdated radiotherapy equipment (mainly old Co-60 machines), paediatric oncology and mammography screening programme. Mission recommendations, contained in a comprehensive national imPACT Report that will emerge as the outcome of the mission, will be the basis for planning future national investments, as well as the technical cooperation with the IAEA and other international partners.

A multitude of partners are active in the health sector in Sri Lanka. The World Health Organization (WHO) Country Office actively partners and cooperates with the MoH, other government agencies, UN agencies, development partners, private sector, academia and non-government organizations in implementing its programmes and activities. Sri Lanka has been designated by the WHO as a fast-track country for NCDs to receive "One-WHO"-integrated technical support at the global, regional and national level, including the support of the IAEA within its specific mandate in radiation medicine.

2.3.3. Nutrition Practices

Sri Lanka is facing a double burden of malnutrition, with stagnant rates of undernutrition combined with growing numbers of overweight people and a rise in obesity rates. The Government Vision 2025 identifies that in 2015 around 4.7 million people were undernourished, with high regional disparities in malnutrition. National Nutrition Policy as defined in 2010 sets the vision that Every Sri Lankan has access to appropriate and adequate food and nutrition irrespective of their geographical location and socio-economic status and an overarching goal to achieve and maintain the nutritional well-being of all Sri Lankans enabling them to contribute effectively towards national socio-economic growth and development. 2018 Global Nutrition Report classifies Sri Lanka as the country experiencing

one form of malnutrition only – anaemia, while identifying some progress in two targets only (under-5 stunting and exclusive breastfeeding), while no progress or worsening is recorded in other targets (under-5 wasting, under-5 overweight, WRA anaemia, adult female/male obesity and adult female/male diabetes). While country has experienced in preceding 4-years positive trends in GDP growth and decease in under-5 mortality, overall trends in under-5 stunting shows stagnation and rise in obesity in all categories (under-5, 5-19 and adults). Key institutions that work towards improved nutrition in Sri Lanka include the Nutrition Division of the Ministry of Health and Indigenous Medicine (MHNIM), Inter-ministerial National Nutrition Council, multi-sectoral National Steering Committee for Nutrition and the Nutrition Society of Sri Lanka (NSSL).

The IAEA supported Sri Lanka in the area of nutrition through both TC national and regional programmes and the Coordinated Research Project (CRP) scheme. The just completed project SRL/6/035 supported reducing cardio-metabolic risk by addressing adolescent health and nutrition, improving national capacities to screen and identify Sri Lankan adolescents at risk of cardiovascular diseases and intervene in order to prevent future disease. Earlier project SRL/6/030 supported the improvement of micronutrient health status of adolescent girls through dietary modification. Sri Lanka also participates in the regional project RAS/6/092 aimed to apply stable isotope techniques to assess body composition and energy expenditure of infants and young children across the region of Asia and the Pacific, and to harness key stakeholders to partner in planning and implementing sustainable interventions to improve health outcomes through infant and young child nutrition. In the forthcoming period Sri Lanka will continue to seek TC assistance to address nutrition and its health consequences in its population, via both national and regional TC programme.

Thematic Area Outcomes:

Strengthened national capacities to control vector-borne diseases including dengue.

Increased access of Sri Lankan people to quality health services for diagnosis and treatment of non-communicable diseases, including palliative care.

Improved nutrition practices for healthier population of Sri Lanka.

The planned outcomes will contribute to the attainment of the UNSDF Driver 3 – Human security and socio-economic resilience, as well as the SDG 3 - Good Health and Well-Being.

2.4. Water Resources Management

The changing environment and growing needs of the economy increased the competition for water resources, making more pressure on the quantum of available water in Sri Lanka.

Moreover, the groundwater resources in Sri Lanka have been under threat over the past three decades with the increased industrial development and extensive application of fertilizer in agricultural activities together with high extractions resulting rapid ground water depletion, saline intrusion and groundwater pollution.

The Government's goal is to ensure equitable access to safe drinking water and sanitation for the entire population in order to increase socio economic condition as well as living standards of the people in the country, while accommodating increasing demand of water supply of the commercial and industrial sector. These priorities are set out in the Vision 2025 and in the National Drinking Water Policy, which envisions "a healthy society that values the reliability and safety of drinking water and is committed for its sustainable use." The Public Investment Programme has indicated that Government policy directions are to ensure water availability to users, providing water in adequate quantities with improved management, enhanced productivity and water use efficiency while paying attention to spatial variation of water availability in the country.

The programme plan of water resources management in the country is directed to achieving the targets identified under the SDG 6 - Clean Water and Sanitation, of which has already been declared as to ensure universal and equitable access to safe and affordable drinking water for all by 2030. Accordingly, the sectoral investment during the medium term will be mainly focused on bridging the gaps of regional disparities in water services while giving area based high priority in providing good quality water to the areas where there is high prevalence of CKDu. The water-use efficiency across all sectors needs to be increased and sustainable withdrawals and supply of freshwater are to be ensured to address water scarcity and substantially reducing the number of people suffering from water scarcity by 2030 as per the status of SDG indicators defined for Sri Lanka in 2017. Also, it is planned to implement integrated water resources management at all levels, including through trans-boundary cooperation as appropriate, by 2030. In addition to that, the capacity-building through international cooperation is expected to enhance the research and development activities in water management aspects particularly on groundwater assessments. The Department of National Planning, which implements the Vision 2025, has indicated that the Government will improve access to pipe-borne water supply facilities in underserved urban areas and rural and estate areas, focusing on areas affected by CKDu. However, it is essential to find potential and clean water resources in such areas to fulfil the above requirements. In this context, groundwater would play an important role. In addition, the Government is exploring water supply projects in Northern Province, North-Central Province and Central Province where the water-related issues are present.

Some of the key strategies are to minimize spatial variation of water availability, enhance water retention capacity of existing reservoirs/tanks and conveyance systems, minimize groundwater depletion via groundwater research and studies on quality, quantity and recharging, extracting and management of groundwater, preserve eco-system, protect

watersheds through agricultural management practices, increase water use efficiency and productivity of most of the irrigation schemes and reforestation etc.

The early identification of the water pollution issues and implementation of remedial measures are of vital importance since the groundwater contamination is irreversible if significant damages have already occurred.

The spatio-temporal assessment of hydrogeological setup and present water chemistry of the groundwater resources of the country is off prime importance before the establishment of systematic long-term groundwater monitoring network which is essential before the implementation of any remedial plans.

IAEA support is sought to enhance Sri Lanka's capacities in sustainable water resource management through the use of isotopic techniques, in particular in river basins that suffer from a significant water deficit and also those with salinity problems (caused by intrusion from the sea), for better quantification of recharge, investigation of groundwater dynamics, assessment of aquifer potential for sustainable management and identification of the various mechanisms responsible for the contamination and pollution of aquifers. The Government has already set up laboratory facilities for isotope hydrology at the SLAEB and it is planned to upgrade the same as a Central Laboratory Facility to fulfil the national requirements. Funds are continuously allocated by the Government for this purpose.

In addition, the IAEA is helping Sri Lanka assess the quantity and quality of groundwater resources, as well as their temporal fluctuations in the dry zone of Sri Lanka, to enable the effective and safe management of the aquifer system for the benefit of the people in the area.

Recent studies have shown evidence to support an environmental aetiology to CKDu and drinking well water is reported to be a significant predictor of CKDu. The environmental researches, carried out so far to identify the origin of groundwater contaminants, have mainly concerned the quality of water sources, but its temporal and spatial variations are not sufficiently explained. The isotope techniques in hydrology with nuclear and chemical analytical techniques can be applied to understand the groundwater dynamics, origin of groundwater contaminants and hydro-geochemistry of the affected zones, protect watersheds through agricultural management practices and increase water use efficiency and productivity of most of the irrigation schemes.

Thematic area outcome:

Enhanced Sri Lanka's capacities in sustainable water resources management.

The planned outcome will contribute to the attainment of UNSDF Driver 4 – Enhancing resilience to climate change and disasters and strengthening environmental management

(indicator 4.2. Percentage increase in implementation of integrated water management systems), and the attainment of SDG 6 – Clean Water and Sanitation.

2.5. Energy and Industry

Sri Lanka has no proven fossil fuel deposits, such as petroleum, natural gas or coal that can be used for electricity power generation. At present, Sri Lanka has almost fully utilized its hydro resources for electricity generation and the dependence on imported fossil fuel for electricity generation has increased, reaching more than 50% of the electricity production in the country.

