NATIONAL ENVIRONMENTAL ACTION PLAN 2022-2030:

Pathway to sustainable development

Ministry of Environment

Sri Lanka

2022

PUBLICATION COPYRIGHTS

ISBN 978-624-5817-24-5

Technical and Financial Assistance : GEF/UNDP
Enhancing Biodiversity Conservation and Sustenance of Ecosystems services in Environmentally Sensitive Areas

Managing Together: Integrating Community centered, ecosystem based approaches into forestry, agriculture and tourism

CITATION

MoE (2022). *National Environmental Action Plan 2022-2030.* Colombo, Sri Lanka: Ministry of Environment. xxii+346pp.

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MESSAGE FROM THE SECRETARY

Environmental planning is a striking tool that can be utilized to enhance the integration of environmental concerns into development planning. The first comprehensive National Environmental Action Plan (NEAP) for Sri Lanka was prepared and implemented in 1992 and contributed to many positive developments in environment conservation. Thereafter, a series of National Environment Action Plans came into action, for instance NEAP 1998-2000, Caring for the Environment 2003-2007, Haritha Lanka Programme 2009-2016. NEAP (2022-2030) is the first Environment Plan prepared as an operational guide, after the adoption of the SDGs and the Paris Agreement. In compliance with those international agreements, the Plan has appropriately incorporated these novel global concerns in the local context in many themes in achieving the objectives.

Moreover, Ministry of Environment recognized the need of a NEAP to be in line with the National Environment Policy to maintain the vitality and integrity of natural resources and living environment of the country that would steer the country towards sustainable development. In this context, NEAP has been prepared through an interactive process with the involvement of the key stakeholders. The NEAP (2022-2030) consists of nine themes and three cross-cutting areas. Air, Biodiversity, Climate, Coastal and Marine, Land, Waste, Water, Cities and Industry are the main focus areas reflected in the NEAP. Learning from experiences and major challenges of the implementation of previous action plans, implementation and monitoring, indicative budgets, key performance indicators, key responsible agency have been identified in the NEAP to assure outcomes.

I believe that the successful implementation of the NEAP needs mutual understanding of all stakeholder agencies and recognize their vital role in environment management as well. In addition, sharing information and knowledge plays a vital role in achieving the objectives of the NEAP. It is expected that the goals, objectives and strategies in the NEAP will be converted into realistic action programmes by all the agencies of the country. The NEAP is not one-off document or plan, it is rather a live action plan which needs to be improved and updated as and when necessary, so that the government agencies of the country themselves will own this plan and will be able to incorporate this into their action plans.

I take this opportunity to express my sincere gratitude to all the stakeholder agencies and all other partners for supporting and providing valuable inputs to develop NEAP. My appreciation also extends to Dr. Shamen Vidanage, Team Leader and all the experts who worked for the preparation of NEAP. I would like to acknowledge the role played by the UNDP for their continuous assistance throughout the whole exercise in numerous ways.

Dr. Anil Jasinghe
Secretary - Ministry of Environment

MESSAGE FROM THE RESIDENT REPRESENTATIVE, UNDP SRI LANKA

Conserving and sustaining a biodiverse environment is a significant challenge in a highly vulnerable Sri Lanka, one of the world's biodiversity 'hotspots' according to Conservation International (2016).

At the same time, Sri Lanka has taken important steps towards climate action and conservation of natural capital, including through several policy measures embedded in its Nationally Determined Contributions, and the low carbon emissions objectives tied to high Human Development. These measures - in line with the Sustainable Development Goals - bolster economic growth, encourage new investments, promote transformational action, and drive environmental sustainability, given the interdependence of Sri Lanka's key economic sectors with the natural resources of the country.

Flagship research from UNDP (2021) shows that 'eight out of 10 people that could become poor by the end of this decade because of the pandemic will live in countries with low or medium human development'. But the same research also details how a combination of policy choices and investments in governance, social protection, green economy and digitalization - through an 'SDG Push' - can help countries exceed pre-pandemic development trajectories, even when taking the impact of COVID-19 into account. The SDGs can still be achieved and reversals due to the pandemic can be undone. Collective action, political will, and scaling up of green investments, can better achieve an equitable post COVID-19 world. To address these extraordinary challenges, through its new Strategic Plan 2022-2025, UNDP is harnessing innovation and partnerships to build the world envisioned by the 2030 Agenda for Sustainable Development with planet and people in balance.

UNDP is supporting the Government of Sri Lanka with key policy products, which are spearheading the systemic shift for more green development. As such, UNDP is pleased to have assisted the Ministry of Environment with technical and financial contributions to develop the National Environment Action Plan 2022-2030: Pathway to Sustainable Development - a nationally significant initiative.

This intervention is a complement to the overall national development planning and finance support extended by UNDP to the Government of Sri Lanka to establish SDG-aligned processes. The National Environmental Action Plan will be catalytic in advancing Sri Lanka's green development trajectory, mainstreaming nature-based solutions at the national and local levels and guiding the country's development sectors to embed biodiversity conservation and ecosystem restoration in their efforts. This Plan can boost approaches to sustainable development envisaged in national policy framework 'Vistas of Prosperity and Splendour', the National Environment Policy and the National Policy on Environmentally Sensitive Areas (ESAs) - being finalized with the support of UNDP.

UNDP remains a committed partner to the Ministry of Environment in supporting implementation of this National Environmental Action Plan 2022-2030: Pathway to Sustainable Development, which will positively inform efforts of the Government and all stakeholders in putting environmental concepts and preservation of nature capital at the heart of economic development in Sri Lanka.

Robert Juhkam
Resident Representative, UNDP in Sri Lanka

ACRONYMS

3Rs	Reduce, Reuse, Recycle
ABS	Access and Benefit Sharing
ADB	Asian Development Bank
AER	Agro Ecological Regions
AGD	Attorney General's Department
AirMAC	Air Resource Management Centre
AQ	Air Quality
AQM	Air Quality Management
ARM&NOU	Air Resource Management & National Ozone Unit
BARTs	Best Available Retrofit Technologies
BATs	Best Available Technologies
BAU	Business-as-Usual
BCP	Bio Cultural Community Protocols
BCNP	Biodiversity, Cultural and National Heritage Protection
BDS	Biodiversity Secretariat
BES	Biodiversity and Ecosystem Services
BIOFIN	Biodiversity Finance Initiative
BOBLME	Bay of Bengal Large Marine Ecosystem
BoI	Board of Investment of Sri Lanka
C&HS	Cities and Human Settlement
CA2025AP	Clean Air 2025 Action Plan
CAA	Consumer Affairs Authority
CAASL	Civil Aviation Authority of Sri Lanka
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CBSL	Central Bank of Sri Lanka
CC	Climate Change
CC&CRMD	Coast Conservation and Coastal Resources Management Department
CCAC	Climate & Clean Air Coalition
CCB	Coconut Cultivation Board
CCC	Ceylon Chamber of Commerce
CCF	Central Cultural Fund
CCS	Climate Change Secretariat
CDA	Coconut Development Authority
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CECB	Central Engineering Consultancy Bureau
CEPF	Critical Ecosystem Partnership Fund
CEPOMs	Committees on Environmental Policy and Management
CFHC	Ceylon Fishery Harbours Corporation
CGI	City Governance Index
CHM	Clearing House Mechanism
CIAs	Chambers & Industry Associations
CIDA	Construction Industry Development Authority
CIEDP	Committee on Integrated Environment & Development Policy
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMC	Colombo Municipal Council
CMS	Convention on Migratory Species
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
CoP	Code of Practice
CP	Cleaner Production
CPC	Ceylon Petroleum Corporation
CPI	City Performance Index
CR	Critically Endangered
CRI	Coconut Research Institute
CSIAP	Climate Smart Irrigated Agriculture Project
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
CTB	Ceylon Transport Board
CTCN	UN Habitat and Climate Technology Centre and Network
CZ&CRMP	Coastal Zone and Coastal Resources Management Plan

ACRONYMS

DAD	Department of Agrarian Development
DAP&H	Department of Animal Production and Health
DArch	Department of Archaeology
DAyur	Department of Ayurveda
DB	Department of Buildings
DCS	Department of Census and Statistics
DCWS	Department of Community Water Supply
DEA	Department of Export Agriculture
DEC	District Environmental Committee
DFAR	Department of Fisheries and Aquatic Resources
DiVEC	Divisional Enviornmental Committees
DivS	Divisional Secretary
DMC	Disaster Management Centre
DMT	Department of Motor Traffic
DNA	Deoxyribonucleic Acid
DNBG	Department of National Botanic Gardens
DNM	Department of National Museum
DNZG	Department of National Zoological Gardens
DoA	Department of Agriculture
DoF	Department of Fisheries
DoGI	Department of Government Information
DoH	Department of Health
DRR	Disaster Risk Reduction
DS	District Secretary
DSS	Department of Social Services
DWC	Department of Wildlife Conservation
E3ST	Energy Efficient and Environmentally Sound Technology
E-IPs	Eco Industrial Parks
EAFM	Ecosystem-based Approach to Fisheries Management
ECBA	Extended Cost Benefit Analysis
Eco-DRR	Ecosystem-based Disaster Risk Reduction
EDB	Export Development Board
EE	Energy Efficiency
EEBC	Energy Efficient Buildings Code
EERS	Energy Efficiency Rating Scheme
EEZ	Exclusive Economic Zone
EFL	Environmental Foundation (Guarantee) Limited
EIA	Environmental Impact Assessment
ENSO	El Niño–Southern Oscillation
EPA	Environment Protection Areas
EPL	Environment Protection License
EPP	Environment Pioneer Programme
EPR	Extended Producer Responsibility
EPZ	Export Promotion Zone
ERD	Department of External resources
ESA	Environmentally Sensitive Areas
ESD	Education for Sustainable Development
EST	Environmentally Sustainable Transport
EV	Electric Vehicle
FAO	Food and Agriculture Organization
FARA	Fisheries and Aquatic Resources Act
FCAU	Food Control Administration Unit
FCCISL	Federation of Chambers of Commerce and Industry in Sri Lanka
FCRDI	Food Crop Research and Development Institute
FD	Forest Department
FFPO	Fauna and Flora Protection Ordinance
FQS	Fuel Quality Standards
FR	Forest Reserve
FRDI	Fruit Research & Development Institute
ft	Feet
GAP	Good Agricultural Practices
GBCSL	Green Building Council of Sri Lanka
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GIS	Geographic Information System
GLASoD	Global Assessment of Soil Degradation
GMO	Genetically Modified Organism
GMP	Good Manufacturing Practices
GoSL	Government of Sri Lanka
GPS	Global Positioning System
GSMB	Geological Survey and Mines Bureau
GWh	Gigawatt hours
GWMO	Global Waste Management Outlook
ha	Hectares
HBASL	Hadabima Authority of Sri Lanka
HCWM	Health Care Waste Management
HDV	Heavy Duty Vehicle
HEM	High Efficiency Motor
HLP	Haritha Lanka Programme
HORDI	Horticulture Research and Development Institute
HRD	Human Resources Development
HS	Harmonized Commodity Description and Coding System
HWM	Holistic Waste Management
IAP	Indoor Air Pollution
IAQ	Indoor Air Quality
IAS	Invasive Alien Species
ICM	Integrated Coastal Management
ICS	Improved Cooking Stoves
ICT	Information & Communication Technology
ICTA	Information and Communication Technology Agency
ICTAD	Institute of Construction Training & Development
ID	Irrigation Department
IDB	Industrial Development Board
IEE	Initial Environmental Examination
IEPSL	Institute of Environmental Professionals
IESL	Institute of Engineers Sri Lanka
IKMGG	Information and Knowledge Management for Green Growth
IMO	International Maritime Organization
IMS	Information Management System
INGO	International Non-Governmental Organization
IOTC	Indian Ocean Tuna Commission
IP	Industrial Park
IPCC	International Panel on Climate Change
IPM	Integrated Pest Management
IPNS	Integrated Plant and Nutrition Systems
IPOA	International Plan of Action
IPRO	Intellectual Property Office
IPS	Institute of Policy Studies
IRBM	Integrated River Basin Management
ISB	Industrial Services Bureau
ISIC	International Standard Industrial Classification
ISWA	International Solid Waste Association
ISWM	Integrated Sustainable Waste Management
ITI	Industrial Technology Institute
IUCN	International Union for Conservation of Nature
IUU Fishing	Illegal, Unreported and Unregulated Fishing
IWMA	International Waste Management Association
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management

NATIONAL ENVIRONMENTAL ACTION PLAN 2022-2030: Pathway to sustainable development

ACRONYMS

JEDB	Janatha Estates Development Board
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Area
kg	Kilogramme
km	Kilometre
km²	Square kilometre
km³	Cubic kilometres
KPI	Key Performance Indicators
KOICA	Korean International Cooperation Agency
LAs	Local Authorities
LC	Lifecycle
LDD	Legal Draftsman's Department
LDN	Land Degradation Neutrality
LDV	Light-Duty Vehicle
LECO	Lanka Electric Company
LETS	Local Exchange Trading System
LINDEL	Lanka Industrial Estates Ltd
LKR	Sri Lankan Rupee
LMO	Living Modified Organisms
LNG	Liquified Natural Gas
LRC	Land Reforms Commission
LRWHF	Lanka Rainwater Harvesting Forum
LUPPD	Land Use Policy Planning Department
m	Metre
m³	Cubic metre
M	Million
MARPOL	The International Convention for the Prevention of Pollution from Ships
MASL	Mahaweli Authority of Sri Lanka
MBI	Market-Based Instruments
MCs	Municipality Councils
MEA	Millennium Ecosystem Assessment
MENR	Ministry of Environment and Natural Resources
MEPA	Marine Environmental Protection Agency
MET	Department of Meteorology
MFARD	Ministry of Fisheries & Aquatic Resources Development
MHQU	Ministry of Health Qurantine Unit
MoA	Ministry of Agriculture
MoCA	Ministry of Cultural Affairs
MoD	Ministry of Defence
MoE	Ministry of Environment
MoE&WR	Ministry of Environment and Wildlife Resources
MoEd	Ministry of Education
MoEn	Ministry of Energy
MoF	Ministry of Finance
MoFA	Foreign Ministry
MoFish	Ministry of Fisheries
MoH	Ministry of Health
MoInd	Ministry of Industries
MoIrri	Ministry of Irrigation
MoL	Ministry of Labour
MoLands	Ministry of Lands
MoMD&E	Ministry of Mahaweli Development and Environment
MoMM	Ministry of Mass Media
MoP	Ministry of Power
MoPla	Ministry of Plantation
MoPorts	Ministry of Ports and Shipping
MoPP&L	Ministry of Public Services, Provincial Councils and Local Government
MoSY	Ministry of Sports and Youth Affairs
MoT	Ministry of Transport
MOU	Memorandum of Understanding
MoUDH	Ministry of Urban Development & Housing
MoWFC	Ministry of Wildlife and Forest Conservation
MoWS	Ministry of Water Supply
MRV	Monitoring, reporting and verification

NATIONAL ENVIRONMENTAL ACTION PLAN 2022-2030: Pathway to sustainable development

MSMEs	Micro, Small and Medium Scale Enterprises
MSS	Merchant Shipping Secretariat
MSW	Municipal Solid Waste
MUSSD	Department of Measurement Units, Standards & Services
MW	Megawatt
MWFC	Ministry of Wildlife and Forest Conservation
N/A	Not applicable
NAITA	National Apprentice and Industrial Training Authority
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NaPID	National Policy for Industrial Development
NAQDA	National Aquaculture Development Authority
NARA	National Aquatic Resources Research and Development Agency
NASA	National Aeronautics and Space Administration, USA
NASTEC	National Science and Technology Commission
NBRO	National Building Research Organization
NBSAP	National Biodiversity Strategic Action Plan, 2016-2022
NCD	Non-communicable Diseases
NCoE	National Colleges of Education
NCPC	National Cleaner Production Center
NCPCP	North Central Province Canal Project
NCR	National Conservation Review
NCRE	Non-Conventional Renewable Energy
NDCs	Nationally Determined Contributions
NDDCB	National Dangerous Drugs Control Board
NDMC	National Disaster Management Council
NDMP	National Drought Management Plan
NDRSC	National Disaster Relief Services Centre
NEA	National Environmental Act No. 47 of 1980
NEAP	National Environmental Action Plan
NEAP CC	NEAP Coordinating Commitee
NEDA	National Enterprise Development Authority
NEP	National Environmental Policy
NERD	National Engineering Research & Development Centre
NFS	National Fertilizer Secretariat
NG	Natural Gas
NGJA	National Gem and Jewelry Authority
NGO	Non-Governmental Organisation
NGOS	NGO Secretariat
NH	National Herbarium
NHDA	National Housing Development Authority
NIBM	National Institute of Business Management
NIE	National Institute of Education
NIFS	National Institute of Fundamental Studies
NIOSH	National Institute of Occupational Safety and Health
NIPO	National Intellectual Property Office
NLDB	National Livestock Development Board
NMT	Non- Motorized Transport
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NOSCOP	National Oil Spill Contingency Plan
NP	National Park