With the increasing electricity demand of 4.5% annually in Sri Lanka and expected future economy developments, it is envisaged that the country will need more energy resources in the longer term. It is also very important to explore alternative energy supply options to avoid excessive dependence on imported fossil fuels and protect the environment.

Sustainable energy development will continue to be a high priority area in the near and medium term in line with the Government Vision 2025 and the commitments to:

- Increase overall power generation, access, and storage by implementing long-term generation expansion plans,
- Promote diversified production and storage of sustainable clean energy,
- Follow the Blue Green initiative to encourage low emission economic development.

To this end, Sri Lanka is considering the use of nuclear power as an option to meet the future power demands, which are growing as its economy expands and industry diversifies. The main outlines of the Long-Term Electricity Generation Expansion Plan 2018-2037 are:

- The generation demand is expected to grow 5.9% per annum from 2018-2022 and peak demand is expected to grow 5.1% per annum,
- The same is expected to grow 4.9% per annum from 2018-2037 with peak demand expected to cross 4.5%
- Estimated installed capacity (2018) – 4,269 MW
- Estimated installed capacity (2037) – 10,783 MW
- From 2018-2037, Sri Lanka plans to add 842 MW of major hydro, 215 MW of mini hydro, 1,389 MW of solar, 1,205 MW of wind, 85 MW of biomass, 425 MW of oil-based power, 1,500 MW of natural gas and 2,700 MW of coal power into the electricity generation system,
- In total, Sri Lanka plans on 8,361 MW of new additions (including the committed power plants) to the national grid in coming 20 years, as of 2018.

- The total investment required for implementing the 2018-2037 plan is approximately $14.568 billion (Rs. 2,168.93 billion) without considering the projects for which funds have already been committed.

Past technical cooperation enhanced Sri Lanka's capacities to effectively assess its energy demands through training and expert support with emphasis on electrical power system expansion planning, identifying possible sites for future nuclear power plants (NPPs). Sri Lanka has developed capabilities for the establishment of academic programmes for sustainable human resources development in support of a possible future nuclear power programme. Current IAEA TC support focuses on establishing a roadmap and developing a national strategy for possible introduction of nuclear power in Sri Lanka. Key stakeholders include the Ceylon Electricity Board (CEB), the Public Utilities Commission of Sri Lanka (PUCSL) as the electricity regulator, and the Ministry of Power, Energy and Business Development (MPEBD).

Nuclear power will become increasingly important as a means of addressing climate change and enhancing socio-economic development in the country as well as in the region. Since Sri Lanka is an island nation, the introduction of nuclear power and NPP location(s) should be carefully identified with the regional cooperation agreement with neighbouring countries. The CEB will play a major role in this project with the assistance of ministries and other Government organizations.

Pending Government decision on introduction of nuclear power, Sri Lanka would envisage continuous support of the IAEA to prepare a comprehensive set of activities for nuclear power development, including legal, regulatory and safeguards aspects; communications and human resources; commercial and policy aspects; electricity market and generation mix; favourable nuclear power technology; siting of nuclear power plants; economics and finance; environmental impact assessment; nuclear safety and security, in line with the IAEA's Milestones Approach towards the first NPP. Enhancement of energy planning capabilities will assist in addressing the energy and environmental issues in the national context. This will be a base for future policy and decision making by the Government.

In industry applications, SLAEB has launched a major programme to upgrade Non-Destructive Testing applications in the country. Under this programme a National Centre for NDT has been established and human resources development and equipment purchasing are being processed. Ongoing TC support is provided mainly for metallic testing. Further SLAEB plans are to extend the NDT practices to non-metallic materials, especially in concrete structures. The IAEA support will be sought for capacity building, expanding application of NDT to non-metallic materials (concrete structures), enhancing technical knowhow on civil constructions, establishing accredited NDT laboratories for concrete structure testing. The expected impact will be the improvement of the quality of civil engineering structures.

Thematic Area Outcomes:

Increased and diversified energy production in Sri Lanka.

Strengthened and expanded non-destructive material testing practices in Sri Lanka.

The planned outcome will contribute to the attainment of SDG 7 – Affordable and Clean Energy and SDG 9 – Industry, Innovation and Infrastructure.

2.6. HUMAN RESOURCES DEVELOPMENT FOR NUCLEAR APPLICATIONS

Various ongoing and planned activities in Sri Lanka that involve nuclear sciences and applications require adequate human resources development through higher education and training of professional staff. The Government puts the education as a very high priority in its Vision 2025, identifying that "education and skills development are currently inadequate to sustain growth through knowledge-based, competitive economic activities" and proposing several strengthening measures, including increased access to tertiary education.

Nuclear and radiation professionals in main nuclear institutions (SLAEB and SLAERC), as well as medical physicists, radiation therapy technicians, professionally exposed workers, researchers and other professionals involved in activities with radiation sources need proper professional profile and regular training. Currently the only higher education establishment offering a degree in nuclear applications is the University of Colombo. However, both its programme and instrumentation available is obsolete. Following the Chernobyl disaster, poor public perception and general refrain from nuclear energy has resulted in reducing education programmes in nuclear field and consequently ageing of staff in main nuclear institutions.

Renewed interest for the areas where nuclear technologies offer clear advantages over other conventional techniques, as well as possible national decision to introduce nuclear power in the energy production mix, make the modernization of the curricula and technical basis in nuclear education a priority already at this stage. The possible Government decision to embark on nuclear power would open a new horizon of needs to establish a dedicated nuclear engineering programme and appropriate professional degree.

Support of the IAEA would be needed in both non-power and power related education and training. In the former, the support of the IAEA Nuclear Sciences and Applications Department would be provided through advisory missions on modernization of the curricula and nuclear instrumentation at the University of Colombo. In the latter, a whole set of activities in nuclear education and training would be needed to ensure sufficient human workforce as one of the most important of 19 nuclear power infrastructure issues of the Milestone approach. In this scenario a comprehensive IAEA support to human resources

development would be provided at different levels, coordinated by the Nuclear Energy Department and Nuclear Infrastructure Development Section. The first step – the support to set up the scientific exhibition on nuclear applications including nuclear power at the lobby of the new building of the Sri Lanka Atomic Energy Board, as the education but also as a public outreach tool, has been discussed.

A very specific need of Sri Lanka in the field of university education, training and modernization of curricula and practices reflects towards the preservation of the cultural heritage by employing radiation techniques.

Thematic Area Outcome:

Strengthened nuclear education and training capacities of Sri Lanka.

The planned outcome will contribute to the attainment of UNSDF Driver 3 – Human security and socio-economic resilience (indicator 3.3. Proportion of youth aged 15-29 years engaged in education, unemployment, training or volunteer activities, by gender and location) .

3. RESULTS MATRIX

Nuclear and Radiation Safety and Security

Nuclear and Radiation Safety and Security Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Strengthened national nuclear and radiation safety infrastructure, technical capacities and human resources for the protection of people and environment of Sri Lanka.	Number of trained staff in SLAERC and human and technical capacities of SALAEB in 2019.	Number of trained scientific, technical and legal staff and the degree of modernization of the technical capacities as compared to the baseline, by 2025.	SLAERC personal files, RASIMS database, IAEA database and mission reports, SLAEB annual reports, publications, documentation.	Trained staff retained by SLAERC and effectively performing regulatory functions. SLAEB continues to offer valid and accurate technical services in radiation protection to the end-users and to provide necessary data to enable SLAERC to issue certificates/licenses.