ACRONYMS

NPD	National Planning Department
NPPD	National Physical Planning Department
NRC	National Research Council
NRIFAP	National REDD+ Investment Framework and Action Plan
NRMC	Natural Resources Management Centre
NSF	National Science Foundation
NSWMSC	National Solid Waste Management Support Centre
NTC	National Transport Commission
NWG	National Working Group
NWP	North Western Province
NWPCP	North Western Province Canal Project
NWPEA	North Western Provincial Environmental Authority
NWSDB	National Water Supply & Drainage Board
NYSC	National Youth Services Council
O_3	Ozone
OECD	Organisation for Economic Co-operation and Development
OFC	Other Field Crops
OPA	Organisation of Professional Associations
OPs	Other Provinces
OSF	Other State Forests
OTEC	Ocean Thermal Energy Conversion
PA	Protected Area
Pb	Lead
PCs	Provincial Councils
PD	Police Department
PDoA	Provincial Department of Agriculture
PDoEd	Provincial Department of Education
PDoI	Provincial Department of Irrigation
PEC	Provincial Environmental Committee
PES	Payment for Ecosystem Services
PGIAR	Postgraduate Institute of Archaeology
PGRC	Plant Genetic Resources Centre
PID	Provincial Irrigation Department
PM	Particulate Matter
PMoA	Provincial Ministry of Agriculture
PMoH	Provincial Ministry of Health
PMoLs	Provincial Ministry of Livestock
POPs	Persistent Organic Pollutants
PPP	Polluter Pays Principle
PSs	Pradeshiya Sabhas
PUCSL	Public Utilities Commission of Sri Lanka
PV	Photovoltaic
R&D	Research and Development
RA	Risk Assessment
RC	Risk Communication
RDA	Road Development Authority
RDHS	Regional Director of Health Services
rDNA	Recombinant DNA
RE	Renewable Energy
RECP	Resource Efficient Cleaner Production
REDD+	Reducing Emissions from Deforestation and forest Degradation, '+' signifies the conservation and sustainable management of forests
RES	Rewards for Ecosystem Services
RFP	Request for Proposals
RISC	Regional Industry Service Committee
RLE	Red Listing of Ecosystems
RoP	Registrar of Pesticides
RPCs	Regional Plantation Companies
RRDI	Rice Research and Development Institute
RRI	Rubber Research Institute
RTI	Right to Information

NATIONAL ENVIRONMENTAL ACTION PLAN 2022-2030: Pathway to sustainable development

SACEP	South Asia Corporative Environment Programme
SCAs	Sectorial Competent Authorities
SLCPs	Short-lived Climate Pollutants
SCP	Sustainable Consumption and Production
SD	Survey Department
SDC	Sustainable Development Council
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessments
SEC	Sector Expert Committee
SEEA	System of Environmental- Economic Accounting
SLAAS	Sri Lanka Association for the Advancement of Science
SLAB	Sri Lanka Accreditation Board
SLAEB	Sri Lanka Atomic Energy Board
SLAERC	Sri Lanka Atomic Energy Regulation Council
SLC	Sri Lanka Customs
SLCARP	Sri Lanka Council for Agricultural Research Policy
SLCF	Sri Lanka Carbon Fund
SLCG	Sri Lanka Coast Guard
SLEMA	Sri Lanka Energy Managers Association
SLIA	Sri Lanka Institute of Architecture
SLIBTEC	Sri Lanka Institute of Biotechnology
SLIC	Sri Lanka Inventors Commission
SLIDA	Sri Lanka Institute of Development Administration
SLIM	Sri Lanka Institute for Marketing
SLINTEC	Sri Lanka Institute of Nanotechnology
SLINTGL	Sri Lanka Institute of National Tourist Guide Lecturers
SLLDC	Sri Lanka Land Development Corporation
SLN	Sri Lanka Navy
SLP	Sri Lanka Police
SLPA	Sri Lanka Ports Authority
SLPC	Sri Lanka Press Commission
SLR	Sri Lanka Railway
SLRM	Sustainable Land Resources Management
SLRWHF	Sri Lanka Rainwater Harvesting Form
SLSEA	Sri Lanka Sustainable Energy Authority
SLSI	Sri Lanka Standard Institute
SLTB	Sri Lanka Tea Board
SLTDA	Sri Lanka Tourism Development Authority
SLVET	Sri Lanka Vehicle Emission Testing Programme
SMA	Special Management Areas
SMEs	Small & Medium Enterprises
SMED	Small and Medium Enterprice Development project of FCISL
SMIs	Small and Medium Industries
SMoDM	State Ministry of Disaster Management
SMoLs	State Ministry of Livestock
SMoPC&LG	State Ministry of Provincial Councils and Local Government
SMoPSF&RCI	State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticide Use
SMoSVR&I	State Ministry of Skills Development, Vocational Education, Research and Innovation
SMoSWHPD	State Ministry of Solar Power, Wind and Hydro Power Generation Projects Development
SMoUD	State Ministry of Urban Development, Coast Conservation, Waste Disposal and Community Cleanliness

ACRONYMS

SMoVR	State Ministry of Vehicle Regulation, Bus Transport Services and Train Compartments and Motor Car Industry
SMoWCP&P	State Ministry of Women and Child Development, Pre-schools and Primary Education, School Infrastructure and Education Services
SNA	System of National Accounting
SO_2	Sulphur Dioxide
SOC	Soil Organic Carbon
SPP	Sustainable Public Procureent
SPPA	Standard Power Purchase Agreement
SSFA	Site-Specific Fertilizer Application
SWDS	Solid Waste Dump Sites
SWM	Solid Waste Management
SWML	Schedule Waste Management License
MT	Metric Ton
TAC	Technical Advisory Committee
TECs	Technical Expert Committees
TK	Traditional Knowledge
ToT	Training of Trainers
TRC	Telecom Regulatory Commission
TRI	Tea Research Institute
TSHDA	Tea Small Holder Development Authority
TVEC	Tertiary and Vocational Education Commission
TWG	Technical Working Group
UCs	Urban Councils
UDA	Urban Development Authority
UGC	University Grant Commission
UGI	Urban Governance Index
UMW	Upper Mahaweli Watersed
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nation's Framework Convention for Climate Change
UNHABITAT	United Nations Human Settlements Programme
UNHCR	United Nations High Commission for Refugees
UNHRC	United Nations Human Rights Council
Uni	Universities
UNIDO	United Nations Industrial Development Organization
UPP	User Pays Principle
URI	Urban Resilience Index
USAID	United States Agency for International Development
USD	US Dollars
USDA	Urban Settlement Development Authority
VET	Vehicle Emission Test
VFD	Variable Frequency Drive
VICs	Veterinary Investigation Centres
VRI	Veterinary Research Institute
VTA	Vocational Training Authority
VTCS	Village Tank Cascade Systems
w.r.t.	With Respect To
WB	World Bank
WHO	World Health Organization
WM	Waste Management
WMAWP	Waste Management Authority of the Western Province
WP	Western Province
WRB	Water Resources Board
WtE	Waste to Energy
WWF	World Wide Fund for Nature

NATIONAL ENVIRONMENTAL ACTION PLAN 2022-2030: Pathway to sustainable development

EXECUTIVE SUMMARY

The National Environmental Action Plan (NEAP) 2022-2030 is the 4th NEAP in the series starting from the plan initiated in 1990s. This NEAP fills the national environmental planning gap since the National Action Plan for Haritha Lanka Programme 2009-2016 ended its intended implementation period in 2016. The NEAP 2022-2030 is vital as it provides the strategies and action plans aligned with the National Environment Policy of 2021, to address environmental challenges of the 21st century and to achieve sustainable development aligned with the UN Sustainable Development Goals (SDGs). As with the previous instances, this NEAP has been prepared in a highly consultative, but mainly virtual manner, despite the limitations imposed by the COVID-19 pandemic that prevailed during its preparation. The NEAP 2022-2030 identified the drawbacks in the implementation of previous versions - such as inbuilt, explicit arrangements for strong implementation, monitoring resource mobilization and communication.

The NEAP 2022-2030 is presented in five chapters. Chapter 1 covers a brief introduction to the NEAP, including the process followed in its preparation. Chapter 2 is presented in nine thematic areas: 1) Air Quality Management; 2) Biodiversity Conservation and Sustainable use; 3) Climate Actions for Sustainability; 4) Conservation and Sustainable Use of Coastal and Marine Resources; 5) Sustainable Land Resource Management; 6) Holistic Waste Management; 7) Integrated Water Resources Management; 8) Environmental Management in Cities and Human Settlements; and 9) Greening Industries. In each of these nine thematic areas, the background is provided by way of a brief overview, current status, policy and legal framework, before the introduction and presentation of respective Action Plans. The actions in each Action Plan are presented under identified strategies, and provide important information including key performance indicators, targets, timelines, responsible lead agencies, other key agencies, indicative budgets and the relevance to SDGs.

This NEAP is different from previous versions of the NEAP, because it contains indicative costing, a resource mobilization plan with innovative financing mechanisms, and a a chapter on communication and knowledge management. Importantly, it also contains institutional arrangements for the implementation and coordination of the NEAP. Therefore, in addition to the nine thematic areas presented in the Chapter 2, chapters on resource mobilization; implementation and monitoring arrangements; as well as communication, information and knowledge aspects of the NEAP are provided as three cross-cutting areas.

Chapter 3 on Resource Mobilization provides three sections that cover budgeting, financing and valuation of the NEAP actions. Budgeting explains how the indicative budget for each action was formulated, financing indicates available sources of resources to meet budget requirements for implementing actions of the NEAP. The final section is on environmental valuation, where a framework is presented for the monetary benefits of undertaking NEAP actions.

Chapter 4 is on Information and Knowledge Management for Green Growth (IKMGG) where the communication, capacity building and knowledge management aspects of the NEAP are presented. Strategies for knowledge management are related to coordination and incentivizing of knowledge generation for environmental management; guiding and empowering decision-makers with timely access to quality data and information; influencing behaviour and attitudinal change through awareness and advocacy; promoting quality and lifelong environmental and sustainability-oriented education; and building capacities and access financing for research, innovation and monitoring change.

Chapter 5 is on Implementation and Monitoring Arrangements for the NEAP. One of the main drawbacks in previous environmental action plans was weak implementation. A key feature in the implementation arrangements is the establishment of a NEAP Secretariat at the MoE, dedicated to coordinating NEAP implementation and monitoring. This will be carried out along with the establishment and operationalization

EXECUTIVE SUMMARY

of eleven NEAP Coordinating Committees and eleven NEAP Working Groups, to strengthen the implementation and monitoring of the NEAP, with the engagement of all the implementing agencies and their appointed NEAP focal points. In addition, a revival of Environmental Committees at Divisional and District level and the establishment of similar mechanisms at the provincial level is emphasized, to ensure inclusion on NEAP actions at sub-national levels. It is expected that each implementing agency adopts the NEAP and integrates relevant actions into their annual programmes and periodically report the progress of implementation to the NEAP Secretariat. Integrating NEAP actions into individual action plans is expected at both national and sub-national entities of the state, international agencies, NGO, private sector to meet the sustainable development objectives of Sri Lanka.

CHAPTER 1

INTRODUCTION

1.1 GENERAL OVERVIEW

In 1998, Sri Lanka was one of the first countries to produce a National Conservation Strategy, following the guidance set globally in 1980 through the 'World Conservation Strategy: living resources conservation for sustainable development'. In the World Conservation Strategy, the phrase 'Sustainable Development' was introduced globally long before it gained popularity with the publication in 1987, of 'Our Common Future'. Following this, in 1991, Sri Lanka produced its first 'National Environmental Action Plan (NEAP)' for the period 1992-1996 and later, in 1994 and 1998, updated the NEAP. Meanwhile, both globally and locally, there were many initiatives on sustainability, as well as many sectoral policies relating to environment, although there was no overall national environmental planning framework for Sri Lanka, until 2009, when the 'National Action Plan for Haritha Lanka Programme (HLP)', was launched for the period from 2009-2016.

The National Action Plan for Haritha Lanka Programme 2009-2016 (HLP) was developed with a high-level participatory process, bringing together all the relevant ministries, to ensure the production of a practically enforceable sustainability plan. However, since 2016, when the HLP completed its planning cycle, despite attempts to review and revise this framework (in 2017), Sri Lanka has lacked an overarching environment planning framework.

Therefore, this 'National Environmental Action Plan 2022-2030: Pathway to sustainable development (NEAP 2022)' was prepared as a guide to for the relevant sectors to achieve sustainable development aligned with the global 2030 Sustainable Development Agenda, also aligning with the overall national policy framework 'Vistas of Prosperity and Splendour' (2019) and the 'National Environmental Policy, 2003', and its revision 2022.

In retrospect, the National Conservation Strategy for Sri Lanka (CEA, 1988) is regarded as one of the best national strategies, in which challenges were identified clearly and strategic priorities for a sustainable development path were proposed and still remain valid for addressing current challenges. As a nation, Sri Lanka currently faces the formidable task of balancing the aspirations for the development of the country, while maintaining the integrity of the natural environment and its resources for future generations. Unless development is sustainable, this cannot be achieved. Ensuring sustainability requires a comprehensive framework of environmentally-focused policies, strategies and action plans. The NEAP 2022 is expected to fill this gap.

The formulation of the National Environmental Action Plan 2022-2030: Pathway to Sustainable Development (NEAP 2022) was carried out by the Ministry of Environment (MoE), together with key stakeholders and with technical and financial assistance from UNDP. The NEAP 2022 is aligned with the priorities of current global trends - such as recovery from post-COVID-19, the 2030 agenda of Sustainable Development, the Post 2020 Biodiversity Framework, green economy concepts - and is guided by the National Environmental Policy, which is being finalized.

1.2 THE PROCESS FOR THE PREPARATION OF THE NEAP

By the request of the MoE, the process of initiating the preparation of the NEAP was facilitated by the UNDP. It included the formulation of a team of experts to assist the MoE in the preparation of the NEAP. The team, in collaboration with the MoE focal points assigned for nine thematic areas and three cross-cutting areas of the NEAP, worked to prepare the draft NEAP. The initial step for preparation included literature reviews, where many documents were reviewed, including those concerning existing concerning policy, legal and institutional topics, as well as documentation on environmental management and development that provided guidance for developing actions for the NEAP. Then, the 2017 draft revision of the HLP was used as the foundation to identify gaps in specific sectors; and stakeholder consultations conducted at the highest level (carried out mainly on virtual platforms, with limited physical meetings). Where necessary, one-on-one discussions were carried out by phone. All materials produced in the NEAP were peer-reviewed by the expert team.

The Environmental Planning and Economics Division facilitated the overall coordination of the NEAP preparatory process.

The NEAP was also prepared in close consultation with the expert team working on the revision of the National Environmental Policy (NEP) and is aligned fully with the seven Policy Thematic Areas of the NEP 2022.

1.3 SUMMARY OF KEY MATERIALS REVIEWED

Presented below is a list of key documents reviewed in preparing the NEAP. There were many more thematic areas specific documents reviewed but not listed here because of space constraints.

- Caring for the Environment 2003-2007, 2003;
- Caring for Environment II 2008-2012, 2008;
- Clean Air 2025 - Action Plan for Air Quality Management, 2016;
- Land Administration in Sri Lanka Issues and Challenges, 2016;
- National Action Plan for Haritha Lanka Programme: 2009 -2016 and 2015-2022 (draft);
- National Action Program (NAP) for Combating Land Degradation in Sri Lanka, 2014;
- National Environment Policy 2003 and 2022 (draft);
- National Agriculture Policy, 2007;
- National Biodiversity Strategic Action Plan 2016-2022, 2016;
- National Climate Change Adaptation Strategy 2011-2016;
- National Climate Change Policy, 2003;
- National Energy Policy & Strategies of Sri Lanka, 2019;
- National Environmental Act No: 47 of 1980 and its amendments;
- National Environmental Action Plans (NEAP) 1998-2001, 2203-2007, 2007- 2012;
- National Physical Planning Policy & The Plan - 2017 - 2050;
- National Policy and Strategy on Sustainable Development for a Sustainably Developed Sri Lanka, 2020 (draft);
- National Policy on Sustainable Consumption and Production for Sri Lanka, 2019;
- National REDD+ Investment Framework and Action Plan (NRIFAP), 2017;
- National Land Transport Policy, 2020 (draft);
- National Water Resources Management Policy, 2018 (draft);
- National Watershed Management Policy, 2004;
- Nationally Determined Contributions (NDCs,) 2021 to 2030 (2021);
- Natural Resources of Sri Lanka: Conditions and Trend, 2010;
- Sector Vulnerability Profiles for Climate Change, 2010;
- Sri Lanka Tourism Strategic Action Plan, 2020-2023 (draft);
- Surakimu Ganga National Programme, 2020;
- The National Water Use Master Plan of 2014;
- The Public Investment Programme (PIP), 2017-2020;
- UNCCD - National report on desertification/land degradation in Sri Lanka, 2000;
- Updating the National Red List of Sri Lanka – Conserving Fauna and Flora, 2012; and
- Vistas of Prosperity and Splendour, 2019.

In 2015, Sri Lanka committed to the new development agenda of the United Nations (UN) and adopted the Sustainable Development Goals (SDGs). The SDGs are rooted in the principles of sustainable development (which were first adopted in Rio in 1992), for the wise use of the environment. Sustainable development upholds the right of nations and people to progress economically and socially, while ensuring that the capacity of the natural word is able to support such demands, as well as protecting and preserving natural assets for future generations.