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
National capacities and capabilities of SLAERC (regulator) improved to ensure radiation safety for the people and environment of Sri Lanka.	2020-2021, 2022-2023, 2024-2025	SLAERC SLAEB Ministry of Power, Energy and Business Development (MPEBD) Ministry of Environment (MMDE) Ministry of Health (MHNIM) Ministry of Higher Education (MCPWSHE) Ministry of Science, Technology and Research (MoSTR)	€500,000	€400,000	€100,000
Technical capabilities and human resources of SLAEB (designated TSO) enhanced to provide higher quality radiation protection technical services for end-users in Sri Lanka.	2022-2023, 2024-2025	SLAEB Ministry of Power, Energy and Business Development (MPEBD) Ministry of Environment (MMDE) Ministry of Health (MHNIM) Ministry of Higher Education (MCPWSHE) Ministry of Science, Technology and Research (MoSTR) Ministry of Agriculture (MARLIFA)	€600,000	€500,000	€100,000

Nuclear and Radiation Safety and Security

Nuclear safety capacities for nuclear power established in line with the IAEA Safety Standards (SSG-16) (provided positive Government decision on nuclear power)	2022-2023, 2024-2025	SLAERC SLAEB Ministry of Power, Energy and Business Development (MPEBD) Ministry of Environment (MMDE) Ministry of Health (MHNIM) Ministry of Higher Education (MCPWSHE) Ministry of Science, Technology and Research (MoSTR)	€300,000	€200,000	€100,000

Nuclear and Radiation Safety and Security Subtotals		
Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
€1,400,000	€1,100,000	€300,000

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Food and Agriculture

Food and Agriculture Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Enhanced productivity, competitiveness and climate change resilience of food, agriculture and animal production and health sector for the benefit of the people and economy of Sri Lanka.	Lack of new tea varieties for the last 20 years. No vaccine for goat stomach worm. Lack of sustainable, climate-change resilient agricultural management practices for farming systems.	Number of new tea varieties. Animal productivity growth Vaccine against Haemonchus contortus developed by 2025. Sustainable, climate change resilient agricultural management practices established for farming system by 2025.	National reports, Tea Research Institute annual reports, reports of the Department of Animal Production and Health, IAEA databases.	Continued Government support in line with the Vision 2025, availability of timely provision of technology and expertise from the IAEA. Continued exporting demand for goat meat and tea.

Food and Agriculture

Indicative Outputs	**Indicative Timeframe** (Future TC cycle)	**Relevant national counterpart(s)/ institute(s)**	**Approximate Cost in €** (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
Sustainability of the tea industry in Sri Lanka enhanced.	2020-2021, 2022-2023	SLAEB Tea Research Institute (TRI) Ministry of Agriculture (MARLIFA) Ministry of Plantation Industries (MPI)	€600,000	€500,000	€100,000
Farmers' goat husbandry improved and export-quality meat production increased.	2020-2021, 2022-2023	SLAEB Department of Animal Production and Health Ministry of Agriculture (MARLIFA) University of Peradeniya	€600,000	€500,000	€100,000
Resource-use efficiency and resilience to climate change of farming systems enhanced.	2022-2023, 2024-2025	SLAEB Ministry of Agriculture (MARLIFA) Universities, Departments of Agriculture	€400,000	€300,000	€100,000
The sterile insect technique (SIT) integrated with other methods for the suppression of fruit fly pests	2022-2023, 2024-2025	SLAEB Ministry of Agriculture (MARLIFA) Universities, Departments of Agriculture	€400,000	€300,000	€100,000

Food and Agriculture Subtotals		
Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
€2,000,000	€1,600,000	€400,000

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Health and Nutrition

Health and Nutrition Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Strengthened national capacities to control vector-borne diseases including dengue.	Currently employed vector control methods inefficient. Lack of awareness on the blood test need. The high cost of blood test.	Diminishing mosquito population. Reduced dengue incidence.	SIT reports, National Vector Surveillance system, MHNIM annual reports and databases, IAEA databases.	Continued Government priority of human health, eradication of vector-borne diseases, control of NCDs and combating malnutrition.
Increased access of Sri Lankan people to quality health services for diagnosis and treatment of non-communicable diseases, including palliative care.	3 Existing PET/CT cameras. 9 LINACs. FGD imported from India, high cost and long transport time. Long waiting lists for radiotherapy services.	Reduced waiting lists, improved quality of life of cancer patients, decreased cancer morbidity and mortality rates, extended post-cancer life expectancy.	Cancer Register, NCI, NCCP, MHNIM reports, IAEA databases.	
Improved nutrition practices for healthier population of Sri Lanka.	Under-5 mortality 8.8 per 1000 live births. Nutrition status: Under-5: stunting 17.3%; overweight 2%. Children and youth (5-19): underweight boys 40.4%, girls. 35%; overweight boys 13.9%, girls 11.7%; obesity boys 5%, girls 4.4% Adults: overweight men 18.7%, women 27.4%; obesity men 2.9%, women 7.3%. (2018 status)	Reduced malnutrition consequences: Percentage of anaemia, raised blood pressure, diabetes in appropriate population categories.	MHNIM reports, Nutrition Division reports, NSSL reports, Global Nutrition Report, Scaling Up Nutrition (SUN) database.	

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
SIT technique implemented to control vector-borne diseases.	2020-2021, 2022-2023	SLAEB MHNIM University of Kelaniya	€600,000	€500,000	€100,000
Nuclear medicine capacities enhanced, including cyclotron-based radiopharmaceutical production in Sri Lanka established.	2020-2021, 2022-2023	SLAEB MHNIM National Cancer Institute (NCI)	€3,300,000	€3,000,000	€300,000
Radiation therapy services improved for cancer patients in Sri Lanka.	2022-2023, 2024-2025	SLAEB MHNIM National Cancer Institute (NCI)	€400,000	€300,000	€100,000
Recommendations for nutritional interventions developed for policy-makers in Sri Lanka	2022-2023, 2024-2025	MHNIM, Nutrition Division Nutrition Society of Sri Lanka (NSSL)	€400,000	€300,000	€100,000

Health and Nutrition

	Health and Nutrition Subtotals		
	Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
	€4,700,000	€4,100,000	€600,000

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Water Resources Management

Water Resources Management Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Enhanced Sri Lanka's capacities in sustainable water resources management.	SLAEB laboratory facility for Isotope Hydrology lacks HR and technical capacities to act as a Central Laboratory Facility to fulfil national requirements. Mechanisms responsible for the contamination and pollution of aquifers not identified.	Centralised laboratory facility at SLAEB for Isotope Hydrology established, number of staff recruited and trained. Number of new mechanisms of aquifers pollution identified by applying isotope hydrology. Community water supply schemes started based on available scientific data (isotopic and chemical). Drip irrigation schemes started based on isotope findings, potential ground-water aquifers identified, oil spills recovered using oil absorbent developed using radiation technology.	National reports, SLAEB reports, IAEA databases, reports of National Water Supply and Drainage Board and Water Resource Board.	Continued Government policy and financial support in line with the Vision 2025 and National Drinking Water Policy.

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
Institutional capacities in water resource management strengthened.	2022-2023, 2024-2015	SLAEB National Water Supply and Drainage Board (NWSDB) Water Resource Board (WRB)	€600,000	€500,000	€100,000

Water Resources Management

Water quality in the country improved to protect the health and well-being of the people.	2020-2021, 2022-2023, 2024-2025	SLAEB National Water Supply and Drainage Board (NWSDB) Water Resource Board (WRB)	€400,000	€300,000	€100,000
The understanding about the quantity, quality and dynamics of Sri Lanka's water resources for informed decision-making by the Government regarding water resources management improved.	2020-2021, 2022-2023, 2024-2025	SLAEB National Water Supply and Drainage Board (NWSDB) Water Resource Board (WRB)	€300,000	€200,000	€100,000

Water Resources Management Subtotals		
Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
€1,300,000	€1,000,000	€300,000

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Energy and Industry

Energy and Industry Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Increased and diversified energy production in Sri Lanka.	Installed production capacity 4,269 MW in 2018. Milestone approach not embarked on.	Number of infrastructure issues (out of 19) addressed in the Milestone approach. Number of new MW of production capacity installed.	CEB reports, MPEBD reports, PUCSL reports, IAEA database,	Continued Government support in line with the Vision 2025 and Long-Term Electricity Generation Expansion Plan.
Strengthened and expanded non-destructive material testing practices in Sri Lanka.	NDT practices limited to metallic materials. 5 accredited methods in place in 2019.	Number of new NDT practices. Number of newly accredited methods. Number of staff trained.	SLAEB annual reports.	

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
Government enabled to make knowledgeable decision on the introduction of nuclear power in Sri Lanka.	2020-2021	SLAEB Ceylon Electricity Board (CEB) Ministry of Power, Energy and Business Development (MPEBD)	€200,000	€100,000	€100,000

Energy and Industry

NDT practices expanded to non-metallic materials, especially concrete structures.	2022-2023, 2024-2025	SLAEB	€600,000	€500,000	€100,000

Energy and Industry Subtotals		
Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
€800,000	€600,000	€200,000

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the country programme framework.

Human Resources Development for Nuclear Applications

HRD Outcome[s]	Baseline	Indicators	Means of Verification	Assumptions/risks
Strengthened nuclear education and training capacities of Sri Lanka.	Curricula on nuclear sciences at one university only. Programme and instrumentation obsolete.	Number of updated curricula. Number of nuclear applications programmes in the country.	National reports, university and departmental website,	Nuclear applications in the country revisited and upgraded. Sustained interest of the Government in nuclear power.

Indicative Outputs	Indicative Timeframe (Future TC cycle)	Relevant national counterpart(s)/ institute(s)	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
Non-power nuclear applications curricula at the University of Colombo reformed and strengthened.	2022-2023, 2024-2015	SLAEB University of Colombo	€300,000	€200,000	€100,000
Nuclear engineering curricula established in Sri Lanka (provided positive Government decision on nuclear power).	2022-2023, 2024-2025	SLAEB University of Colombo	€400,000	€300,000	€100,000
Radiation techniques in protection of cultural heritage of Sri Lanka established.	2022-2023, 2024-2025	SLAEB University of Colombo	€300,000	€200,000	€100,000

HRD Subtotals		
Approximate Cost in € (A)	**Estimated resources* available in €** (B)	**Resources to be identified/mobilised in €** (A-B)
€1,000,000	€700,000	€300,000

3.1. RESOURCES SUMMARY TABLE

Thematic Area	Approximate Cost in € (A)	Estimated resources* available in € (B)	Resources to be identified/mobilised in € (A-B)
Nuclear and Radiation Safety and Security	1,400,000	1,100,000	300,000
Food and Agriculture	2,000,000	1,600,000	400,000
Health and Nutrition	4,700,000	4,100,000	600,000
Water Resources Management	1,300,000	1,000,000	300,000
Energy and Industry	800,000	600,000	200,000
Human Resources Development for Nuclear Applications	1,000,000	700,000	300,000

Total estimated overall cost for CPF	Total estimated resources* available for CPF	Total resources to be identified/mobilised
€11,900,000	€9,100,000	€2,100,000

Estimated government cost sharing (included in the above total of resources* available -B)	€3,750,000
Other estimated extrabudgetary contributions from donors/partners who have expressed interest (included in the above total of resources* available - B)	€0
Estimated in-kind contributions from the Government and other partners/donors that have expressed interest (included in the above total of resources available - B)**	€1,150,000

(*)-The above stated figures are indicative. Signing of the CPF does not commit to funding of the CPF implementation by the Member State or the IAEA, nor does it suggest the expectation of continued levels of Agency funding. The main purpose is to assist planning and prioritization of the Country Programme Framework.
(**)-This estimate should reflect the total estimated value (in Euros) of in-kind contributions provided by the Member State to carry out the planned programme (in-kind examples: time of staff, infrastructure, materials, equipment, repairs, construction work, sampling costs, shipment costs, etc.)

4. Programme Implementation and Support

4.1 CPF Coordination

The preparation of this CPF was coordinated and monitored by the SLAEB and the Ministry of Power, Energy and Business Development, as the institution hosting the NLO office, and the Programme Management Officer (PMO) at the Division of Asia and the Pacific of the IAEA Department of Technical Cooperation. The PMO coordinated the relevant inputs from the IAEA Technical Departments, the Department of Safeguards, as well as the IAEA's Programme of Action for Cancer Therapy (PACT) and the Division for Programme Support and Planning at the IAEA's Department of Technical Cooperation. The National CPF Coordinator identified and nominated focal persons in the relevant Ministries and Government organizations (SLAEB, SLAERC, MPEBD, MoSTR, MARLIFA, MHNIM, NWSDB and WRB), as well as a national climate change focal point, and the institutes and laboratories listed in the Results Matrix to participate in the preparation process. In addition, the National CPF Coordinator and the PMO identified and engaged relevant members of the United Nations Country Team (UNCT). All stakeholders involved in the development of the CPF and the relevant senior managers of the focal persons (Ministers, Vice-Ministers and Directors of Institutes and Laboratories) were kept informed to ensure the ownership of this planning document.

4.2 Future Review of CPF

Future reviews of progress under this CPF will be ongoing throughout the lifetime of this CPF and will be conducted shortly before the end of each TC programme cycle. The knowledge gained from the review of the CPF will serve to better inform the formulation of new project proposals for the following TC programme cycle. The review will consider evolving development priorities at the national level, including the consideration of any significant changes (positive or negative) that have affected the programme. Due to the fact that the CPF will expire in 2025 and some of the listed policy documents that have been taken into account for the development of the CPF will expire before the completion of the CPF (e.g. UNSDF 2018-2022), their successor editions will be reviewed and incorporated, as appropriate, during the CPF mid-term review process in 2022.

The review will be led by the PMO within the Asia and the Pacific region at the IAEA's Department of Technical Cooperation and the NLO at the SLAEB. The final review and update towards the following CPF will be made latest in 2024, one year prior to the expiration of this CPF.

4.3 Partner Coordination

Sri Lanka became a member of the United Nations on 14 December 1955. As a member of the UN, Sri Lanka adopted the 2030 Agenda for Sustainable Development with the SDGs at its core.

The partnership between Sri Lanka and the UN is guided by the United Nations Sustainable Development Framework 2018-2022, which is aligned with the Sir Lanka National Development Strategy and the SDGs. It identifies strategic priorities that are of relevance to the IAEA's TC programme and the current CPF, as follows:

Driver 1: Towards improved data, knowledge management and evidence-based policy

By 2022, people in Sri Lanka benefit from improved data and knowledge management to address inequalities and ensure inclusive and responsive decision making.

Driver 2: Strengthened innovative public institutions and engagement towards a lasting peace.

By 2022, people in Sri Lanka, especially the marginalised and vulnerable, benefit from more rights-based, accountable, inclusive and effective public institutions, to enhance trust amongst communities

Driver 3: Human security and socio-economic resilience

By 2022, people in Sri Lanka, especially the vulnerable and marginalised groups of children, youth, women, elderly and disabled, benefit equitably from dynamic and responsive social protection systems.

Driver 4: Enhancing resilience to climate change and disasters and strengthening environmental management

By 2022, people in Sri Lanka, in particular the vulnerable and marginalized are more resilient to climate change and natural disasters and benefit from increasingly sustainable management of natural resources, better environmental governance and blue/green development.

The IAEA is part of the UN Country Team as a non-resident agency and has practiced information exchange with UNDP, WHO and FAO in the implementation of past TC programmes.

This CPF has been developed based on Sri Lanka's National Development Strategy Vision 2025, the UN Sustainable Development Framework 2018-2022 and the SDGs. These include SDGs 1 and SDG 2, SDG 3, SDG 4, SDG 5, SDG 6, SDG 7, SDG 8, SDG 9, SDG 12, SDG 13, SDG 14 and SDG 15. In addition, a number of international frameworks, policies and conventions have been taken into consideration in the formulation of the CPF. These include Sri Lanka's

National Health Policy 2016-2025, National Drinking Water Policy, the National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations in Sri Lanka, the National Agriculture Policy, the Industrial Policy and Strategy, and the National adaptation plan for climate change impacts 2016-2025.

The major donor countries and development partners assisting the development activities of Sri Lanka that are relevant for the implementation of the proposed TC programme under this CPF are:

Organisations: United Nations Development Programme, Food and Agriculture Organization, International Fund for Agricultural Development, World Health Organization, United Nations Educational, Scientific and Cultural Organization, World Bank, Asian Development Bank, Islamic Development Bank, Japan International Cooperation Agency, European Investment Bank, the OPEC Fund for International Development

Donors: China, Japan, Netherlands, UK, India, Spain, Korea, United States, Singapore, Germany

For the implementation of the proposed programme under this CPF, the following have been identified as key partners:

National: Sri Lanka Atomic Energy Board, Sri Lanka Atomic Energy Regulatory Council, Ministry of Power, Energy and Business Development, Ministry of Health, Nutrition and Indigenous Medicine, Ministry of Mahaweli Development and Environment, Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation, Fisheries and Aquatic Resources Development, Ministry for City Planning, Water Supply and Higher Education, Ministry of Science and Technology, Ministry of Housing, Construction and Culture Affairs, Department of Wildlife Conservation, National Department for Community Water Supply, National Water Supply and Drainage Board, International Water Management Institute, Ministry of Industry and Commerce, Resettlement of Protracted Displaced Persons and Co-operative Development and national universities.