The 17 sustainable development goals were adopted by a world which was already seeing irreversible consequences of environmental degradation, despite over two decades of commitments to the Rio Convention on climate, land and biodiversity. The SDGs are underpinned by its environmental goals – on climate, water, oceans and forests – that set the foundation for goals on social and economic progress (Figure 1.1.).

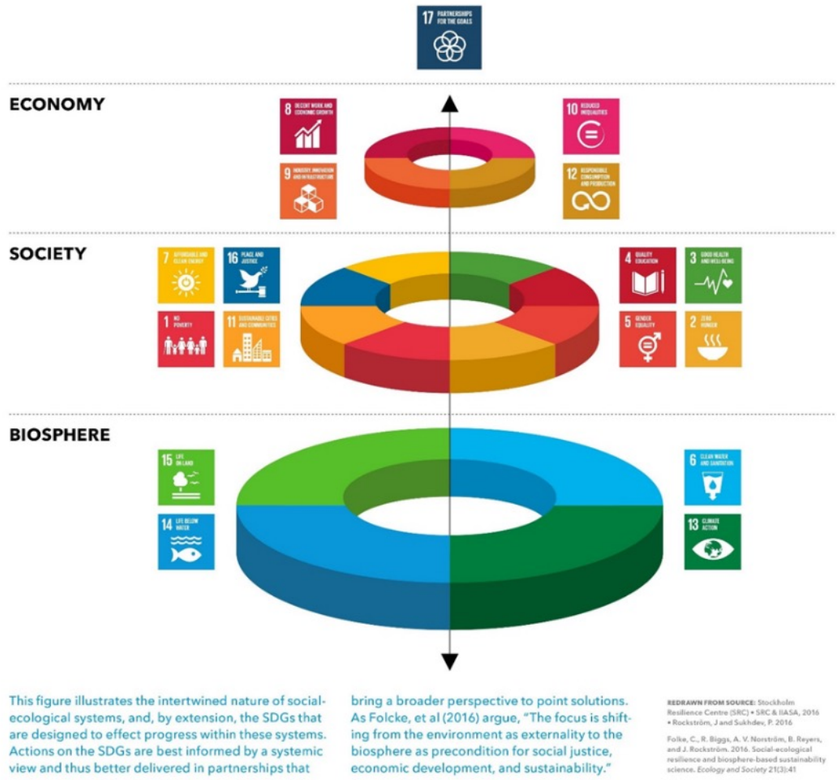

Figure 1.1. The SDGs are underpinned by its environmental goals

(Source: Stockholm Resilience Centre, 2016)

Thus, the NEAP revision was guided by the following overarching principles;

1. In the next decade, Sri Lanka as a middle-income, developing country will prioritise sustainable economic and human development.
2. The concept of wise use of natural resources will underpin the country's economic and social policies and development investments.
3. Sustainable consumption and production will be promoted through incentives/dis-incentives at different levels – public, private and individual.
4. Although not a high GHG emitter, Sri Lanka will commit to transition to a low-carbon, green economic model with international technical and financial assistance.

The initial draft prepared was shared with the carefully selected stakeholders for all thematic areas, online sessions conducted for inputs, periodic review sessions held with MoE and peer review of sections were carried out by the expert team. Finally, the document was validated section-wise by key stakeholders.

1.4 INTRODUCTION TO NEAP

The NEAP comprises five chapters. Chapter 1 presents a brief introduction to the NEAP.

Chapter 2 has nine sections for the following thematic areas.

Theme 1: Air Quality Management
Theme 2: Biodiversity Conservation and Sustainable use
Theme 3: Climate Actions for Sustainability
Theme 4: Conservation and Sustainable Use of Coastal and Marine Resources
Theme 5: Sustainable Land Resources Management
Theme 6: Holistic Waste Management
Theme 7: Integrated Water Resources Management
Theme 8: Environmental Management in Cities and Human Settlements
Theme 9: Greening Industries

These sections are organized to provide an overview; the current status; policy legal and institutional context; a summary of the key materials reviewed related to each thematic area; and a detailed action plan based on different strategies under each thematic area. These action plans are the most detailed and comprehensive sections of the NEAP, where actions, key performance indicators, the baselines, targets, short-, medium- and long-term timeframes, relevance to SDG targets, indicative budgets and responsible agencies for implementation are provided.

In addition to these nine thematic areas, three cross-cutting areas – i) Resource Mobilization; ii) Implementation and Monitoring Arrangements and iii) Information and Knowledge Management for Green Growth are also provided as support to the thematic areas.

The NEAP is organized to contribute to the seven Policy Thematic areas of the NEP as shown in Figure 1.2.

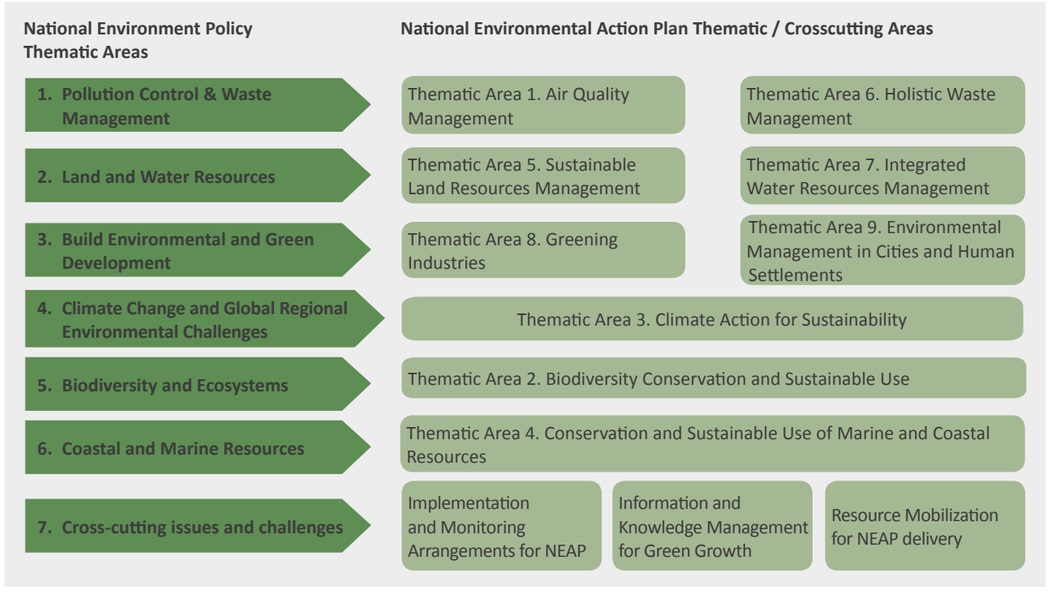

Figure 1.2. Linkages among NEP and NEAP Thematic Areas

Presented below are summaries of each theme.

THEME 1
Air Quality Management

This thematic area considers clean air to be essential, not only for overall human health and well-being, but also for the integrity of the biosphere. Multiple natural and anthropogenic sources and processes create air pollution. While natural sources could contribute substantially to local air pollution in some regions, the contribution from human activities far exceeds these natural sources. In recent decades, this human-induced contribution is attributed to economic development practices and lifestyles. Air quality (AQ) degradation occurs both indoors and outdoors and is a result of a complex set of parameters such as emitting sources, processes, pollutants, dispersion mechanisms and environmental conditions. Air pollution is an environmental risk to human health and has detrimental impacts on climate, agriculture, biodiversity, ecosystems, building/ structures and, in general, on the quality of life.

The action plan for the thematic area on Air Quality Management has ten strategies and 60 actions to address the objectives of this theme.

THEME 2
Biodiversity Conservation and Sustainable Use

Sri Lanka boasts of a suite of terrestrial, inland aquatic, coastal and marine ecosystems, a variety of species, including many endemic and range-restricted species, which provide humans with life-sustaining ecosystem services - such as the provision of food, fodder, fibre, timber and medicinal and ornamental resources; regulation of air and water quality, erosion and climate regulation; carbon sequestration; providing habitats for pollinators; pest and disease regulation; soil formation; primary production; nutrient and water cycling; aesthetic values, recreation and eco-tourism; as well as knowledge and educational services (MoMD&E, 2016; 2019). However, indirect and direct drivers of ecosystem change (threats) are destroying and damaging Sr Lanka's natural capital. Indirect drivers include increasing urbanisation and population density and often unplanned and unsustainable development (MEA, 2005). Direct threats include habitat destruction and degradation, overexploitation, pollution, invasive alien species and the overarching driver of ecosystem change - climate change, which exacerbates the impacts of every other threat (MEA, 2005). In Sri Lanka, habitat destruction is a primary, continuing threat, while the other drivers of change also continue to damage and degrade ecosystems and threaten the survival of species found on the island.

This thematic area was considered under the general areas of ecosystems, species, genetic diversity and ecosystem services. The action plan for Biodiversity Conservation and Sustainable Use includes seven strategies and 37 actions to address the objectives of this theme.

THEME 3
Climate Actions for Sustainability

Global warming is caused by continual human activities, with the inevitable impact of the progressive emission into the atmosphere of greenhouse gases (GHGs), entrapping the Earth's heat. Carbon Dioxide (CO_2) causes the highest impact; the others are methane, oxides of nitrogen and chlorofluorocarbons. Besides the direct impact of the rise in temperature on plant and animal life, global warming will cause perturbations in the Earth's weather patterns and a rise in sea level. Changes in weather patterns are generally expected to increase rainfall in wet areas and aggravate water shortages in dry areas. Sea level rise will occur due to the melting of polar ice sheets and a decrease in the snow cover in mountainous regions, as well as the expansion of ocean water bodies. Although the human-induced global warming is now unavoidable, the scale of the impacts will depend on the extent to which the global community will adopt measures to restrict the emission

of greenhouse gases. Sri Lanka recognizes its responsibility as a global citizen to uphold the Paris Agreement's underlying principal of containing global warming under to 2°C. It will strive to steer development along a low-emission trajectory, that supports both mitigation and adaptation to climate change, with a strong focus on reaching high income and human development in the next decade.

The action plan for this thematic area includes six strategies and 121 actions to meet the expected objectives for climate change.

THEME 4
Conservation and Sustainable use of Marine and Coastal Resources

Because Sri Lanka is an island, the ocean is a vital resource for aspects such as food security, trade and shipping, coastal livelihoods, tourism, coastal protection and national security. Sri Lanka's coastal and marine resources and biological diversity, as well as the coastal and marine environment, provide a range of critical ecosystem services that benefit the people, sustaining livelihoods, as well as playing a vital role in economic development and strengthening protection from natural disasters. Sri Lanka's coastal zone is under threat from increasing population pressure and unmanaged human activities that cause coastal water pollution because of, *inter alia*, sewage and solid waste; industrial effluents; pollution by tourists; the sectors of power, fisheries and aquaculture; oil spills; heavy metals and plastics. In addition, there is coastal erosion, sedimentation and siltation because sand and coral mining, coastal structures, upland irrigation schemes, deforestation, dams, etc.; habitat destruction, resource depletion and loss of biodiversity because of over-harvesting, selective harvesting and use of harmful harvesting techniques. These threats are exacerbated by global warming leading to climate change and sea level rise, impacting on coastal ecosystem health, livelihoods (e.g., fisheries, aquaculture, and tourism) and the increased frequency and severity of natural hazards - such as storm surges and storm waves.

The action plan for this thematic area has nine strategies and 49 actions to address the challenges identified under this Theme.

THEME 5
Sustainable Land Resources Management

Land is a fundamental natural resource on which life depends. Land resources refer to the terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including near-surface climate, terrain forms, hydrology, the soil, near-surface layers, fauna, flora, human settlements and infrastructure. Land is the most vital natural resource and foundation, as well as the key driver of Sri Lanka's economic productivity, well-being and livelihood. Land resources are being used by several economic sectors such as agriculture, plantation, forestry, irrigation schemes, human settlements, industries and infrastructure and include many types of landscapes and ecosystems. It is known that healthy ecosystems provide food, shelter, the capacity to assimilate and recycle wastes, clean air and water.

Land use changes have transformed land cover to farmlands, human settlements and urban centres, at the cost of natural vegetation. Many studies have shown strong linkages between the present trends of land-use changes and deforestation, biodiversity loss and land degradation. Increased population pressure in different types of natural lands, results many consequences and impacts threatening the sustainability, consistency and the existence of ecosystem components. Improper and un-synchronized land governance and unfriendly land use changes aggravate land degradation reducing the capacity of on-site and off-site ecosystem functions.

The action plan for this thematic area has nine strategies and 53 actions to meet the objectives of sustainability.

THEME 6
Holistic Waste Management

Waste could be defined as substances or objects which the holder intends or is required to dispose of. Though the waste could be generated by natural phenomena, the current severity of waste issues is attributed to the urbanization, industrialization and economic growth of human societies, with both quantitative (generation of more waste) and qualitative (varied compositions, including chemicals, hazardous and toxic wastes, as well as healthcare waste) implications. The situation is aggravated further with the changing lifestyles and consumption pattern trends in a consumerist society, together with use of more chemicals and hazardous substances. The ever-changing quantity and quality of waste has led to the management of waste becoming more complex. The issue of waste is deliberated more in cities and other urban environments, particularly in relation to the generation municipal solid waste and industrial waste. Poorly managed waste could lead to severe adverse impacts on air, surface and groundwater, soil, as well as the coastal and marine environment, climate, and ultimately, from multiple fronts, on public health, with corresponding economic implications.

The action plan for the holistic waste management thematic area includes nine strategies and 63 actions to meet the challenges in the sector.

THEME 7
Integrated Water Resources Management

Water is an essential component of the environment, which helps to sustain all forms of life - including humans - on Earth. This is a resource that is considered finite and hence, the pressure on this resource is increasing, especially with the population growth, changes in lifestyles, increase in industrialization and many other anthropogenic activities. The contamination of water - which make this precious resource unsuitable for use - has currently become a serious challenge. Because of this, providing safe drinking water has become a priority in Sri Lanka. In addition, strategies need to be taken to ensure that people are provided with adequate water for irrigation to ensure livelihoods and food security. This theme on integrated water resources management is expected to formulate strategies within next 10 years to address those key challenges, while safeguarding the environmental sustainability.

The action plan includes 14 strategies and 74 actions to achieve sustainability for this sector.

THEME 8
Environmental Management in Cities and Human Settlements

Historically, urbanization characterized the economic development of human societies and countries. Although cities and urban settlements, in general, are the face of the future, urbanization has become a rapidly growing force and the most significant trends shaping the built environment over the course of the past century, as an increasing number of people have begun to move to towns and cities. Urbanization is not just an outcome of the shift out of agriculture and into an economy dominated by industrial and other services, but is coupled strongly with the provision of more economic advantages. In particular, cities are centres of excellence, bringing together innovators, entrepreneurs, financiers and academics. They attract a rising tide of humanity – people hoping for better lives for themselves and families. The cities and human settlements in urban areas are dynamic and vital parts of the human society and are the main engines of social, economic and technological development. The economic role of cities is significant. Every region in the world is expected to become more urbanized in the next 10 years, although highly urbanized areas are expected to slow their rate of urban growth.

The action plan for this sector includes nine strategies and 60 actions to meet sustainability objectives.

THEME 9
Greening Industries

Industrial establishments in Sri Lanka have the potential to cause environmental damage by discharging waste products, which may be toxic and hazardous. Among these, textile dyeing and bleaching; paper; paints; cement; asbestos; leather tanning; rubber processing; food processing; distilleries; manufacturing of agricultural and mineral products; and metal works are of particular concern. Industrial effluents are sources of toxic inorganic compounds containing heavy metals, as well as organic compounds.

The action plan for greening industries includes nine strategies and 72 actions to be implemented by various stakeholders.

Chapter 3 is on Resource Mobilization, which has three sections covering budgeting, financing and valuation. Budgeting explains how the indicative budgets for each action are derived, while financing indicates the available sources of resources to meet budget requirements to implement the actions in NEAP. The final section of this chapter is on valuation, where a framework is presented on the benefits of undertaking NEAP Actions.

The chapter consists of six strategies and 26 actions.

Chapter 4 is on Information and Knowledge Management for Green Growth where the communication, capacity building and knowledge management aspects for the NEAP are presented.

Chapter 4 presents five strategies and 22 actions.

Chapter 5 is on the Implementation and Monitoring Arrangements for the NEAP. One of the main drawbacks in the previous environmental action plans was associated with implementation. Therefore, the cross-cutting areas in the NEAP were targeted to address these limitations. The key feature in the arrangements for implementation is the establishment of a NEAP Secretariat at the MoE, to facilitate the implementation and monitoring of the NEAP.

Chapter 5 has two strategies and 17 actions.

This version of the NEAP is different because it contains indicative costing, a resource mobilization plan with innovative financing mechanisms, communication and knowledge management, as well as institutional arrangements for the implementation and coordination of the NEAP, such as the establishment of a NEAP Secretariat, NEAP Coordinating Committees and NEAP Working Groups for integrating environmental considerations into development planning.