International: World Bank, IBRD, ADB, IDB, EIB, UNDP, UNIDO, UNEP, UNICEF, FAO, UN-Habitat, UNOPS, WHO, IFAD, ICBA, CGIAR, HarvestPlus, OIE, IARC, UICC, WGCI, WFP, JICA, AERIAL (France), AERI, ANSTO, and TEES.

ANNEX 1: PARTNERSHIP MATRIX

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDF Outcomes	Relevant Partners
Nuclear and Radiation Safety and Security	**Vision 2025** 12. GOVERNANCE AND ACCOUNTABILITY Strengthened policies of good governance.	Strengthened national nuclear and radiation safety infrastructure, technical capacities and human resources for the protection of people and environment of Sri Lanka.			*National:* SLAERC SLAEB MPEBD MoSTR *International:* UNEP TEES GNSSN RCF
Food and Agriculture	**Vision 2025** 11. AGRICULTURE AND SUSTAINABLE DEVELOPMENT • Facilitate efficiency in agricultural markets. • Help smallholders in the tea, rubber and non-traditional export sectors. • Promote the investment in the livestock sector. • Promote investment in the fisheries sector. • Encourage nutritious farming practices. **National Agriculture Policy** GOALS AND OBJECTIVES Increase domestic	Enhanced productivity, competitiveness and climate change resilience of food, agriculture, and animal production and health sector for the benefit of the people and economy of Sri Lanka.	SDG 2: Zero Hunger SDG 13: Climate Action SDG 15: Life on Land	Driver 4: Enhancing resilience to climate change and disasters and strengthening environmental management	*National:* MARLIFA SLAEB *International:* FAO UNDP IFAD ICBA World Bank ADB CGIAR HarvestPlus OIE

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDF Outcomes	Relevant Partners
	agricultural production to ensure food and nutrition security of the nation. • Enhance agricultural productivity and ensure sustainable growth. • Maximize benefits and minimize adverse effects of globalization on domestic and export agriculture. • Adopt productive farming systems and improved agro-technologies with a view to reduce the unit cost of production and increase profits. • Adoption of technologies in farming that are environmentally friendly and harmless to health. • Promote agro-based industries and increase employment opportunities. • Enhance the income and the living standard of farming community.				
Health and Nutrition	**Vision 2025** 8. ECONOMIC AND SOCIAL INFRASTRUCTURE Improved healthcare for better labour market and	Strengthened national capacities to control vector-borne diseases including dengue. Increased access of Sri Lankan	SDG 3: Good Health and Well-Being	Driver 3: Human security and socio-economic resilience.	<u>*National:*</u> MHNIM SLAEB <u>*International:*</u>

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDF Outcomes	Relevant Partners
	education outcomes. • Strengthened curative and preventive primary health care delivery system to treat NCDs. • Supported programmes combating CKDu. **National Health Policy 2016-2025** Healthier nation that contributes to its economic, social, mental and spiritual development. **National Nutrition Policy** Ensured optimal nutrition throughout the life cycle.	people to quality health services for diagnosis and treatment of non-communicable diseases, including palliative care. Improved nutrition practices for healthier population of Sri Lanka.			WHO IARC UICC WGCI UNICEF World Bank ADB SUN
Water Resources Management	**Vision 2025** 8. ECONOMIC AND SOCIAL INFRASTRUCTURE • Ensured equitable access to safe drinking water and sanitation for the entire population. • Upgraded water quality assessment capacities to detect heavy metals in water in combating CKDu. **National Drinking Water Policy**	Enhanced Sri Lanka's capacities in sustainable water resources management.	SDG 6: Clean Water and Sanitation	UNSDF Driver 4: Enhancing resilience to climate change and disasters and strengthening environmental management Indicator 4.2. Percentage increase in implementation of integrated water management systems	*National:* MARLIFA MCPWSHE MHCCA MMDE CEA DWC NDCWS NWSDB IWMI SLAEB *International:* FAO

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDF Outcomes	Relevant Partners
	• A healthy society that values the reliability and safety of drinking water and is committed for its sustainable use. • Promote incentives for conservation and efficient use of resources through appropriate measures consistent with other policies and programmes. **National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations in Sri Lanka (October 2014)** 5. Policy Objective The main objective of this policy is to protect and conserve all the water sources their reservations the conservation areas and immediate catchment areas to ensure the existence of the water sources in Sri Lanka.				UNDP UNEP UN-Habitat UNICEF UNOPS WFP WHO World Bank ADB IDB EIB JICA
Energy and Industry	**Vision 2025** 11. AGRICULTURE AND SUSTAINABLE DEVELOPMENT Increased overall power	Increased and diversified energy production in Sri Lanka. Strengthened and expanded non-	SDG 7: Affordable and Clean Energy SDG 9: Industry,		*National:* MPEBD MIC MMDE

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDF Outcomes	Relevant Partners
	generation, access, and storage by implementing long-term generation expansion plans • Promoted diversified production and storage of sustainable clean energy. • Followed Blue Green initiative to encourage low emission economic development. **Industrial Policy and Strategy** Enhancing the competitiveness of selected thrust areas Productivity improvement in industry sectors	destructive material testing practices in Sri Lanka.	Innovation and Infrastructure		SLAEB *International:* UNDP UNIDO World Bank ADB IDB EIB AERIAL (France) KAERI
Human Resources Development for Nuclear Applications	**Vision 2025** 8. ECONOMIC AND SOCIAL INFRASTRUCTURE Increased access to tertiary education	Strengthened nuclear education and training capacities of Sri Lanka.		Driver 3: Human security and socio-economic resilience Indicator 3.3. Proportion of youth (aged 15-29) engaged in education, unemployment, training or volunteer activities, by gender and location.	*National:* MCPWSHE University of Colombo SLAERC SLAEB *International:* UNESCO ANSTO KAERI AERIAL (France) TEES

ANNEX 2: LIST OF PARTICIPATING INSTITUTIONS

Participating Institutions	Roles and Responsibilities
Ministry of Power, Energy and Business Development Ceylon Electricity Board **Sri Lanka Atomic Energy Board (SLAEB)** National Centre for Non-Destructive Testing- SLAEB Sri Lanka Gamma Centre-SLAEB **Sri Lanka Atomic Energy Regulatory Council**	The Ministry of Power, Energy and Business Development serves as the line ministry for SLAEB and SLAERC. It is responsible for the formulation of policies, programmes, projects, and monitoring for evaluation as regards the subjects of power and renewable energy. www.powermin.gov.lk www.ceb.lk www.aeb.gov.lk www.aerc.gov.lk
Ministry of Foreign Affairs UN, MA Division	The Division works in coordination with local line ministries/departments and agencies, UN agencies represented in Sri Lanka, international and local non-governmental organizations, human rights and civil society groups, and experts to promote and protect Sri Lanka's interests, and contribute to the norm setting and other processes within the UN systems and procedures. These functions are carried out through Sri Lanka's Permanent Missions to the UN in New York and in Geneva, and through Sri Lanka's Embassies/ High Commissions. e.g. Vienna www.mfa.gov.lk
Ministry of Finance and Mass Media Sri Lank Customs – Mega Port Surveillance Unit	The Ministry coordinates with international agencies and mobilize foreign resources ensuring effective use. While its treasury allocations provide approximately 50% of SLAEB's total budget. www.treasury.gov.lk www.customs.gov.lk
Ministry of Justice and Prisons Reforms Attorney General's Department	Formulation of policies, plans and programmes in respect of the machinery for administration of justice. www.moj.gov.lk The Attorney General is the Chief Legal Advisor to the Government. In that capacity he advises the Government, Government Departments, Statutory Boards and Public Corporations in respect of all legal matters. He conducts prosecutions in criminal cases and appears on behalf of the Government, Government Departments, Statutory Boards and Public Corporations in any Court or Tribunal. The SLAEB liaises with the AG's Department for all legal matters. e.g. IAEA Privileges and Immunities www.attorneygeneral.gov.lk

Participating Institutions	Roles and Responsibilities
Ministry of Health, Nutrition and Indigenous Medicine International Health Unit National Cancer Institute/Apeksha Hospital - Maharagama Cancer Control Programme Department of Nutrition	The Ministry contributes to social and economic development of Sri Lanka by achieving the highest attainable health status through promotive, preventive, curative and rehabilitative services of high quality made available and accessible to people of Sri Lanka. Among its strategic objectives the MOH coordinates with health related governmental, non-governmental, international agencies and organizations in promoting health of people. www.health.gov.lk www.ncisl.health.gov.lk www.nccp.health.gov.lk
Ministry of Education Ministry of Education – Science Branch NEI – National Education Institute - Maharagama	The mission of the MOE is to develop competent citizens keeping with the global trends through innovative and modern approaches to education leading to efficiency, equity and high-quality performance ensuring stakeholder satisfaction. While it oversees the education of school children on nuclear science and technology. www.moe.gov.lk www.nie.lk
Ministry of City Planning, Water Supply and Higher Education **University of Colombo** Department of Nuclear Science Department of Physics Department of Chemistry Faculty of Medicine **University of Jaffna** Faculty of Medicine (NMU) **University of Sri Jayewardenepura** Department of Chemistry -Faculty of Applied Sciences **University of Kelaniya** Department of Archaeology of The Faculty of Social Sciences Department of Chemistry Faculty of Medicine- Molecular Medicine Unit **University of Peradeniya** Faculty of Agriculture Faculty of Engineering Faculty of Medicine-Nuclear Medicine Unit- NMU Faculty of Science Department of Nuclear Science Department of Veterinary Science & Animal Health	The Ministry plays an important role in the area of organizing and directing the higher education system. The Ministry develops partnerships with international universities for two-way information exchange and to increase opportunities for scholarships for overseas study for Sri Lankans. www.mohe.gov.lk The relevant universities currently engaged with SLAEB are; www.cmb.ac.lk www.jfn.ac.lk www.sjp.ac.lk www.kln.ac.lk www.pdn.ac.lk www.ruh.ac.lk www.mrt.ac.lk www.wyb.ac.lk www.sab.ac.lk www.ou.ac.lk National Water Supply and Drainage Board is the national organization responsible for the provision of safe drinking water and facilitating the provision of sanitation to the people in Sri Lanka. www.waterboard.lk

Participating Institutions	Roles and Responsibilities
Open University of Sri Lanka **University of Sabaragamuwa** Faculty of Applied Science **University of Ruhuna** Department of Oceanography and Marine Geology **University of Moratuwa** Department of Mechanical Engineering Department of Electrical Engineering Department of Civil Engineering Department of Material Science **University of Wayamba** Department of Electronics Department of Livestock and Avian Science, Faculty of Livestock, Fisheries and Nutrition Department of Plantation Management, Faculty of Agriculture and Plantation Management **National Water Supply and Drainage Board**	
Ministry of Defence Sri Lanka Airforce- CBRN Unit Sri Lanka Army- CBRN Unit Sri Lanka Navy- CBRN Unit, Sri Lanka Coast Guard	The mission of the MOD is to formulate and execute strategic plans and policies for a secure, safe and sovereign country with territorial integrity. www.defence.lk www.airforce.lk www.army.lk www.navy.lk www.coastguard.gov.lk
Ministry of Law and Order Sri Lanka Police Special Task Force (STF)	The Ministry is responsible for formulating and implementing national policy on law and order and other subjects which come under its purview. The Ministry manages the country's police. www.lawandorder.lk www.police.lk
Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation, Fisheries and Aquatic Resources Development Department of Agriculture Horticultural Crop Research and Development Institute (HORDI) Rice Research and Development Institute-Batalegoda Oil Crops Research and Development Centre-Angunakolapelessa Field Crop Research and Development Institute-Mahailuppalama Department of Export Agriculture	The agricultural sector makes a significant contribution to the national economy, food security and enables employment in the country. Agriculture is the main livelihood of the majority in the rural sector and plays a key role in alleviating rural poverty. www.agrimin.gov.lk www.doa.gov.lk Ministry's mission is to achieve globally competitive production, processing and marketing enterprises through socially acceptable, innovative and commercially-oriented agriculture, through sustainable management of natural resources of

Participating Institutions	Roles and Responsibilities
	the country. The vision of the Ministry is to be the leader of conservation and sustainable utilization of Fisheries and Aquatic Resources in the South Asian Region. While its mission is to manage the utilization of Fisheries and Aquatic Resources for the benefit of the present and future generation. Water Resources Board aims to conserve and sustainably utilize water resources of the country by using new technologies and management tools. www.wrb.gov.lk www.fisheries.gov.lk
International Water Management Institute	Non-profit, scientific research organization focusing on the sustainable use of water and land resources in developing countries. www.iwmi.cgiar.org
Ministry of Transport and Civil aviation Airport and Aviation Cervices- Sri Lankan Airlines	The duties and functions of the Ministry are; formulation of policies, programmes and projects, monitoring and evaluation in regard to the subject of transport and those subjects that come under the Department of Sri Lanka Railways, Sri Lanka Central Transport Board, National Transport Medical Institute, Department of Motor Traffic, National Transport Commission, Civil Aviation Authority, Airport and Aviation Services (Sri Lanka) Ltd. www.transport.gov.lk www.srilankan.com
Ministry of Ports and Shipping and Southern Development Ports Authority	The Ministry formulates appropriate policy frameworks and efficient mechanisms that lead to the provision of competitive and qualitative port and shipping services in order to fulfil the local and international requirements in the field of maritime activities for national economic development. www.portmin.gov.lk
Ministry of Mahaweli Development and Environment Central Environmental Authority **Geological Survey and Mines Bureau**	The Ministry is committed for the management of the environment and natural resources of the country, maintaining the equilibrium between the trends in rapid economic development and use of natural resource base. Social and economic behaviour of the increasing human population has put a major threat in achieving these objectives. The ministry has framed key policies for adoption in management of environment and natural resources of the country. These policies are implemented with the participation of stakeholders including government, agencies, NGO's and communities. www.mmde.gov.lk

Participating Institutions	Roles and Responsibilities
Ministry of Industry and Commerce, Resettlement of Protracted Displaced Persons, Cooperative Development and Vocational Training & Skills Development	This Ministry has been assigned the functions of planning, formulating, coordinating, implementing and setting up of the necessary infrastructure for the promotion and development of the industrial sector. It has taken several initiatives to carryout diversified high value-added industry base, high economic growth, create more employment opportunities, environment sustainability, sustainable industrial development and regional industrial development. www.industry.gov.lk
Department of Archelogy	Sri Lanka claims a cultural heritage of over 2500 years. While the mission of the Department of Archaeology of Sri Lanka is to function as Sri Lanka's apex institution and chief regulatory body for the management of its archaeological heritage. www.archaeology.gov.lk
Department of National Museums	The national museums have now developed to international levels. While branch museums have opened in Jaffna, Kandy and Rathnapura. The extension of the number of branch museums has now increased to nine and in addition a school science programme and a mobile museum service are also in operation. This process has further been improved by the arrangement of the galleries of the ground floor in a historical sequence and those of the upper galleries on a thematic basis. www.museum.gov.lk
Ministry of Science, Technology and Research National Institute of Fundamental Studies (NIFS)	The goal of NIFS is to stimulate the growth of knowledge by the enhancement of the countries national scientific research capability, in selected fields to eventually build a knowledge-based Sri Lankan society. It conducts basic research in; mathematics, chemistry, life sciences and social sciences as well as dissemination of gained knowledge. NIFS also trains around 32 graduate students at any given time. www.nifs.ac.lk

ANNEX 3: LEGAL FRAMEWORK AND IAEA-RELEVANT TREATIES

	Title	In Force	Status
P&I	Agreement on the Privileges and Immunity of the IAEA		Non-Party
VC	Vienna Convention on Civil Liability for Nuclear Damage		Non-Party
VC/OP	Optional Protocol Concerning the Compulsory Settlement of Disputes		Non-Party
CPPNM	Convention on the Physical Protection of Nuclear Materials		Non-Party
CPPNME	Amendment to the Convention on the Physical Protection of Nuclear Materials		Non-Party
NOT	Convention on Early Notification of a Nuclear Accident	1991-02-11	Accession: 1991-01-11
ASSIST	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1991-02-11	Accession: 1991-01-11
JP	Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention		Non-Party
NS	Convention on Nuclear Safety	1999-11-09	Accession: 1999-08-11
RADW	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management		Non-Party
PVC	Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage		Non-Party
SUPP	Convention on Supplementary Compensation for Nuclear Damage		Non-Party
RSA	Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA (RSA)	1979-09-18	Signature: 1979-09-18
RCA	Third Agreement to Extend the 1987 Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA)	2002-04-26	Acceptance: 2002-04-26
AFRA	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) - Third Extension		Non-Party
ARCAL	Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL)		Non-Party
ARASIA	Co-operative Agreement for Arab States in Asia for Research, Development and Training Related to Nuclear Science and Technology (ARASIA)		Non-Party

Safeguards Agreements

Reg. No	Title	In Force	Status
1514	Application of safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons	1984-08-06	Signature: 1980-07-05

ANNEX 4: DETAILS OF PAST TC PROGRAMME ACHIEVEMENTS

Sri Lanka joined the IAEA TC programme in 1976.