It is expected that each implementing agency adopts the NEAP and integrates relevant actions into their annual programme and periodically reports the progress of implementation to the NEAP Secretariat. Integrating NEAP actions into individual action plans is expected at both national and sub-national entities of the state, international agencies, NGO, private sector in order to meet the sustainable development objectives of Sri Lanka.

CHAPTER 2

THEMATIC AREAS

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THEME 1
AIR QUALITY MANAGEMENT

Air is a natural resource produced from a series of complex interactions between the atmosphere and other elements in biosphere. Clean air is essential, not only for overall human health and well-being, but also for the integrity of the biosphere. Multiple natural and anthropogenic sources and processes create air pollution, thus diminishing the quality of clean air.

2.1.1 Overview

Air is a natural resource produced from a series of complex interactions between the atmosphere and other elements in biosphere. Clean air is essential, not only for overall human health and well-being, but also for the integrity of the biosphere. Multiple natural and anthropogenic sources and processes create air pollution, thus diminishing the quality of clean air. While natural sources can contribute substantially to local air pollution in some regions, the contribution from human activities far exceeds that from natural sources, and this is mainly attributed, in recent decades, to economic development practices and lifestyles. Air quality (AQ) degradation occurs both indoors and outdoors, and depends on a complex set of parameters such as emitting sources, processes, pollutants, dispersion mechanisms and environmental conditions. Although ambient air pollution is mostly from local emission sources, under certain atmospheric conditions airborne pollutants can travel long distances across national borders (transboundary), thereby affecting the environment considerably far from its original source. Air pollution poses a major threat to human health and has detrimental impacts on climate, agriculture, biodiversity, ecosystems, buildings/structures and the quality of human life, in general.

The most severe impact of air pollution is health issues for humans. Exposure to air pollution causes a wide range of health impacts including respiratory illness and infections, heart disease, stroke, lung cancer and adverse birth outcomes (e.g. pre-term birth and low birth weight). A growing body of evidence links air pollution to other health problems including cataracts, ear infections, the onset of asthma in children, chronic deficits in lung function, stunting, diabetes, childhood obesity, developmental delays, reduced intelligence and neurological disorders that afflict both children and adults. The World Health Organization (WHO) estimates that worldwide, outdoor and indoor air pollution causes seven million premature deaths. This is attributed primarily to exposure to fine particulate matter ($PM_{2.5}$), which ranks as the 6th highest risk factor for premature deaths. Over 90% of populations exposed and affected are in low- and middle-income countries, including those in Southeast Asia (ADB, 2018). About 70% cities in developing countries in Asia have unhealthy levels of air pollution. Annually, close to four million people die prematurely from illness attributable to household air pollution from inefficient cooking practices that use polluting stoves fired with solid fuels and kerosene, while outdoor air pollution contributes to over two million premature deaths in Asia. Outdoor air pollution is among the top five risks in the developing countries of Asia (ADB, 2014). Another aspect of air pollution is that, though it affects everyone, the burden of related disease has a disproportionate impact on certain vulnerable segments of populations such as women, children, the elderly, minorities, indigenous peoples and other traditional communities, people living in poverty, as well as people with pre-existing health conditions (UN, 2019).

Air quality degradation has adverse impacts on agriculture, biodiversity and ecosystems. Some air pollutants - such as ground level ozone and particulates - have damaging impacts on agricultural productivity. Globally, it is estimated that about 100 million tonnes of crops are lost annually because of air pollution. In addition, various air pollutants cause, or contribute to, acidification of lakes, eutrophication of estuaries and coastal waters as well as mercury bioaccumulation in aquatic food webs. Terrestrial ecosystems - including forests, grasslands and their soils -are also damaged by air pollutants. Ambient air pollution also contributes to climate change with emissions of short-lived climate pollutants (SLCPs) such as black carbon as a consequence of the combustion of diesel and solid biomass fuels (UN, 2019).

The economic implication of air pollution is also a major concern. While the expenditure for the healthcare systems is a burden to the economy, the economic output too is adversely affected by deterioration of the health conditions of people. For example, globally, the estimated annual healthcare cost in 2015 was USD 21 billion, which is predicted to increase to USD 176 billion by 2060. Air pollution could be responsible for a reduction in global economic output of USD 330 per person. In South Asia, the annual labour income losses from premature deaths of working-age men and women are equivalent of 0.8% of the gross domestic product (GDP) (ADB, 2018).

With the overpowering impacts of AQ degradation on human lives, health, economy, biodiversity, ecosystems etc., the need for a comprehensive and systematic approach to AQ management (AQM) has been recognized worldwide. This requires the mainstreaming of AQM into the development agenda of the country. Accordingly, AQM is now incorporated into the targets and indicators of the United Nations' Sustainable Development Goals (SDGs) such as Good Health & Wellbeing (Goal 3) and Sustainable Cities & Communities (Goal 11). Other SDGs that directly or indirectly contribute to improving global AQ include: SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure) and SDG 12 (Responsible Consumption and Production) (ADB, 2018). Further, increased attention by global community to issues of air pollution has been seen recently with several initiatives such as (i) UN declaration on International Day of Clean Air for blue skies (September 07), emphasizing the importance of and urgent need to raise public awareness at all levels and to promote and facilitate actions to improve AQ; (ii) the Climate & Clean Air Coalition (CCAC), a global effort that unites governments, civil society and private sector, committed to improving AQ and protecting the climate in next few decades by reducing SLCPs across sectors; and (iii) the resolution adopted by the UN Human Rights Council (UNHRC) in 2018 in Human Rights and the Environment, which describes human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment and protection gaps thereto, including in the context of sustainable development.

Of these, UNHRC mandates the member states to protect the clean air component as a right to a healthy environment though seven key steps, including (a) monitoring AQ and impact on human health; (b) assessing sources of air pollution; (c) making information publicly available, including public health advisories; (d) establishing AQ legislation, regulations, standards and policies; (e) developing AQ action plans at the local, national and, if necessary, regional levels; (f) implementing AQ action plans, and enforcing standards; and (g) evaluating progress and, if necessary, strengthening plans to ensure that the standards are met (UN, 2019). As illustrated in Figure 2.1.1, these seven steps could be taken into consideration in developing a strategic framework for AQM, providing a sound basis for the development of strategies and activities under the Thematic Area 1.

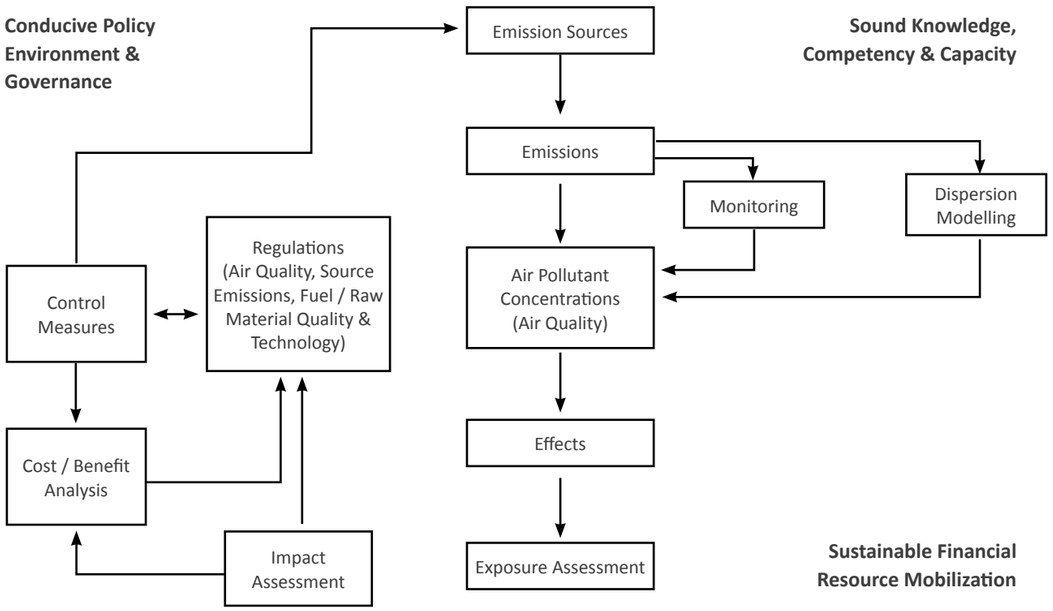

Figure 2.1.1. Strategic framework for integrated air quality management plan (AQM plan)

2.1.2 Current Status

The issue of air pollution in Sri Lanka, particularly in the urban sector, surfaced in late 1990s with the findings of several research studies and field measurements. The analysis of AQ data suggested that the transport sector was the main source of pollution. Accordingly, the main thrust in AQM has been given to the road transport sector, and Sri Lanka Vehicle Emission Testing programme (SLVET) is now being implemented throughout the country. The implementation of SLVET, since 2008, has shown progressive improvements in the urban AQ (as signified by the reduction of PM_{10} concentrations from >70 µg/m^3 in 2008 to ~60 µg/m^3 in 2015), even with a significant increase in the active vehicle fleet. However, over the years, due to rapid economic development, urbanization, industrialization, deterioration of public transport and increased use of personal vehicles as well as lifestyle changes, AQ continues to degrade. This degradation has been attributed to wide-ranging sources/processes in other sectors (such as power, industry, waste).

In addition to the transport sector, other main concerns of AQ degradation are thermal power plants (particularly coal), open burning and open dumping/dump sites in the waste sector (particularly municipal solid waste and healthcare waste), industrial processes, and use of variety of chemicals and hazardous materials. The burning of plastics and polythene at lower temperatures at household level, a common practice in Sri Lanka, is of particular concern, as this emits dioxins and furans – which are persistent organic pollutants (POPs) identified under the Stockholm Convention. Further, frequent breakdowns, malfunctioning and limited functionalities of air pollution control sub-systems and devices of the existing coal power plant have been occurred from commencement to date, leading to concerns over the severity of environmental implications of the plant. Particulate emissions, from the construction industry also has been a key concern. Further, though there is limited data, indoor air pollution (IAP) is considered to be more critical in both urban and rural households and built environment, because of the presence of multiple sources (including infiltration of outdoor air) and inadequate levels of ventilation. Biomass cooking with inefficient and conventional stoves, particularly in rural and urban-poor communities, therefore becomes a key concern (Ranathunga et al., 2021).

Considering the diverse sources of air pollution (both stationary and mobile), there could be thousands of chemicals which have negative impacts on AQ. However, to date the substances that have been the primary focus of abatement efforts because of their known adverse health effects are: particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), nitrogen oxides (NO_X), carbon monoxide (CO), ozone (O_3) and lead (Pb). Also among many other air pollutants of concern are benzene, polycyclic aromatic hydrocarbons, dioxins and furans, asbestos and mercury. The lack of resources for measurements and monitoring of concentrations of air pollution has resulted in limited availability of information on AQ levels in the country. The available data on ambient AQ indicates that, in general, the annual average concentrations of the pollutants such as PM_{10}, $PM_{2.5}$, SO_2, NO_X, O_3 and CO are within the national standards, but some pollutants such as $PM_{2.5}$ do not comply with the WHO guidelines. However, there are seasonal variations and sudden increases, where the pollution levels record significantly higher values than annual averages. Some of the rapid increases, particularly PM, are attributed to potential transboundary air pollutions.

The ambient concentration of air pollutants has been highest in the Colombo city area, where a significant proportion of the country's population resides, and most of the industrialization, transportation and commercial activities occur. Here, the transport sector is considered to contribute about 60% to air pollution. Meanwhile, the city of Kandy, because of its topography, has been shown to have significant effects on AQ levels. The AQ levels in other major urban centres such as Kurunegala, Anuradhapura, Nuwara Eliya and Galle have also seen progressive deterioration due to an increased number of vehicles and the establishment of industrial activities within and in the periphery. During the initial period of COVID-19 pandemic, during which vehicle movements were restricted, a significant improvement in urban AQ levels was observed, indicating that the major contribution for air pollution is, in fact, from the transport sector. Though the implementation of SLVET since 2008 has shown positive impact on air quality, the programme has not been updated since then, resulting in inadequacy for the current circumstances, while the lack of quality assurance has resulted a variety of shortcomings, signifying the urgent need for a review and upgrade.

The lack of a centralized AQ monitoring network for generation of sufficient data to understand the actual status air pollution across the country is critical for effective AQM in Sri Lanka. Though limited, the efforts of ambient AQ measurements and monitoring carried out by agencies - such as Central Environmental Authority (CEA), National Building Research Organization (NBRO) and Industrial Technology Institute (ITI) - have revealed some vital information on the status and trends in AQ levels in the country. Further, frequent experiences and public complaints of poor AQ are witnessed in and around stationary sources (e.g. flue gas and fugitive emissions from the coal power plant, smoke from healthcare waste incinerators and crematoriums, fugitive emissions from industrial processes, indoor air pollutions because of combustion and evaporative emissions), as well as open burning of waste. Lack of data and information on these sources and processes hinders a clear understanding of the situation. This is further aggravated by the ever-increasing respiratory illnesses and related health impacts are good indications of the severity of the air pollution issue in the country (Nandasena et al., 2012).

2.1.3 Policy and Legal Framework

There is no separate policy on clean air or AQM in Sri Lanka but the topic is covered by National Environment Policy and Strategies published in 2003, which stress the commitment of government, in partnership with the people, to effectively manage the environment for the benefit of present and future generations. The aim of the policy is to ensure sound environmental management within a framework of sustainable development in Sri Lanka. This policy has recently been updated as the National Environment Policy (NEP), in which the policy statement on Controlling of Air Pollution refers directly to AQM. Other recent national development policies such as the National Policy Framework – Vistas of Prosperity and Splendour and National Policy and the Strategy on Sustainable Development (Draft), and several other sectoral policies and strategies also support AQM.

The main legal and institutional framework for AQM is the National Environmental Act No. 47 of 1980 (NEA) and subsequent amendments, as well as the establishment of CEA to implement the provisions of NEA. A series of regulations related to AQM has been gazetted, including National Environmental (Ambient Air Quality) Regulations, National Environment (Air Emission, Fuel and Vehicle Importation Standards) Regulations, National Stationary Sources Emission Standards, and subsequent amendments to those. Of these, ambient AQ regulations specify maximum permissible levels for six pollutants: PM_{10}, $PM_{2.5}$, NO_2, SO_2, O_3 and CO, which are, in general, less stringent than those of WHO guidelines. Adoption of WHO guidelines for the ambient AQ regulations is anticipated for clean environment, but the economic situations in the country, lack of resources, inadequate level of enforcement and limited data/information make implementation unrealistic. Yet, regular review and strict enforcement of the ambient AQ regulations have become crucial elements in integrated AQM plan.

Another important landmark of AQM in Sri Lanka is the establishment of Air Resource Management Centre (AirMAC), which has been instrumental in consolidating stakeholder participation on AQM in the country (AirMAC, 2012). Though not institutionalized, AirMAC is effected through the functionalities of the Air Resource Management & National Ozone Unit (ARM&NOU), within Ministry of Environment. This unit is now coordinating AQM activities, particularly policy-related matters, while engaging stakeholders – including government, private sector, academics and civil society organizations. Some recent initiatives of the division include the development of a Road Map for Cleaner Fuels & Vehicles and Ambient Air Quality Guidelines. One of the key undertakings of ARM&NOU is the monitoring of the progress of activities and targets of Clean Air 2025 Action Plan (CA2025AP). This includes twelve main strategies and a set of sub-strategies and activities under each thematic area (MoMD&E, 2016). It is the evolving outcome of a comprehensive set of strategies and activities identified and prioritized by the stakeholders since the early 1990s, as reflected in the Clean Air Action Plans published since then (2000, 2007 and 2015). In fact, the Mission 1: Clean Air Everywhere of the National Action Plan for Haritha Lanka Programme 2015-2022 (Draft) too was built on the experience and lessons learned from Clean Air Action Plans (MoMD&E, 2015). This mission includes twelve strategies and a set of actions under each strategy, which are very similar in character and scope to those of CA2025AP.

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2.1.4 Introduction to the Action Plan

The action plan for the Thematic Area 1: AQM is formulated with a set of guiding principles, in line with those of the 2030 Agenda for Sustainable Development and SDGs, and the strategic directions received in design, preparation and development of the National Environment Action Plan 2022 for Sri Lanka. Further, the strategies and activities are identified within the strategic framework for integrated AQM plan presented previously, and built on the CA2025AP and the Mission 1: Clean Air Everywhere of the National Action Plan for Haritha Lanka Programme 2015-2022 (Draft). Although there were twelve strategic areas identified in CA2025AP, the AQM thematic area of NEAP presented in this section use ten strategies to present the necessary actions. The two strategic areas related to human resource development and the development of sustainable financing mechanisms in CA2025AP are integrated as activities into each of the other ten areas to derive the ten main strategies of AQM thematic area of the NEAP. Such integration is required because capacity building and financial requirements are primarily programme- project- or activity-based parameters.

2.1.5 Strategies for Management

Shown below are ten main strategies of the Thematic Area 1: AQM:

Strategy 1. Effectuate a sound institutional framework for integrated AQM, while fostering advocacy, governance and stakeholder participation.

Strategy 2. Manage air pollution from mobile sources.

Strategy 3. Manage air pollution from stationary sources.

Strategy 4. Manage indoor air pollution issues.

Strategy 5. Prevent air pollution due to unethical, unintentional, unprofessional and harmful actions.

Strategy 6. Reduce air pollution by deploying environmentally sound technologies, processes and cleaner fuels.

Strategy 7. Establish comprehensive and integrated air quality monitoring and modelling facilities, with a centralized data sharing platform.

Strategy 8. Encourage information and knowledge management, including citizen science, for better air quality.

Strategy 9. Foster innovation, research and development for effective AQM.

Strategy 10. Enhance global participation and collaboration for furthering AQM.

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2.1.6 Action Plan for Air Quality Management

Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
Strategy 1: Effectuate a sound institutional framework for integrated AQM, while fostering advocacy, governance and stakeholder participation.											
1.1 Improve and formalize the institutional arrangement of Air Resource Management Centre (AirMAC), as a multi-stakeholder partnership for effective engagement of stakeholders in decision-making and implementation	No. of Stakeholder consultative meetings held	No regular meetings		4	✓	-	-	16.6; 17.17; 17.20	1.5	MoE	MoT, MoP, MoEn, MoInd
	No. of Working Committee meetings held	-		6	✓	-	-				MoH, CEA
1.2 Establish and operationalize sound functional arrangements of AirMAC, for effective and active engagement of stakeholders through involvement of Technical Expert Committees (TECs) & Technical Working Groups (TWGs)	No. of TEC meetings held/yr	-		3	✓	✓	✓	16.6; 17.17; 17.20	3.1	MoE	MoT, MoP, MoEn, MoInd, MoH, CEA, Uni
	No. of TWG meetings held/yr	-		6	✓	-	-				
1.3 Create and sustain political support and commitment for AQM (at national, provincial and local government levels)	No. of Policy dialogues conducted/yr	No regular dialogues		3	✓	✓	✓	17.20	4.4	MoE	MoPP&L
1.4 Promote good governance concepts for AQM through stakeholder consultations at national, provincial and local government levels	No. of stakeholder consultation programmes held/yr	No regular consultations		3	✓	✓	✓	16.7; 17.17; 17.20	2.7	MoE	MoPP&L
	No. of meetings with government entities held/yr	No regular meetings		2	✓	✓	✓				
1.5 Encourage a conducive policy and regulatory environment for AQM through annual reviews of key regulations, including Ambient air quality and source emission standards	Policy and regulatory reviews conducted/yr	-		1	✓	✓	✓	16.6; 17.14	1.4	MoE	MoT, MoP, MoEn, MoInd. MoPP&L, CEA
1.6 Establish and maintain a central platform to record the relevant AQM programmes and projects implemented in the country, with the supervision of AirMAC (link to Activity 10.5)	Establishment of a central platform	-		Fully operational central platform	Central platform established			12.6; 12.8; 16.10	5.0	MoE	NPD, Uni, CEA, ITI, NBRO, NSF, NRC
	No. of updates done/yr	-		4	✓	✓	✓				
Strategy 2: Manage air pollution from mobile sources.											
2.1 Promote the concept of 'Avoid/Reduce' within the broader context of mobility/ connectivity/ accessibility, including the use of ICT for virtual connectivity and services through the development and implementation of a communication strategy, covering all critical masses and effective use of communication platform (link to Theme 8 – Activity 4.1)	Formulation of a communication strategy (and knowledge products)	-		Communication strategy developed				1.4; 4.7; 12.8	100.0	MoT	MoE, ICTA, SLSEA, NTC, UDA
	No. of national level awareness campaigns for stakeholders on Avoid/Reduce concept conducted/yr	No national level awareness campaigns		1	✓						

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
2.2 Advocate the 'Shift' concept in moving away from high polluting transport modes to cleaner ones, with particular emphasis on NMT (walking/ cycling), public transport (bus, rail), intermodal / multimodal transport systems (link to Theme 8 - Activity 4.1)	No. of national level awareness campaigns on Shift concept conducted/yr	No national level campaigns		1	✓	✓	✓	4.7; 9.1; 11.2	100.0	MoT	MoE, SLSEA, NTC, SLR, DMT, CTB, UDA
2.3 Immediate remediation of SLVET with (i) the establishment of a Technical Advisory Committee (TAC); (ii) Auditing of VET Centres; (iii) Establishment of a certification procedure for garages; (iv) Road-side testing programme, and (v) Recruitment of permanent cadre	No. of key interventions initiated	Limited functionality		5	All the 5 interventions initiated	-	-	3.9; 11.6; 13.3	5.9	DMT	SMoVR, MoE, CEA, MUSSD
	No. of TAC meetings conducted/yr	-		4	✓	✓	✓				
	% of VET Centres Audited	-		100%	✓	✓	✓				
	No. of awareness programmes on certification of garages conducted/yr	-		3	✓	✓	✓				
	No. of progress reports on roadside testing submitted to TAC/yr	-		4	✓	✓	✓				
	% of permanents cadre positions filled	-		100%	75%	100%	100%				
2.4 Revive and operationalize the VET Fund, with particular emphasis on allocation of financial resources for the implementation of SLVET and CA2025AP in particular, and NEAP in general	Retrieval of VET fund	Not within VET programme		VET Fund retrieved within VET programme	VET Fund retrieved within VET programme	-	-	9.a; 17.20	No additional cost	DMT	SMoVR, MoE, MoF
	Progress report of VET Fund submitted to TAC/yr	-		2	✓	✓	✓				
2.5 Operationalize the VET database, with particular emphasis on progress reporting and access to stakeholders/researchers	Operational level of VET database	Limited functionality		Fully functional VET database	Fully functional VET database	-	-	12.8; 16.10	No additional cost	DMT	SMoVR, MoE, ICTA
	Progress report of VET database submitted to TAC/yr	-		2	✓	✓	✓				
2.6 Strengthen the SLVET through enhanced regulatory interventions, including (i) accreditation of VET centres; (ii) certification of testing technicians; (iii) accreditation of garages, (iv) smoke-spotter programme	No. of key interventions initiated and operationalized	-		4	3	4	4	3.9; 4.7; 11.6; 13.3; 16.6	No additional cost	DMT	MoE, SMoVR, CEA, MUSSD, SLAB
	% of VET Centres accredited	Few VET centres		100%	50%	100%	100%				
	% of testing technicians certified	Few VET centres		At least 75%	50%	75%	75%				
	Implementation level of accreditation scheme of garages	No scheme for garage accreditation		Fully operational scheme	Development of the scheme initiated	Accreditation scheme established	Accreditation scheme is operational				
	No. of progress reports on smoke spotter programme submitted to TAC/yr	-		4	✓	✓	✓				
2.7 Strengthen the SLVET through effective communication by development and implementation of communication strategy and knowledge products	Formulation of a communication strategy (and knowledge products)	-		Communication strategy developed	Endorsed communication strategy	-	-	3.9; 4.7; 11.6; 13.3; 16.6	30.0	DMT	MoE, SMoVR
	No. of national communication campaigns/yr	-		1	-	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
2.8 Modify/Upgrade the SLVET through revision of testing procedures and standards	Revision of testing procedures	No-load test		Revised procedures	-	Revised testing procedures developed	New VET centre operators procured	3.9; 11.6; 13.3	100.0 (Programme cost) + 1,000.0 (Investment by private sector)	MoE	SMoVR, DMT, CEA, MUSSD
	Revision of regulations	Present test standards/ regulation		Revised regulation	-	Revised regulations gazetted					
2.9 Take initiatives to manage air pollution from other (non-road) passenger/freight transport systems (rail, water/sea and air)	No. of guidelines for rail, water/sea, air transport	-		3	-	Emission control guidelines developed for (i) rail, (ii) water/ sea (iii) air transport	-	3.9; 11.6	6.0	MoE	SLR, CAASL, CEA
	Awareness programmes conducted/yr	-		1	-	1	1				
Strategy 3: Manage air pollution from stationary sources.											
3.1 Popularize and enforce standards for emissions from stationary sources through creation of awareness and establishment of a database for best available technologies and retrofit technologies (BATs & BARTs and Code of Practice (CoP)	No. of awareness programmes conducted/yr	-		2	✓	✓	✓	3.9; 9.4; 11.6; 12.a; 17.6; 17.7	50.0	CEA	MoE
	% of BATs/ BARTs covered in the database	-		100%	20%	50%	100%				
	% of standards covered in the CoP	-		100%	20%	50%	100%				
3.2 Strengthen the resources (including establishment of IMS) and capacities of the CEA for enforcement of the regulations and standards	No. of training programmes conducted/yr	-		2	✓	✓	✓	9.4: 12.2; 13.3; 17.7	86.0 55.0 (Expenditure for equipment and IMS)	CEA	MoE
	No. of field measurement to establish baseline	-		2	2	-	-				
	Expenditure for equipment and IMS	-		55 M LKR	55 M LKR	-	-				
3.3 Facilitate the enhancement of resources and capacities of other stakeholder organizations involved in management of air pollution from stationary sources (e.g. ITI, NBRO, SLP and MUSSD)	No. of training programmes conducted/yr	-		4	✓	✓	✓	9.4: 12.2; 13.3; 17.7	6.0	MoE	CEA, ITI, NBRO, SLP, MUSSD
3.4 Promote and facilitate management of air pollution from stationary sources in large and medium industries with regular familiarization and enforcement	No. of training programmes conducted/yr	-		3	✓	✓	✓	9.4; 12.2; 17.7	50.0	CEA	MoE, MoInd, ITI, NBRO, IDB, CCC
	Scheme for AQM in large and medium industries	-		Fully operational AQM scheme	AQM scheme established	AQM scheme in implementation	AQM scheme in implementation				
3.5 Assist control of air pollution from micro, small, and traditional industries through creation of awareness with the aid of guidelines; sector specific regulations; financial schemes, and piloting of control technologies	No. of training programmes conducted/yr	-		6	✓	✓	✓	9.3; 9.4; 17.7	50.0	CEA	MoE, MoInd, IDB, ITI, NBRO
	Expenditure on piloting (LKR M)/yr	-		3	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
3.6 Improve/Update the stationary sources emission standards considering local circumstances and implementability (particularly non-combustion sources)	Revisions and enforcement of standards	Existing standards		Updated standards developed and enforced	-	Updated standards regularized	Updated standards enforced	3.9; 9.4; 11.6	5.0	CEA	MoE, MoInd
3.7 Support the industry to identify most effective emission reduction technologies/ processes (Environmentally Sound Technology Compendium)	No. of training programmes/ yr							9.4; 17.6; 17.7	50.0	CEA	MoE, MoInd, IDB, NERD, SMoSVR&I
	(i) for enforcement officers	-		6	✓	✓	✓				
	(ii) Industry	-		8	✓	✓	✓				
Strategy 4: Manage indoor air pollution issues.											
4.1 Publish guidelines for management of indoor air quality (IAQ)	Preparation of IAQ Guidelines	Draft Guidelines		Published guideline	Published guideline	-	-	3.9; 7.1 11.6	No additional cost	CEA	MoE MoH, NIOSH, CEA, NBRO
4.2 Support the creation of awareness on IAQ issues and potential mitigation options through development and implementation of communication strategy and knowledge products (both technical and non-technical)	No. of consultative meetings held	-		6	✓			11.6; 12.8 13.3	45.2	MoH	MoE, CEA, NBRO, NIOSH
	Formulation of communication strategy (and knowledge products)	Communication strategy developed		Endorsed communication strategy	✓						
	No. of national communication campaigns/ yr	-		1	-	✓	✓				
	No. of awareness programmes conducted/yr	-		12	✓	✓	✓				
4.3 Update and enhance the scope of IAQ guidelines, including sector specific guides and schemes for regularization and compliance, with the aid of pilot studies	No. of pilot IAP studies conducted	-		3	-	✓	-	9.4: 11.6 12.2	15.4	CEA	MoE, MoH, NBRO, NIOSH
	No. of exposure assessment studies conducted	-		3	-	✓	-				
	No. of TWG meetings held	-		6	-	✓	-				
4.4 Improve the enforcement aspects of the IAQ guidelines, through awareness on regulatory interventions (particularly related to building approval process)	Total no. of training programmes conducted	-		12	4	8	-	9.4: 11.6 12.2	15.0	UDA	MoPP&L, MoE, CEA
	Total no. of Field measurements campaigns conducted	-		6	2	4	-				
4.5 Facilitate mitigation of indoor air pollution due to cooking, through the creation of awareness and technology deployment (improved cook-stoves and cleaner fuels)	No. of national awareness campaign conducted/yr	-		2	✓	✓	✓	9.4: 11.6 12.2	50.0	SLSEA	MoE, MoH, CEA, NERD
	No. of pilot ICS dissemination programmes	-		10	2	3	5				
4.6 Characterize indoor air pollution sources and processes and take action to manage IAP (including establishment of IMS)	No. of awareness campaigns/yr	-		1	✓	✓	✓	9.4: 11.6 12.2	25.0	CEA	MoE, NBRO
	No. of field measurements campaigns/yr	-		1	✓	✓	✓				
Strategy 5: Prevent air pollution due to unethical, unintentional, unprofessional and harmful actions.											
5.1 Characterize air pollution as a result of unethical, unintentional unprofessional and harmful activities / practices and establish a proper IMS	No. of field measurements campaigns conducted/yr	-		1	✓	✓	✓	3.9; 11.6 12.4	50.0	CEA	MoE, MoH, SMoDM, DMC, NBRO, MoInd
	Operationalize IMS	-		Operational IMS	Established IMS	Operational IMS	Operational IMS				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
5.2 Create awareness to reduce air pollution from unethical, unintentional, unprofessional and harmful activities / practices	No. of TWG meetings conducted	-		16	✓	-	-	3.9; 11.6 12.4	100.0	CEA	MoE, MoH, SMoDM, DMC, NBRO, MoInd
	No. of awareness programmes conducted/yr	-		6	✓	✓	✓				
	No. of media campaigns conducted/yr	-		6	✓	✓	✓				
	No. of pilot projects conducted	-		8	2	2	4				
5.3 Prepare a contingency/emergency AQM action plan for air quality degradation situations (improve resilience)	No. of TWG meetings held	-		8	✓	-	-	3.9; 11.6 12.4	5.0	CEA	SMoDM, MoE, MoH, DMC, MEPA, NBRO
	Contingency plan prepared	-		Approved contingency plan	Contingency plan approved	-	-				
5.4 Establish more information and specifications on critical pollution processes such as the construction industry, open burning and agricultural/fisheries sectors' endeavours (including emission inventory - activity rates / emission factors)	No. of field-testing campaigns conducted	-		10	4	6	-	3.9; 11.6; 12.4	30.0	CEA	MoE, MoH, MoInd, SMoDM, DMC, MEPA, NBRO, ITI
	Comprehensive report on critical pollution processes prepared	-		Comprehensive report	-	Final comprehensive report	-				
Strategy 6: Reduce air pollution by deploying environmentally sound technologies, processes and cleaner fuels.											
6.1 Promote electric mobility as an energy-efficient and environmentally sound technology (E^3ST) option for transport	No. of TWG meetings held/yr	-		2	✓	✓	✓	7.3; 7.4; 7.a;7.b; 12.a, 17.7	1,750.0	MoT	MoE, SLSEA, PUCSL, DMT
	No. of national e-mobility projects implemented	-		1	GEF Project document preparation and initiation	GEF Project implementation including piloting	Follow up including Sharing lessons learnt				
6.2 Promote local value addition/ manufacture of EVs and related components / infrastructure, including sustainable management system for electric vehicle batteries (reuse/recycle/safe disposal)	Annual funding allocated (M LKR/yr)	-		2	✓	✓	✓	7.3; 7.4; 7.a;7.b	20.0	SLSEA	MoE, CEA, MoInd
6.3 Promote use of renewable energy (RE) (particularly solar PV) for e-mobility	No. of awareness programmes conducted/yr	-		4	✓	✓	✓	7.3; 7.4; 7.a;7.b	5.0	SLSEA	MoE, CEB, PUCSL
6.4 Introduce a fuel economy/carbon emission labelling programme for road vehicles: (i) Phase 1: LDVs; (ii) Phase 2: HDVs (covering gasoline, diesel and EVs) (link to Activity 4.4 in Theme 8)	No. of fuel economy labels developed	-		6	4	2	-	7.3; 7.4; 7.a;7.b	10.2	SLSI	SLSEA, MoE, DMT
	No. of pilot projects implemented	1		2	1	2	-				
6.5 Develop/update fuel quality standards (FQS) covering all types (gasoline, diesel, furnace oil, kerosene, coal) and sectors (transport, power, industry/commercial)	No. fuel types covered by updated FQS	-		5	5	-	-	7.a	25.0	CPC	MoE, MoEn, MoP. MoInd
6.6 Introduce cleaner fuels to all sectors through upgrading of local refinery processes (CPC)	% of fuels complying with FQS produced and imported	-		100%	-	60%	100%		200.0	CPC	MoEn, MoP
6.7 Study the potential and feasibility of alternative (cleaner) fuels in the transport sector (such as biodiesel, ethanol; biogas/methane; NG) to establish a roadmap for introduction	Preparation of the study report and roadmap	-		Completion of: Study report; Roadmap	Completed study report; Completed roadmap	-	-	7.4; 7.a	5.0	MoE	MoEn, CPC, SLSEA