During the past decades, Sri Lanka completed 116 national technical cooperation projects and participated in 8 interregional and 177 regional projects across all the TC thematic areas from nuclear safety and security through food and agriculture and health and nutrition, to water, energy and industry. A broad spectrum of trainings helped enhance national capacities in the application of nuclear technology in particular in medicine, industry and agriculture. Amongst others, national capacities in radiation therapy, diagnostic radiology and nuclear medicine services have been strengthened both in quality and quantity; national capacities in radiation technology for food irradiation, in non-destructive material testing, in mutation breeding for enhanced crop production, in energy planning, in soil and water management and fertilizer use efficiency, in radiation sterilization of human tissue for transplantation, and the sterilization of medical supplies have been strengthened. In addition, national capacities have been enhanced in the use of isotope hydrology for water resources management and the use of diagnostic techniques for animal health.

Key areas and major impact include:

Thematic area	Results of past technical cooperation	Key counterpart institutes and partners
Radiation safety and security	Through its participation in national, regional and interregional TC projects, Sri Lanka strengthened its national capacities in nuclear and radiation safety and security for the protection of the people and the environment, including the protection of patients and occupationally exposed workers to ionizing radiation. Sri Lanka has promulgated the basic law to meet international requirement which include safety, security and safeguards. The Act also established an independent regulatory body to execute the mandate of the act to control radiation sources and nuclear materials – the Sri Lanka Atomic Energy Regulatory Council (SLAERC). Between 2009 and 2018, the national capability for **early detection of environmental radioactivity** due to transboundary nuclear dispersions was improved in support of decision-making for the protection of the public. An easy to operate and maintain early warning system was proposed and background radiation levels were measured to provide the baseline for the identification of increased radiation levels in the environment due to the nuclear fallout. The national nuclear and radiological emergency protocol was drafted and reviewed by the expert to define the roles of the participating organizations in the national disaster management scheme, including those of the Disaster Management Centre and the Atomic Energy Authority and to propose the intervention and action levels for decision making in the event of emergency. The protocol will have to be considered and approved by the Government to become effective.	Sri Lanka Atomic Energy Board Disaster Management Centre

	Between 2012 and 2018, the **radiation safety for patients and medical staff** was strengthened and nuclear analytical services enhanced. The practice of diagnostic radiology within safety standards while maintaining optimum diagnostic quality was established. This is bringing a uniform practice of diagnostic radiation in terms of radiation protection of staff and patients and radiation safety standards in Sri Lanka up to currently accepted international recommendations, with added sustainability and knowledge dissemination through the hospital's function as teaching hospital attached to the University of Colombo. Due to the training and expert support provided in combination with the proper analytical, calibration and dosimetry equipment, Sri Lanka established a quality radiation safety infrastructure in the country, upgraded existing X-ray Fluorescence (XRF) facilities for forensic, archaeological and cultural heritage analysis and extended the Total Reflection X-ray Fluorescence (TXRF) facility to assist biomedical studies on CKDu.	Sri Lanka Atomic Energy Board National Hospital of Sri Lanka
Food and Agriculture	Between 2001 and 2005, TC support helped Sri Lanka **to develop black pepper mutant varieties by radiation-induced mutations**. The Agency provided laboratory equipment and supplies for the molecular biology laboratory at Matale. As a result, the institutional capability has been enhanced in performing DNA finger printing with amplified fragment length polymorphism (AFLP), randomly amplified polymorphic (DNA) (RAPDS) and simple sequence tandem repeats (ISSR) analysis coupled to polymerase chain reaction (PCR). The project results could increase total black pepper production and reduce the production cost and eventually increase in export earnings.	Department of Export Agriculture
	From 2001 to 2009, IAEA technical cooperation helped enhance national capacities in **monitoring of the quality of food commodities** and public health hazards in terms of food-borne pathogens, the incidence of antimicrobial resistant pathogens and residues of antimicrobial drugs chemical residues. Technical cooperation contributed to the establishment of facilities and capabilities in the University of Peradeniya Faculty of Veterinary Medicine and Animal Science including the screening of food commodities for residues of antimicrobial substances, screening of animal feed samples for antimicrobial additives, screening of foods for food-borne pathogens, monitoring campylobacter in food commodities and providing analytical services to the livestock and aquaculture industries. Good laboratory practice (GLP) principles such as record keeping, equipment calibration, personnel training, and preparation of a quality manual and other quality management documentation are implemented. Food safety has been enhanced for the local population and the necessary standards can now be met with regard to veterinary drug residues and microbiological contamination to assist in maintaining international trade in animal-derived food commodities. The impact of the support has been recognized by the Sri Lankan Authorities through the formation of a new University of Peradeniya Department of Veterinary Public Health and Pharmacology. The knowledge and experience gained by the trainees has been further disseminated via the under and postgraduate academic programmes of the Department.	University of Peradeniya, Faculty of Veterinary Medicine and Animal Science
	Between 2001 and 2005, a TC project helped **develop improved banana mutant clones** at the Department of Botany, University of Colombo, with the aim to minimize the risk of spreading viruses through mass-propagation as well as to ensure the availability of virus free mutant clones to the farmers. The major achievement of the project was the development of disease indexing	University of Colombo, Faculty of Science, Department of

	techniques for routine testing the disease of planting material of mutant banana clones. The technology of producing banana virus antibodies through the 'hen egg technique' has also been successfully transferred to the University of Colombo. The counterpart has developed an Enzyme Linked Immunosorbent Assay (ELISA) based virus testing kit for the detection of banana streak virus (BSV), which is much cheaper than the commercially available kit. A detailed protocol has been established which would allow tests for other banana viruses which enabled to produce healthy and disease-free plants of the improved banana cultivars for large-scale cultivation. As a result, disease-free planting material was readily available to the growers.	Plant Sciences Mahaweli Authority Walawa Area Office
	Between 2009 and 2013, the IAEA helped Sri Lanka enhance **the crop nutrition in coconut plantation through the application of N-15 isotope tracer technology**. The knowledge and technical skills acquired through the project were disseminated to other R&D organizations in the country through workshops and collaborative work, to ensure maximum benefits. The main output of the project – an environmentally friendly low-cost fertilizer for coconut-based cropping systems was transferred to the end users, small and medium scale coconut growers.	Coconut Research Institute
	Between 2007 and 2012, the IAEA helped enhance the **productivity of small holder goat farms,** which led to an increased income of the farmers. The laboratories established now function as service facilities for farmers and commercial goat breeders as well as researchers. Livestock extension officers, farm managers, veterinary surgeons and livestock researchers, goat farmers, commercial goat breeders and consumers of goat products are the major beneficiaries of this project.	University of Peradeniya, Faculty of Veterinary Medicine and Animal Science, Department of Basic Veterinary Science
Health and Nutrition	Between 2003 and 2009, the IAEA TC programme helped enhance national capacities in **molecular diagnostic services** for major infectious diseases to the general public. The support was also instrumental in assisting the counterpart with the preparation of standard operating procedures (SOP) for each diagnostic assay and the preparation of a laboratory manual for Quality Assurance and Quality Control (QA/QC) of major infectious diseases in Sri Lanka. Necessary training was provided to the staff of the counterpart institute to manage the new molecular medicine unit, which is housed in a building as a separate unit of the faculty. The IAEA provided most of the laboratory equipment. Collaboration with the following units and institutions was established: North Colombo Teaching Hospital (NCTH), Department of Microbiology, Faculty of Medicine of University of Colombo, National Blood Bank, Colombo, Ministry of Health, National Teaching Committee for Dengue Control, National Technical Committee for influenza in Sri Lanka, the Department of Virology of Hong Kong University and St. Jude's Hospital, USA. Extensive work was also carried out by the staff of the counterpart institute in the collection of serum samples for diagnosis of dengue, drug resistant malaria infections, hepatitis B/C and tuberculosis.	University of Kelaniya, Faculty of Medicine
	Between 2003 and 2009, technical cooperation helped strengthen the **quality of radiotherapy services** in Sri Lanka as a whole, in particular the radiotherapy centres in Galle (providing services to southern Sri Lanka). Training received led to a 'train the trainers' approach in the fields of radiation therapy technology, radiation physics, radiation biology and clinical radiation oncology. This ultimately led to an increase of trained personnel in the area of radiotherapy in Sri Lanka.	General Hospital University of Ruhuna

	Between7 and 2012, the counterpart's capability in carrying out various data analyses such as using Fourier Transform Infrared (FTIR) Spectroscopy to determine body composition, other methods of body composition such as bioelectrical impedance, and analysis of serum ferritin, folate, vitamin B12 and zinc levels as additional biomarkers of **nutritional status** were enhanced. Results obtained from those analyses contributed towards five research presentations. In addition to helping Sri Lanka to establish the national capability to assess body composition and micronutrient status, the project has helped to evaluate the efficacy of a newly developed nutrition and health education package. The Government of Sri Lanka has accorded the project national strategic status by incorporating it into the National Nutrition Policy and by using its results in the on-going education programme run by the Sri Lankan Ministry of Health.	University of Colombo, Faculty of Medicine
	Between 2009 and 2016, a fully equipped laboratory with basis equipment to carry out techniques related to **biological dosimetry** was established. Systematic screening of radiation workers is carried out in cooperation with clinicians in the radiotherapy department and of patients undergoing radiotherapy to improve the therapy regimen. The facility can ultimately be used to define the causes of cancer among the population in Sri Lanka as a result of exposure to environmental pollutants and/or lifestyle (e.g. betel nut consumption).	University of Kelaniya, Faculty of Medicine
	Between 2012 and 2018, the TC project significantly **enhanced the capacity of the Nuclear Medicine Unit** at the University of Peradeniya. The technological upgrade with a new modern double-head SPECT gamma camera along with other major equipment coupled with the training of nuclear medicine physicians and technologists enhanced access of patients to high quality diagnostic services and improved management of patients affected by cardiac diseases, cancers and other chronic diseases.	Teaching Hospital University of Peradeniya, Faculty of Medicine, Nuclear Medicine Unit
	In 2012-2013, the IAEA supported a project aiming at strengthening radiotherapy for cancer treatment through the **establishment of a brachytherapy facility at the Cancer Unit of Tellippalai, Jaffna**, and strengthening overall radiotherapy, medical physics facility including continuing medical education and research in Sri Lanka.	Teaching Hospital Jaffna
Water and Environment	Between 2003 and 2007, the IAEA helped the Government of Sri Lanka to evaluate the **residue behaviour and environmental fate of pesticides** in different Sri Lankan soil types and to assess the impact of pesticides on water catchments and groundwater contamination. The Agency provided laboratory equipment, chemicals and consumables for conducting pesticide sorption and degradation studies. Training was provided in the utilizing the Pesticide Impact Ranking Index (PIRI) programme under Sri Lankan conditions, pesticide risk assessment, including radiotracer technique that generated data on pesticide sorption and degradation. The training helped to establish national capacity for pesticide risk assessment. It also assisted the main project counterpart in providing technical direction in the field of pesticide risk assessment. As a result of the project, physical and chemical parameters of Sri Lankan soils were characterized to provide the baseline data for the subsequent pesticide fate analysis in which the degradation of the applied pesticides was to be studied and correlated with the soil properties. The respective pesticide sorption studies were conducted to generate values which were used for modelling and risk assessment. Degradation studies were conducted with radiolabelled carbofuran and diazinon for selected soils. The results used for modelling and risk assessment were published in international papers. The project generated data that allowed for a judgement of the impact that the use of pesticides had caused under the conditions prevailing in Sri Lanka.	Industrial Technology Institute University of Kelaniya Sri Lanka Atomic Energy Board

	Between 2003 and 2007, TC support helped enhance the capability of counterpart institutions in the area of **dam safety management**. This would eventually lead to cost effective repair and modifications of the high-risk dams, thus ensuring sustainable power generation, agricultural irrigation and water supply in the country. The operational capacity provided for the tritium enrichment system will also be used for other commercial services. The Agency assisted in carrying out the analysis of water sample collected from the two sites of the project. An expert conducted isotope studies in the Mahaweli River Basin that were aimed at establishing baseline data on natural isotope levels of different water sources such as rainwater and reservoir water. This baseline data was then used to detect the sources and paths of seepages and leakages of dams and reservoirs. The last expert missions that were fielded under the project successfully assembled the tritium enrichment system and put it into routine operation at the laboratory of the Atomic Energy Authority (AEA), Colombo.	Irrigation Department Mahaweli Authority of Sir Lanka Ceylon Electricity Board Sri Lanka Atomic Energy Board
	Between 2005 and 2010, technical cooperation assisted the counterpart in mastering the landscape sampling for **erosion assessment** based on fallout radionuclides. It has also enhanced the capability of counterpart in sampling, detection and interpretation of the Cs-137 information for erosion mapping. As a result, Sri Lankan counterparts are now able to map land use and to assess its impact on erosion, showing the intensity and spatial distribution of erosion and associated nutrient movements. Important data and results have been generated and assisted the relevant authorities of Sri Lanka to assess the actual magnitude of erosion and associated soil fertility degradation and assisted them in designing management approaches to alleviate the soil erosion and degradation problems and to conserve soil fertility for sustainable agricultural development.	Sri Lanka Atomic Energy Board Ministry of Lands and Minor Agricultural Exports, Department of Irrigation, Land Use Division
Energy and Industry	Thanks to a project implemented between 2001 and 2005, staff of the radiation processing laboratory at the SLAEB can **process, analyse, irradiate and heat treat semi-precious stones for research and development work**. Radiation Vulcanized Natural Rubber Latex technology has also been introduced in some end-user applications such as binder for coconut fibres in the manufacture of pots to replace plastic containers used in green houses and nurseries. Those activities promoted the research and development work in the applications of irradiation and would eventually contribute to the commercial applications of irradiation in industries for production of value-added products, and therefore to the increase of exports and national revenue.	Sri Lanka Atomic Energy Board National Gem and Jewellery Authority Rubber Research Institute
	Between 2009 and 2013, the Central Environmental Authority (CEA) and the Atomic Energy Authority, as the main counterpart institutes and the responsible government body have been provided with the basic understanding of the requirements of the establishment of an **electron beam facility** and the necessary training to the manpower for operation and carrying out research and development work for transfer of technology to the industrial sector and end-users. Whenever a decision is made by the authorities for the installation of electron beam wastewater treatment plant, the expertise developed under this project would still be available for making a major contribution towards achieving the objectives.	Central Environmental Authority Sri Lanka Atomic Energy Board
	Between 2012 and 2016, a TC project **supported energy planning capacities and a pre-feasibility study for using nuclear power** in Sri Lanka. Due to the training and expert support provided, Sri Lanka developed enhanced capabilities for energy planning with emphasis on electrical power system expansion planning, identifying possible sites for future nuclear power plants. Sri Lanka also developed capabilities for the establishment of academic programmes for sustainable	Ceylon Electricity Board Ministry of Power, Energy and Business

human resource development in support of a possible future nuclear power programme in the country. Not only the national electricity utility, Ceylon Electricity Board, benefitted from the IAEA support but also the electricity regulator, Ministry of Power, Energy and Business Development, which approves the electricity plans, enhanced its expertise through the project activities.	Development University of Moratuwa; Department of Electrical Engineering
Between 2012 and 2017, **an accredited national centre for non-destructive testing (NDT) was established**. As a result, national capacity to provide NDT services in industry, welding and civil engineering for improved quality, safety and reputation of Sri Lankan industrial products and inspection services has enhanced.	Sri Lanka Atomic Energy Board