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
6.8 Create awareness to prevent miscommunications on fuel additives and combustion improvement devices by revealing performance characteristics through scientific tools	No. of awareness programmes conducted/yr	-		2	✓	✓	-	7.a	10.0	ITI	MoE, CPC, CEA
6.9 Promote natural processes to improve air quality, including ventilation, outdoor tree plantations and indoor houseplants	No. of media campaigns conducted/yr	-		1	✓	✓	✓	11.6	5.0	UDA	MoE, MoUDH
Strategy 7: Establish comprehensive and integrated air quality monitoring and modelling facilities, with a centralized data sharing platform.											
7.1 Establish a nationwide-integrated AQ monitoring system, comprising of both a network of central fixed and mobile stations and a complementary/ supplementary remote sensing techniques/ satellite data platform and sensor/sampling network	Development of the plan for the integrated AQM system	-		Approved plan	AQM plan endorsed	-	-	3.9; 11.6	5.0 (program cost) + 414.4 (Investment)	MoE	CEA, ITI, NBRO
	No. of fixed stations commissioned as per the plan	2		8	2	2	4				
	No. of mobile stations commissioned	2		4	2	2	-				
	Comprehensive remote sensing techniques/ satellite data platform sensor/passive sampling network	-		1	Establishment of the network	Operation of the network	Operation of the network				
7.2 Sustainable management and operation of the nationwide-integrated AQ monitoring system, including the quality assurance and quality control procedures, and financing	TWG meetings held/yr	-		4	-	✓	✓	3.9; 11.6	15.0 (program cost) + 839.6 (Operation cost)	CEA	MoE, MoF, ITI, NBRO
	Comprehensive training programmes conducted/yr	-		3	-	✓	✓				
	General awareness programmes conducted/ yr	-		3	✓	✓	✓				
7.3 Foster AQ modelling though capacity building, financial assistance, and modelling/software tools (including harmonized standards developed though AQ modelling)	No. of AQ modelling activities for enforcement conducted/yr	-		3	✓	✓	✓	3.9	30.0	MoE	CEA, ITI, NBRO, Univ
	No. of Training programmes conducted/yr	-		2	✓	✓	✓				
	Annual funding for AQ modelling allocated (M LKR/yr)	-		1	✓	✓	✓				
7.4 Disseminate AQ information with the use of AQ data analysis and reporting protocol and information dissemination platforms	TWG meetings held	-		8	✓	-	-	3.9; 11.6	25.0	MoE	CEA, ITI, NBRO
	No. of awareness programmes conducted/yr	-		3	✓	✓	✓				
	Improved AQ Indices	Present AQ Index		Improved AQ indices formulated	Improved AAQ index formulated	New IAQ Index formulated	-				
	Information dissemination platform established and operationalized	-		Information dissemination platform established	Information dissemination platform operational	Information dissemination platform operational					

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
7.5 Establish and regularly update a national emission inventory for air pollutants, with referencing to progression in regional platforms	Development of template for the inventory	Draft template		Emission inventory template available	Emission inventory Template established	-	-	3.9; 11.6	6.0	CEA	MoE
	% of key pollutants covered	-		100%	20%	50%	100%				
	% of key sources covered	-		100%	20%	50%	100%				
	Minimum no. of updates/yr	-		3	1	2	3				
7.6 Enhance the capabilities of the AQ monitoring network, to cover transboundary air pollutions	No. of mobile AQM stations for transboundary air pollution	None		1	-	RFP for AQM station prepared	AQM station procured and operational	3.9; 11.6	57.0 (Investment) + 82.7 (Operational)	CEA	MoE, ITI, NBRO
Strategy 8: Encourage information and knowledge management, including citizen science, for better air quality.											
8.1 Foster awareness on AQ issues and potential options and alternative for mitigation with the aid of a communication strategy and knowledge products (Link to Activity 2.1, Activity 2.2, Activity 2.7, Activity 4.2, Activity 4.5, Activity 4.6, Activity 5.2, Activity 5.4 and Activity 6.9)	Development of communication strategy	-		Communication strategy prepared	Approved communication strategy	-	-	3.9; 3.a: 11.6; 12.8	14.8	MoE	MoH, CEA, Uni
	Development of knowledge products	-		Knowledge products prepared	Approved knowledge products	-	-				
	No. of awareness programmes conducted/yr	-		12	✓	✓	✓				
8.2 Enhance knowledge on and response to AQ issues and solutions, including establishment of a Citizen Science platform with the aid of an education strategy/plan and training	Development of educational strategy	-		Educational strategy prepared	Approved educational strategy	-	-	3.9; 3.a: 11.6; 12.8	25.0	MoE	CEA, MoH, Uni
	Development of educational materials	-		Educational materials prepared	Approved educational materials	-	-				
	No. of ToT programmes conducted/yr	-		6	✓	✓	✓				
	No. of active citizen science platforms managed	-		3	1	2	3				
8.3 Conduct advocacy with policymakers and other key stakeholders through regular communication and consultations to ensure stronger commitments for AQM	No. of TEC meetings held/yr	-		2	✓	✓	✓	3.9; 3.a: 11.6	9.8	MoE	CEA, MoH
	No. of National advocacy programmes conducted/yr	-		4	✓	✓					
	No. on Local government level advocacy programmes conducted/yr	-		18	✓	✓	✓				
Strategy 9: Foster innovation, research and development for effective AQM.											
9.1 Establish a research agenda and a roadmap for AQM and communicate to research community	Development of agenda for prioritized research	-		Research agenda prepared	Approved research agenda	-	-	3.9; 4.b; 9.5; 9.b	5.0	MoE	SMoSVR&I, CEA, Uni, NBRO, NSF, NRC
	Development of roadmap	-		Research roadmap prepared	Approved research roadmap	-	-				
	No. of communication meetings conducted/yr	-		2	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
9.2 Establish a sustainable funding scheme for AQ research and development through consultation with funding/financing agencies	No. of TEC meetings conducted/yr	-		3	✓	✓	✓	3.9; 4.b; 9.5; 9.b	54.1	MoE	VET Fund, MoF, NSF, NRC
	No. of consultative meetings conducted/yr	-		2	✓	✓	✓				
	No. of awareness programmes conducted/yr	-		2	✓	✓	✓				
	No. of research projects funded/yr	-		2	✓	✓	✓				
9.3 Assess and value air pollution impacts (health, environmental, social and economic)	No. of TEC meetings conducted/yr	-		3	✓	✓	✓	3.9;4.b; 9.5;9.b	77.1	MoE	MoH, CEA, NBRO, Uni
	No. of awareness programmes conducted/yr	-		2	✓	✓	✓				
	No. of impact assessments and valuations conducted/yr	-		3	✓	✓	✓				
	No. of communications on impacts conducted/yr	-		1	✓	✓	✓				
9.4 Disseminate/Communicate research findings by means of local and regional/international symposia, communication to a larger section of the society and general public	No. of seminars and symposia organized/yr	-		1	✓	✓	✓	3.9; 4.b; 9.5; 9.b	20.0	MoE	Uni, CEA, NBRO, VET Fund
9.5 Promote innovations and creativity through mentoring, facilitating and incentivizing	No. of mentoring sessions conducted/yr	-		2	✓	✓	✓		7.0	SLIC	MoE, VET Fund, Uni, CEA
	Annual funding to support inventions (M LKR/yr)	-		0.5	✓	✓	✓				
Strategy 10: Enhance global participation and collaboration for furthering AQM.											
10.1 Strengthen the existing partnerships with Clean Air Asia (CAA)	Strengthened partnerships with CAA	Existing partnership with limited activities		Strengthened partnership with CAA	Strengthened partnerships with CAA is established	Continuation	Continuation	17.16	No additional cost	MoE	CEA, ITI, NBRO; Uni
10.2 Explore opportunities to form formal partnerships / obtain membership of global institutes / partnerships (such as Climate and Clean Air Coalition – CCAC)	No. of global partnerships initiated	-		3	1	1	1	17.16	No additional cost	MoE	CEA, ITI, NBRO, Uni
	Minimum no. of active global partnerships in each year	-		2	1	2	2				
10.3 Engage in regional and international initiatives, projects, and symposiums related to AQM	No. of international symposia engaged with (BAQ)	1 in 2 yr		5 in 10 yrs (Continuation)	2	3	5	17.16	No additional cost	MoE	CEA, ITI, NBRO, Uni
	No. of projects / programmes participated/yr	-		1	✓	✓	✓				
10.4 Appraise outcome/benefits of the engagement with regional platforms	Appraisal report	Initial phase experience		Comprehensive appraisal	Appraisal report completed	-	-	17.16	No additional cost	MoE	CEA, ITI, NBRO, Uni
10.5 Record and update the AQM programmes and projects implemented with the participation of international organizations (link to Activity 1.6)	No. of updates performed/yr	-		4	2	3	4	11.c; 17.16	No additional cost	MoE	CEA,NPD, ITI, NBRO, Uni

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THEME 2
BIODIVERSITY CONSERVATION AND SUSTAINABLE USE

Sri Lanka boasts of a suite of terrestrial, inland aquatic, coastal and marine ecosystems, a variety of species, including many endemic and range-restricted species, which provide humans with life-sustaining ecosystem services. Globally, Sri Lanka's biodiversity is highlighted as 'biologically rich and deeply threatened' when it was declared as one of 36 biodiversity hotspots in the world with the Western Ghats of India (Conservation International, 2021). Direct threats include habitat destruction and degradation, overexploitation, pollution, invasive alien species and the overarching driver of ecosystem change - climate change, which exacerbates the impacts of every other threat (MEA, 2005). With the effective implementation of this theme's action plan, it is expected that the threats to the survival of species and to the ecosystems of Sri Lanka will be reduced.

2.2.1 Overview

Sri Lanka is endowed with rich natural capital (MoMD&E, 2016a; 2019). Globally, Sri Lanka's biodiversity was highlighted, when with the Western Ghats of India, it was declared as one of 36 biodiversity hotspots in the world, that is, areas that are 'biologically rich and deeply threatened' (Conservation International, 2021). Sri Lanka is also recognised globally for its 92 Key Biodiversity Areas (CEPF, 2007; KBA, 2020); 70 Important Bird Areas (BirdLife International, 2021a & b); two UNESCO natural World Heritage Sites[1] listed for their 'outstanding universal value to humanity' (UNESCO, 2021); seven Wetlands of International Importance/ Ramsar sites[2] (Ramsar, 2014), and four international Man & Biosphere Reserves[3] (UNESCO, 2017).

Globally, there has been a slow shift in thinking about biodiversity conservation from the classic model of delineating protected areas[4], to an understanding that agricultural lands, villages, cities and towns, places of cultural and historical significance, state and private lands are all interdependent mosaics in 'a fully integrated landscape' and therefore, must be managed on a larger, landscape scale (Network for Landscape Conservation, 2021). Thus, management must shift a) to a bigger geographic scale; b) to include private areas; and c) from sectoral to collaborative governance (Network for Landscape Conservation, 2021). The model of Environmentally Sensitive Areas - that balances wise use with conservation measures[5] within human-dominated sites and engages local communities - provides a means of moving management towards a landscape approach (Janson, 2020).

Technological advances in the last few decades have revolutionised biodiversity conservation: Geographic Information System (GIS), Global Positioning System (GPS) coupled with biotelemetry[6], camera traps[7], conservation drones and satellite tracking tools are now integral to understanding species populations and distributions, for precisely following species; assessing vegetative cover and land use change, as well as mapping habitats and managing human-elephant conflict (Audubon International, undated; Hahn et al., 2016, Pacheco, 2018; López & Mulero-Pázmány, 2019). Habitat modelling allows for the prediction of the distribution of a species across geographic space and time. The advances in molecular biology too have been phenomenal – using artificial methods of reproduction[8] and cloning to augment critical endangered populations (O'Brien, 2015), as well as gene editing techniques, which can now be used delete a harmful gene or insert a beneficial one (Pacheco, 2018). In Sri Lanka, in the last two decades, phylogenetic studies (using molecular methodology) have revealed many endemic or range-restricted species.

Many of these technological tools are being used already in Sri Lanka and have contributed greatly to knowledge about biodiversity, but there are gaps - for example, the use of conservation drones, cutting-edge *ex-situ* conservation methods and gene editing - which are yet to be filled.

The ecosystems of Sri Lanka provide humans with life-sustaining ecosystem services. However, the values of these services are rarely publicised. For example, the value of fish and shellfish from three lagoons - Batticaloa, Negombo and Puttalam - was estimated to be 2,866 M LKR[9] (Samarakoon and Samarawickrama, 2012); the annual value of flood protection from Muthurajawala marsh is 1,710 M LKR[10] (Emerton and Kekulandala, 2002) and carbon sequestration per annum from the mangroves around Puttalam lagoon was worth 306 M LKR[11] (Emerton et al., 2016). In 2019, there were 7.3 M local and foreign tourists visiting areas

1 Sinharaja and the Central Highlands (comprising Horton Plains National Park, Peak Wildnernes Nature Reserve and Knuckles Conservation Forest).
2 Bundala National Park; Annaiwilundawa Sanctuary; Maduganga Sanctuary; Vankalai Sanctuary; Kumana Wetland Cluster (within the national park); Wilpattu Wetland Cluster (within the national park), and Colombo Wetland City.
3 Sinharaja, Kanneliya-Dediyagala-Nakiadeniya complex, Bundala and Hurulu (UNESCO, 2017).
4 which usually locked out people, and managed these areas using 'site-specific, parcel-by-parcel' methods (Network for Landscape Conservation, 2021).
5 For example, for Threatened, endemic or range-restricted species, as well as sensitive ecosystems, or areas for migratory species, nesting or as nurseries (Janson, 2020).
6 Radio telemetry, acoustic telemetry, satellite tracking.
7 Motion detection cameras that trigger when an animal passes by (O'Brien, 2015).
8 In vitro fertilisation, surrogacy in domestic species.
9 Current value at 2020.
10 As above.
11 Current value at 2020.

under the jurisdiction of the DNZG, DNBG, DWC and FD; earning a revenue of 2,966 M LKR for these agencies, from entrance tickets sales alone (SLTDA, 2019).

Agriculture, fisheries and tourism rely on natural resources. In 2017, there were 2.1 M households and 8.1 M people engaged in agriculture (DCS, 2017); in 2020, 249,680 fisheries households and 295,325 active fishers (MFARD, 2020); and 402,607 persons directly and indirectly employed in the tourism sector (SLTDA, 2019). This means that 40.35% of the estimated population of Sri Lanka for 2019, in just three sectors, depended on biodiversity for their livelihoods.

Yet, this natural capital is being damaged and destroyed by indirect and direct drivers of ecosystem change (threats). Direct threats are discussed in the following section.

2.2.2 Current status[12]

In Sri Lanka, the primary driver of ecosystem change (threat to biodiversity) is habitat destruction, as well as fragmentation and degradation (MoMD&E, 2016). The connectivity among various protected areas is maintained by state forests not currently within the protected area system, and these need urgent assessment and inclusion, as necessary, into the protected area system, because they are crucially needed for the movement of large vagile[13] mammals (otherwise existing human-wildlife conflict will likely be exacerbated), as well as for pollinators and plant propagules.

It is now known that blue carbon ecosystems - mangroves, inter-tidal flats, salt marshes and seagrass meadows - sequester carbon at a rate of 2-4 times greater than that of tropical forests. Therefore, they are critically important to climate change mitigation (Conservation International, 2019). Salt marshes are only just being recognised as ecologically important (Ranawana et al., 2020) but are also largely outside the protected area system.

Habitat destruction has been identified as the key driver of the emergence of zoonotic[14] diseases (Roe et al., 2020). In the current context of the pandemic and with future predictions about the increase of such diseases, the sheer danger of continuing habitat destruction cannot be over-emphasised (FAO, 2020). The phrase, used in the original National Conservation Strategy (CEA, 1988), that protected areas should 'be made inviolate by statute' is now of utmost importance.

The use of Environmentally Sensitive Areas (ESAs), as a different model for conservation, will be critical within the context of unsustainable development. In this UN decade of restoration (UN/UNEP/FAO/CBD, 2021), assessing degraded ecosystems and conducting an island wide programme of ecological restoration is also needed.

In addition to habitat destruction, there is overexploitation. This is a main area of concern in the coastal and marine fisheries sector, discussed under Theme 4[15]. Illegal fishing and collection of endemic freshwater fish for the ornamental fish trade is still ongoing (Goonatilake et al., 2020). Continuing for decades is the illegal collection of ornamental plants, especially endemic orchids and aquatic ornamental plants. New interests in gardening following COVID-19 lockdowns and the use of social media for advertisement, have greatly increased illegal collection and sale of range-restricted orchids (Fernando, quoted in Sunday Times, 2020).

Consequently, many species have become threatened with extinction. Among groups assessed in the last National Red List™, about 48% of assessed plants were threatened (Wijesundara et al., 2020), and among land snails, dragonflies, bees, freshwater crabs and amphibians, more than half the recorded species are Threatened. For bees and freshwater crabs more than 80% are Threatened (MoE, 2012). The update of the Red List is ongoing, with several groups completed. It is imperative to complete this process quickly and

12 The topics of pollution and climate change – two identified threats to biodiversity (MEA, 2005) – are dealt with under other themes.
13 Able or tending to move from place to place or disperse.
14 Is an infectious disease caused by an infectious agent such as a virus or a bacterium that is transmitted between animals (usually vertebrates) and humans.
15 The issue of poaching of marine mammals and reptiles is also discussed under Theme 4.

twin it with an update of the schedules of the Fauna and Flora Protection Ordinance, to achieve congruence between conservation science and practice[16].

Through Red Listing, species needing *ex-situ* conservation can be identified. However, although breeding/ cultivation *ex-situ* is being carried out for a range of flora and fauna, except for a few of these species, the next step of *ex-situ* conservation - release/transplanting into the wild - has not properly occurred, because of the lack of guidelines for release/transplanting and monitoring, as well as capacity building/strengthening in all *ex-situ* centres.

Habitat fragmentation and ensuing isolation outside protected areas of many Threatened species have resulted in human-wildlife conflict/incidents. In 2019, 405 elephants (Prakash et al., 2020) and reportedly, in 2020, 12 leopards - which are Endangered - died because of such incidents. Planning and pilot testing innovative methods of mitigation, as well as scaling-up of effective measures will be essential.

Some 150 fossil sites[17] have been found in many parts of the island. Except for five allotments in Aruwakkalu gazetted recently (GoSL, 2021), these are completely unprotected. Preparing management plans and conserving sites that represent key evolutionary links, establishing paleo-biodiversity centres and promoting paleo-tourism are needed.

Sri Lanka has lost some 600 traditional, long-lived wild varieties of rice, replaced mostly by varieties improved, for example, for yield and withstanding pest and disease (MoMD&E, 2016). Therefore, preservation of traditional crop varieties and sustainable cultivation methods need continued focus. Other species of concern include endemic and range-restricted species, forestry species, medicinal and aromatic plants - particularly in the context of climate change. Developing, promoting and implementing bio-prospecting programmes with benefit sharing will be needed. A National Genome Centre/s, which use(s) cutting-edge molecular methodology for sequencing of genomes, of among other species, traditional varieties/ wild relatives, native and medicinal plants to ensure wise use of genetic resources must be established. The formulated biosafety action plan for the safe use of GMOs[18] must be implemented concurrently.

The lack of integration of the economic value of biodiversity conservation and sustainable use into the national economy is a critical challenge that needs to be addressed to ensure the long-term conservation of the island's natural wealth.

Ecotourism - which is inherently sustainable - is often used incorrectly to mean 'tourism to natural areas' which is not sustainable, as over-visitation and irresponsible behaviour are issues of considerable concern in Yala National Park (NP), Horton Plains NP, Minneriya NP and Knuckles Conservation Forest. Social carrying capacities must be enforced and the SLTDA and associations of tour guides must change the tourists' and guides' attitudes as well as promote new sites for visitation.

Traditional knowledge and practices (such as paddy cultivation, land preparation, shared ownership during water scarcity, cropping patterns, eco-friendly pest control, and diverse, food-supplying home gardens) are now slowly dying out. Preservation of these practices will allow for the involvement of communities in biodiversity conservation (Padmasiri, 2018).

An applied research agenda to support the strategies proposed is needed. For example, studies of blue carbon ecosystems are rare (Ranawana et al., 2020). Although forest ecosystems have been studied, the value of forests not already within the PA system must be assessed in the context of their ongoing destruction. There is also a major gap in relation to research related to predictive studies on the impacts of climate change on species and ecosystems, as well as studies related to alternative uses of invasive alien species (IAS).

16 There is a difference between the threat level and the protection provided for certain groups, for example, for freshwater fish (Miththapala, 2015).
17 From the Jurassic, Miocene and Holocene periods
18 Based on the Cartagena protocol.

The exponential growth in the use of social media has increased communication concerning threats to biodiversity. Some understanding is now spreading among the public about ecosystem services. Yet, there is a gap in linking ecosystem well-being to human well-being. Information sharing about biodiversity is not yet routinised, nor is it readily available even for researchers in biodiversity conservation and sustainable use.

Perhaps the most severe bottleneck in relation to biodiversity conservation and sustainable use is in institutional issues. There are specific policies for forests, mangroves, watersheds and wetlands, but their implementation needs considerable improvement. While many of the policies mentioned above promote holistic, multi-stakeholder management, they appear not to have been absorbed into the national planning framework, because often, there is competition for space between development and conservation actions.

Also lacking among the policies is an overarching one for biodiversity. Before the 2004 tsunami, the value of mangroves as a means of protection from extreme weather events was unknown, and before the MEA (2005), IAS may have been known but their adverse ecological and economic costs were not yet understood. Using the precautionary principle, an overarching policy for biodiversity must be formulated, as protection from what is yet unknown.

There is a need to carry out a review of all biodiversity-related laws and resolve overlaps and gaps, as well as conflicting aims, it is also necessary to legislate the inclusion of community participation, as in general, there is inadequate community participation in conservation, though fisheries and forestry legislation have mechanisms to mobilise communities.

The main weakness in Sri Lanka's legislation is that there need to be considerable improvement in implementation. Both the DWC and FD are operating with only about 76% and 81% of their expected strength of officers as approved cadres (MoF, 2020). Improving the capacity of all officers in these organisations is also needed, ensuring the use of modern technological tools and new approaches to conservation. There are now many virtual webinars and workshops run by various agencies, such as IUCN's Commissions of Ecosystem Management and Protected Areas, which provide low-cost training.

Almost every recent policy states the need for an inter-sectoral multi-stakeholder approach. This will require institutionalised multi-stakeholder platforms, at national and district levels.

2.2.3 Policy and Legal Framework[19]

The key national policy framework under which this theme is written is 'Vistas of Prosperity and Splendour' (2019), Chapter 8: A Sustainable Environmental Policy, where biodiversity 'will be protected, conserved and restored, ensuring the increase national forest cover by 30%. The wise use as well and planned and systematic integration into other sectors are also envisioned'. The 'National Policy on Invasive Alien Species (IAS) in Sri Lanka Strategies and Action Plan' (2016), implemented by the BDS, MoE, envisages a comprehensive, coordinated, and efficient system, with adequate laws to protect both natural and human-made aquatic, marine and terrestrial ecosystems of Sri Lanka from risks associated with IAS and provides guidance for actions related to IAS'. The 'National Policy for Conservation and Sustainable Utilization of Mangrove Ecosystems in Sri Lanka' (2020) (implemented by the BDS, MoE) has four goals: i) both human and ecological well-being in areas where mangroves are found; ii) ensuring the intake of concerns regarding mangrove ecosystems into policies, legislation, plans, programmes and projects; iii) the empowerment of social capital and protection of traditional knowledge for mangrove conservation allowing equitable access to these ecosystems and iv) the creation of awareness island wide for mangrove conservation. Also implemented by the BDS, MoE, the 'National Policy on Access to Biological Material and Fair and Equitable Benefit Sharing' (2020) aims to 'ensure the fair and equitable sharing of benefits arising from biological material, while securing ownership of such material and associated traditional knowledge among the people of Sri Lanka, with appropriate public participation, to support conservation and sustainable use of biological material in the country'. The 'National Policy and Strategies on Traditional Knowledge and Practices related to Biodiversity' (2020) which aims to

19 Except when central to the theme, only policies, laws and plans in the last decade are shown here.

'conserve traditional knowledge and practices within the sustainable development framework and thereby manage the use of natural resources and ensure the upliftment of the life pattern of the local people' is also implemented by BDS, MoE.

The 'Constitution of Sri Lanka' (1978), Article 27 (14) states that 'The State shall protect, preserve and improve the environment for the benefit of the community' and Article 28 (f) adds that every person has a duty 'to protect nature and conserve its riches'. The 'Fauna and Flora Protection Act No. 2 of 1937' last amended in 2009, implemented by the DWC, provides direct protection to ecosystems and species. Habitats are protected by making them parts of a protected area network as national reserves (only state land) and sanctuaries (both on state and private lands), where each category has different levels of legal prohibition of activities and restrictions. Species are protected under this ordinance through a series of lists (schedules), in which there are categories of protection, based on penalties for infractions. The 'Forest Ordinance No. 16 of 1907' also amended in 2009, implemented by the FD, provides for the declaration of three types of protected areas: Conservation Forests, Reserved Forests (Forest Reserves) and Village Forests. All these can be declared on state land only and there are different restrictions imposed and penalties detailed, within the different categories of reserves. Implemented by the CEA, the 'National Environmental Act No. 47 of 1980' and its amendments, are important for this theme as it requires mandatory Initial Environmental Examination (IEE), or Environmental Impact Assessment (EIA) reports for certain development projects, which need identification of the biodiversity of the area that will be affected by the proposed project, and recommendations for mitigation measures. In addition, there are provisions in this act to designate areas as Environmental Protection Areas, in areas of value in biodiversity. The 'Coast Conservation Act No. 57 of 1981' as amended, mandates the CC&CRMD to be involved directly in natural resource conservation and management, including conservation and management of mangroves and seagrass meadows in the coastal zone. The 'Fisheries and Aquatic Resources Act, No. 02 of 1996' and its amendments, implemented by the DFAR, prohibit the harvest of marine mammals, marine turtles and thresher sharks; prohibit/regulate export and import of certain species; provide for ecosystem-based collaborative management of designated fisheries reserves and fisheries management areas, and prohibit removal, cutting or altering mangrove ecosystems.

The 'National Biodiversity Strategic Action Plan' (NBSAP) (2016-2022) is based on the following five strategic objectives: ensuring the long-term conservation of biodiversity; promoting sustainable use of biological resources; conserving agrobiodiversity; promoting equitable sharing of benefits from biodiversity; and improving human well-being through an ecosystem approach. It has 12 targets and 87 actions. However, under this theme, several of these actions have moved to Theme 3 (Climate actions for sustainability); Theme 4 (Conservation of Marine and Coastal Resources), Theme 5 (Land); and Themes 1 and 6 (Pollution). The oversight agency is BDS, MoE. The Haritha Lanka Programme (HLP) (2009-2016) Mission 2: Saving the Fauna, Flora and Ecosystems had ten strategies and 52 actions. Haritha Lanka Programme (2015-2022), Mission 2: Mainstreaming Biodiversity Conservation for Sustainable Development had 11 strategies and 72 actions. The National REDD+ Investment Framework and Action Plan (NRIFAP) (2017), implemented by FD, is a five-year framework for REDD+ in Sri Lanka. This framework identifies 13 Policies and Measures within three key policy areas: i) Forests, Wildlife and Watershed; ii) Land Use Planning and iii) Other Forested Lands. Many of the Policies and Measures – improving forest law enforcement and monitoring; scaling-up of forest boundary surveys; demarcating and declaring reserves; restoring degraded forests and wildlife ecosystems; strengthening sustainable forest management; supporting the inclusion of Strategic Environmental Assessment; and strengthening the protection of other non-state forested lands – are repeated in some way or another under the actions of this theme.

The 'UN Convention on Biological Diversity' (CBD) (1992) (Focal Point: BDS, MoE) is the overarching and guiding international convention for biodiversity and sustainable use. Countries commit to achieving the targets developed every 10 years. The current 'Post 2020 framework' has eight milestones for 2030, and 20 'action-oriented' targets for 2030. Of the UN Sustainable Development Goals (SDGs) (2015) (Focal Point: BDS, MoF), 'Goal 15 - Life of Land' (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss) - and its 12 targets are important, as well as targets 14.2 and 14.5 of 'Goal 14 - Life below

Water'. 'The Cartagena Protocol on Biosafety to the Convention on Biological Diversity' (2003) (Focal Point: BDS, MoE), a supplementary agreement to the CBD, is a treaty governing the movements of living modified organisms (LMOs) resulting from modem biotechnology from one country to another. The 'UN Convention Concerning the Protection of the World Cultural and Natural Heritage' (1972) (Focal Point: Sri Lanka UNESCO National Commission, MoEd), seeks to encourage the . . . protection and preservation of cultural and natural heritage around the world . . . of outstanding value to humanity. Signatories are expected to ensure the protection of their natural and cultural heritage.' Sinharaja and the Central Highlands (comprising Horton Plains National Park, Peak Wilderness Nature Reserve and Knuckles Conservation Forest) are UNESCO natural world heritage sites. The 'Ramsar Convention on Wetlands of International Importance' (1971) (Focal Point: DWC) for wetlands that is implemented through, *inter alia*, the wise use of wetlands, and the designation and management of Wetlands of International Importance (Ramsar sites). Countries commit to inform the Ramsar Secretariat if there are changes in the ecology of these sites because of human activities. The 'Convention on the Conservation of Migratory Species of Wild Animals' (also called the Bonn Convention) (1979) (Focal Point: DWC) 'provides a global platform for the conservation and sustainable use of migratory animals and their habitats. This convention brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range'. The 'Convention on International Trade in Endangered Species of Wild Fauna and Flora' (CITES) (1963) (Focal Point: DWC) regulates exports and imports of species that are traded. It is important in the context of unregulated trade.

2.2.4 Introduction to the Action Plan

The strategies and actions for Theme 2 were adapted from the base of strategies and actions in Mission 2 of HLP2 but were altered/removed/or added to reflect the current threats to biodiversity. This action plan is aligned with SDG 15 – Life on Land and its targets, as well as targets 14.2[20] and 14.5[21] of SDG 14 – Life below in Water. It heavily uses the CBD post-2020 framework, is also aligned with Chapter 8 of 'Vistas of Prosperity and Splendour' and is guided by the second principle of NEAP 2022 of 'using strategies that ensure that strong safeguards are integrated into development'. The strategies and actions were also aligned with those of the NBSAP (2016).

It should be noted that there was considerable overlap between Theme 4 and this theme, and it was often difficult to decide which action or strategy belonged under which theme (for example. marine species are dealt with under Theme 4). Regarding the protection of sensitive habitats and areas, there is replication under Theme 5. The strategies and actions of Theme 3 (Climate actions for sustainability), as well as Themes 1 and 6 (Pollution) also have considerable bearing on this theme.

20 'By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans' (UN, undated b)

21 'By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information' (UN, undated b).

2.2.5 Strategies for Management

Strategy 1. Optimize the conservation of ecosystems, their services and integral biodiversity, through a well-connected and effective protected area system and other area-based conservation measures.

Strategy 2. Ensure viable populations of native species in all terrestrial and aquatic systems.

Strategy 3. Mainstream the wise use, fair and equitable sharing of benefits arising from fauna, flora and the genetic resources.

Strategy 4. Safeguard and promote traditional knowledge and practices in biodiversity conservation and sustainable use.

Strategy 5. Assess and apply economic values of biodiversity and ecosystem services in decision making.

Strategy 6. Promote research, ensure data governance and sharing for evidence-based decision-making and communication.

Strategy 7. Apply the necessary policy frameworks, legal and organizational arrangements for biodiversity conservation and sustainable use.

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2.2.6 Action Plan for Biodiversity Conservation and Sustainable Use

Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 1. Optimize the conservation of ecosystems, their services and integral biodiversity, through a well-connected and effective protected area system and other area-based conservation measures.											
1.1 Existing PAs are managed effectively[22] to achieve identified conservation goals[23], connectivity of PAs and true representation of the island's biodiversity	No. of PAs with management plans prepared with stakeholder engagement	105 PAs under DWC > 875 PAs under the FD		All PAs	✓	✓	✓	6.6, 14.5, 15.1, 15.4, 15.5	1,500.0	DWC, FD	CC&CRMD, DFAR, CEA, MoE, DS, MASL
	% of PAs managed according to management plans	Participatory management of PAs being considered		50% of the PAs		✓	✓				
	No. of other declared management areas - such as SMA, FMAs and EPAs - implemented with management plans with conservation goals	SMAs and FMAs are not yet properly implemented		All other management areas have management plans, with identified conservation goals		✓	✓			CC & CRMD	
1.2 New PAs[24] are established through evidence-based justifications, including safeguarding of blue carbon ecosystems and vegetation cover outside protected areas	No. of ha of blue carbon ecosystems in the PA network[25]	18,000 ha mangroves are protected. Other blue carbon ecosystems are not protected unless they fall within an existing PA		At least 1,500 of blue carbon ecosystems are in the PA network	At least 10%	At least 30%	At least 35%	14.5	5.0	DWC, FD	MoE, CC&CRMD, DS, academic/ research institutes, INGOs, NARA, CCF
	Extent of forest cover outside PAs declared as new PAs	There are potential areas under OSF covering approximately 340,000 ha		100,000 ha of new PAs	✓	✓	✓	15.5	60.0		
1.3 Physical identification of ESAs for declaration	Stakeholder-validated ESAs and policy available	Draft policy under review		ESA policy adopted	✓			14.2 14.5 15.1 15.2 15.5	16.0	MoE for facilitation LUPPD for physical identification DSs, DivSs	MoE, academic/ research institutes, INGOs, CEA, communities, including CSOs, and public institutions
	Identified ESAs are ground-truthed	Three pilot sites in the Kala Oya basin Some critically important and environmentally sensitive OSF remain outside the PA system		Ground-truthed ESAs	At least 10% identified	At least 50% identified	All the end of this time frame		30.0		
1.4 Declaration of ESAs and their optimal management	No. of ESAs declared	No ESAs declared yet. National scale-up for the identification of ESAs is in progress		5 ESAs declared		✓	✓	14.2 15.1 15.2 15.5	1.0	CEA, FD, DWC and other Gov Agencies	MoE, LUPPD, academic/research institutes, INGOs, local communities, local government/ local state agencies, NGOs, private sector
	Strategic plan for ESAs developed and adopted	Handbook for developing ESA is available		Strategic plan adopted		✓	✓		25.0		
	ESA management structure agreed and functioning			Functional management structures for 30% of ESAs		✓	✓				

22 Conservation goals are identified, management plans are prepared and implemented.

23 This strategy is replicated under Theme 5.

24 Including terrestrial, inland aquatic, coastal and marine ecosystems (repeated under Theme 4 for coastal and marine).

25 The final expectation is that all blue carbon ecosystems are within the PA network.

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
1.5 Revival of ecosystems through appropriate restoration programmes	No. of degraded areas prioritized for restoration	Restoration is carried out in selected areas		Priority areas are identified for restoration		✓	✓	15.1 15.2 15.3 15.5	10.0	MoE	FD, DWC, MASL, ID, SLLDC, UDA, DS, DivS, academic/research institutes, INGOs, private sector
	No. of guidelines and procedures developed and adopted for restoration	Currently, scattered scientific papers and a draft guideline for forest restoration		Three Guidelines are developed		✓				FD, DWC	
	No. of scientific restoration programmes carried out	Draft mangrove restoration guideline		15,000 ha restored	1,500 ha restored	5,000 ha restored	Target achieved		6,000.0	FD, DWC, MASL	
Strategy 2. Ensure viable populations of native species in all terrestrial and aquatic systems.											
2.1 Periodic update of the conservation status of species through Red Listing and amendment of schedules of the FFPO, FD, FARA to reflect the uptake of Red Listing into implementation including the use of data for taking selected species off the Red List through conservation efforts	No. of taxonomic groups updated	National Red List of 2020, updated for flora, fish, birds done; mammals ongoing		Red List of Threatened species completed	✓	✓	✓	15.5	5.0	MoE for red list, DNBG	Different expert groups for taxonomic groups of flora and fauna
	Amendments to relevant schedules according to Red List recommendations	Last FFPO update in 2009		FFPO Schedules updated to match the Red List		✓	✓			DWC for FFPO	IUCN (for technical assistance) office of the legal draughtsman
	Initiatives to improve the population size under threatened species			Species recovery programmes implemented		✓	✓		20.0	DNBG	
2.2 Continuing inventorisation of taxonomic groups found in Sri Lanka, along with upgrading of data and specimen repositories	No. of lesser-known taxa[26] studied	Studies have been carried out for limited taxa		Lesser-known taxa identified and inventoried	✓	✓	✓	15.5	7.0	DNH (NBG), DNM, MoE[28]	NSF, Uni/ Research institutions, Researchers
	No. of biodiversity repositories upgraded[27]	Limited number of molecular phylogenetic studies		Capacities developed in repositories		✓	✓	15.8	2.0	NH / DNBG, Uni, Research institutes	DNM, DNZG
2.3 Implementation of conservation plans for effective *in-situ* conservation of threatened and/or endemic that also include models to accommodate biodiversity in private lands	Mechanism for prioritization of species requiring *in-situ* conservation			Prioritization mechanism adopted		✓	✓	15.5	5.0	MoE	DoA
	No. of conservation plans implemented	Plans exist; coordinated effort is needed for implementation		Action plans implemented		✓	✓	15.5	50.0	DWC	FD, MoE, MWFC
	Public - private partnerships for *in situ* conservation promoted and periodically reported			PPP promoted by 50%		✓	✓	15.5	No additional cost	DWC	FD, CEA MoE

26 Including but not limited to algae, fungi, many lower plants, and coastal, marine and terrestrial invertebrates, coastal and marine vertebrates.

27 The expectation is that the species inventory of Sri Lanka is updated.

28 MoE will have to play a coordinating role, but all these institutions have biorepositories.

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
2.4 Recovery, release and monitoring for threatened and/or endemic species resulting from *ex-situ* conservation efforts are implemented, with relevant stakeholders, for identified species	No. of facilities established for *ex-situ* conservation	Six Botanic Gardens, 04 DNZG exist		Two additional facilities	✓	✓	✓	15.5	250.0 (seed bank)	DNZG, DNBG for captive breeding/ *ex-situ* propagation NARA for aquatic species	DWC, FD, for release into the wild, MoE oversight Academics for monitoring NAQDA
	Adequate skilled personnel available for effective management of *ex-situ* conservation facilities	Breeding and propagating programmes exist		Skilled personnel available	✓	✓	✓				
	No. of recovery programmes implemented	Limited number of programmes[29] exist		10 programmes completed	✓	✓	✓				
	No. of species bred/propagated into viable populations through *ex-situ* conservation			02 species			✓				
2.5 Conservation of genetic diversity of traditional / native varieties / breeds/wild relatives of crops and livestock	No. of resource centres and skilled personnel available	There is no data about the genetic diversity of remaining local breeds[30]		Resource centres established with skilled personnel		✓	✓	15.5	To be estimated	NLDB, DAP&H for domestic fauna PGRC for flora	MoE, VRI, Uni/ Research institutes
	No. of conservation efforts in place	Conservation of major crops is established NIFS has started a repository of fungi		Native/traditional varieties/breeds/wild relatives identified and conserved		✓	✓				
2.6 Safeguard key paleo-biodiversity sites through the declaration of such areas under appropriate acts, preparing management plans, with the promotion of some sites that represent key evolutionary links as tourism destinations[31]	No. of sites declared	Approximately 150 sites have been identified so far[32]		At least 30% declared and conserved		✓	✓	11.4	4.0	DArch	MoE for oversight, PGIAR, DWC, FD, GSMB
	No. of management plans prepared and implemented	Five sites in the Aruwakkalu quarry have just been gazetted as archaeological reserves Five allotments just declared in Aruwakkalu		All declared sites are manged with management plans. Three new paleo biodiversity sites outside PAs declared for protection		✓	✓		6.0	DArch	CCF, SLTDA, DWC, FD, GSMB, MoE, SLC
	No. of paleo-biodiversity sites popularised serving as centres of awareness	Not commenced yet		Three paleo biodiversity sites popularised		✓	✓				

29 Conservation actions for the CR Bandula barb resulted in a population increase from 500 to 1,300; a multi-species plan for amphibians is proposed for Morningside, in Sinharaja; the DNBG propagates Threatened native orchids, trees and shrubs; the Dehiwela Zoo breeds some endemic freshwater fish and reptiles.

30 Cattle breeds are improved using artificial insemination. A local breed of goats has been developed. There may be many local varieties for buffaloes.

31 Through fossils, sub-fossils, as well as living organisms.

32 The earliest known fossils are from the Jurassic period: there are fossils in the tank bund and spill gate canals in Thabbowa tank bund spill gate canals; in Pallama and Andigama, fossils have been discovered when digging farm well, some 30' deep. Miocene sites are found from Aruwakkalu, in Puttalam along the coastal belt to Jaffna and in Minihagalkanda in Yala. In Aruwakkalu, there are Miocene fossil sites, and two prehistoric human habitations, one with stone tools, and the other a shell midden site. In Alawala there are caves, with evidence of prehistoric humans. There are Pleistocene sites in the Sabagamuwa Province, Mediriginiya, Pol, Lunugala and Passara area. In Bundala there is a prehistoric human settlement established. In caves and shelters there are both fossils and subfossils.

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 3. Mainstream the wise use, fair and equitable sharing of benefits arising from fauna, flora and the genetic resources.											
3.1 Access to genetic diversity by mapping genetic data of native biodiversity and creating repositories through National Genome Centre/s	No. of useful genes identified, cloned and patented	Some scattered studies are available[33]		Five patents obtained		✓	✓	14A 15.6	3.0	PGRC (flora), NARA (aquatic fauna), VRI (domestic fauna)	NASTEC, NSF, SLIBTEC, Uni/ Research institutes Collaborate as needed with relevant institutes, SLC
	No. of ornamentals (floriculture) produced for export using rDNA technology	No focus yet on ornamentals		rDNA technology for floriculture well established		✓	✓	14A 15.6		DNBG	
	No. of DNA Barcoding carried out for endemic flora and fauna species used in international trade	No focus yet on traded species		Barcoding well established for endemic species used in the international trade		✓	✓	14A		DNBG, PGRC, Universities	
3.2 Strengthening biosafety by enhancing technical capacity for the detection and identification of LMOs in all related institutes with required infrastructure and skills	Biosafety Act passed	Draft Biosafety act and regulation Draft Biosafety guidelines		Enact the Biosafety Act		✓		15.1	2.0	MoE, CEA	SCAs[34]
	Biosafety regulation gazetted			Regulations for biosafety in place		✓	✓			MoH for disclosure	SCAs, universities, relevant laboratories
	Labelling policy adopted and enforced			Formulate a labelling policy		✓	✓	15.1	2.0	MoE, CEA	
3.3 Management of under-utilised /illegally utilised species through the implementation of pilot level projects to promote wise use, income generation and the establishment of mechanisms to promote with national and international visibility	Review of related legislature and recommendations	There are many private sector nurseries that advertise online and deliver such crops		At least 30% of under-utilised food crops/ other species and wild relatives are explored through pilot projects	✓	✓	✓	2.1 2.5 15.5	2.0	PGRC DoA	DNBG, arboreta, local communities, private sector
	No. of successful programmes implemented			Two programmes implemented		✓	✓				
3.4 Provide benefits to communities by promoting eco-friendly income-generating livelihoods around PA network, ESAs, along coastal belt and river network	No. of livelihoods identified and supported	There are a few projects ongoing with the foreign financing such as UNDP, GCF and some are proposed under BIOFIN project		Implemented the Identified prioritised and proposed programmes under BIOFIN	✓	✓	✓	12.2 14.1 14.2 15.1 15.2 15.5	2.0	CCC	SLTDA, MoE, EDB
	No. of eco-friendly income generating livelihoods established			Efficiency of conversion improved for products from natural resources		✓	✓		5.0		

33 Some scattered studies are available for rubber genes (Liyanage et al., 2014) have been cloned, fragrant (Kottearachchi et al., 2010.) and salt-tolerant gene have been identified in rice; other field crops undergoing biotech research are finger millet, onion, and maize (USDA Foreign Agricultural Service, 2018).

34 Other agencies include MoH, MoA, DFAR, DWC, FD, SLC, DHQU, FCAU, DAP&H, SLC, authorized inspectors, laboratories.

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 4. Safeguard and promote traditional knowledge and practices in biodiversity conservation and sustainable use.											
4.1 Traditional knowledge and indigenous people and local community are recognised and mainstreamed into conservation planning	TK practices and indigenous people and local community recognized in conservation plans	Traditional knowledge policy and publication available		Traditionally important ecological sites, indigenous people and associated knowledge is recognised	✓	✓	✓	6.6 11.4 14.1 14.2 15.1 15.5	3.0	MoE	PGIAR, DAD, MoA Uni/Research institutes, NGOs, and private sector
4.2 Cultural practices and traditional wisdom related to biodiversity conservation and sustainable use[35] are adopted and popularised with economic benefits	No. of practices mobilised	National mobilisation, promotion yet to be carried out. Scattered information		Cultural practices mobilised		✓	✓	6.6 11.4 14.1 14.2	3.0	MoE	PGIAR, DAD, MoA Uni/Research institutes
	No. of community bio-cultural protocols established	Available some information on BCP		3 BCPs related to biodiversity are identified and promoted		✓	✓	11.4	3.0	DAyur, Universities/ Research institutes	MoE
Strategy 5. Assess and apply economic values of Biodiversity and ecosystem services in decision making.											
5.1 The values of ecosystems are mainstreamed into regional and national planning through the Green Accounting Task Force	No. of ecosystems valued and mainstreamed into regional and national planning	Study on integration of Forestry Sector Contribution to the System of National Accounts in Sri Lanka		Value major ecosystems that are under stress	✓	✓	✓	15.5 15.9	21.0	MoE, MoF	Environmental economists, CEA Uni/Research institutes, IPS, Relevant Dept
5.2 Values of biodiversity and ecosystem services are absorbed into regional/ national financing mechanisms and voluntary payment and rewarding mechanisms for biodiversity and ecosystem services (BES) are adopted	No. of pilot projects carried out on financing mechanisms	Documents such as BIOFIN are available at a national level		03 pilot projects carried out		✓		15.5 15.9	5.0	MoE, MoF	Environmental economists, Uni/ research institutes, IPS, CEA, relevant dept. MoF, private sector, relevant institutions
	No. of rewards and payment for ecosystem services adopted	At the initial stage of developing the mechanism		03 financing mechanisms introduced on RES and PES into selected BES			✓	15.5 15.9	No additional cost	MoE	
	Local Exchange Trading System (LETS) initiated			LETS introduced as a potential biodiversity conservation measure		✓		15.5 15.9	2.0	MoE	MoF, private sector, relevant institutions

35 Such as cascade agroecosystems that support home garden diversity, Kandyan home garden agroecosystems, ovita (wet vegetable beds) (Goonatilake & Ekanayake, 2016)

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
5.3 Use the Environmental Conservation Levy Act to tax activities that damage biodiversity	No. of tax/subsidy mechanisms established in the biodiversity sector	Available taxes (Document of Implementation of Economic instruments SL)		Three taxes introduced under Environmental conservation levy		✓	✓	15.1 15.2 15.5	No additional cost	CEA	MoE, MoF
5.4 Extended Cost Benefit Analysis (ECBA) Guidelines prepared and adopted at both project and policy level where decisions to be taken relating to critical biodiversity	ECBA guidelines reviewed and revised to cover project and policy analyses	ECBA guidelines at project level exist and used in some EIAs but without consistency		Revised ECBA guidelines adopted		✓	✓	15.5 15.9	2.0	CEA, environmental economists	Project proponents, MoE
Strategy 6. Promote research, ensure data governance and sharing for evidence-based decision making and communication.											
6.1 An applied research agenda is developed and research priorities for taxa, ecosystems, environmental services, valuation, invasive, proxy species, paleo- biodiversity, bio products and restoration are identified and plans are implemented for the identified research with in-house and stakeholder support	Research agenda developed	No national research agenda for biodiversity conservation and sustainable use Funding for biodiversity research is not according to a national agenda		Research agenda adopted	✓			14, 15 (all targets)	0.6	NRC, MoE	NSF, Uni/Research institutes
	No. of priority research funded			At least 75% of the priorities in research agenda is funded		✓	✓	14, 15 (all targets)	2.0	Uni, research institutes	MoE, NSF, Pvt Sector, NGO, NIFS
6.2 The PA Gap Analysis (2006) and National Conservation Review (1997) are reviewed and updated to provide support for informed decision making with regards to biodiversity and ecosystems	Review, selection and adoption of priority recommendations in the PA Gap Analysis and National Conservation Review	Gap analysis not reviewed, nor field-tested		A strategic plan based on the reviews of GAP analysis and NCR is implemented		✓	✓	14.2 15.1	10.0	MoE	Academic/ research institutes, DWC, FD, CEA, CC&CRMD, MoP[36]
6.3 Ecosystem Red Listing is carried out to categorise threatened ecosystems, according to IUCN standards and are managed accordingly	No. of officers trained in Red Listing of Ecosystems	National ecosystem Red Listing has not been done		At least 50 officers trained in RLE		✓	✓	15.5	20.0	MoE	DWC, FD, CEA, CC & CRMD academic/ research institutes, INGOs
	No. of databases with required data for RLE			Databases developed for RLE		✓	✓				
	No. of RLEs conducted and adopted			Red Listing of Ecosystems is completed		✓	✓				
6.4 Research on bioprospecting is promoted and conducted to facilitate use of data at ground level	No. of bio-prospecting projects funded	Likely to be many in the Department of Ayurveda		Bioprospecting programmes established; GDP increased		✓	✓	15.6	Benefit Transfer	ITI / DAyur	MoE, NSF, NIFS, Uni/Research institutes MoE to ensure adherence to the CBD Article 15 IPR, NIPO
	No. of research symposia	There are no symposia specifically for this purpose		More research on bioprospecting is promoted		✓	✓	15.9	5.0 For research		

36 Currently, there is a GEF 7 proposal for the estate sector, where critical highland habitats will be included in the PA system. This project must be integrated into this action.

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
6.5 Public and key stakeholder awareness, willingness to engage, informed decision-making, citizen science and activism are promoted and facilitated for conservation of biodiversity	No. of citizen science projects promoted	Not formally supported at present		Citizen science programmes promoted		✓	✓	14, 15 (all targets)	5.0	MoE	Communication experts and media personnel
	Extent of coverage in print and other media on biodiversity conservation and sustainable use	This facet is not yet highlighted, although there is a lot of current coverage about habitat destruction		At least some conservation-oriented content covers in all media		✓	✓		4.0		
	No. of programmes supported on environmental activism	Do not consider as an important in national level plans		At least 10 programmes supported		✓	✓				
6.6 Update and strengthen national biodiversity CHM for sharing/ receiving information with regards biodiversity	Availability of infrastructure and skilled person	CHM exists		CHM is maintained, updated and Information sharing is routinised and supports inter-sectoral collaboration	✓	✓	✓	-	1.0	MoE	Biodiversity related agencies
	No. of users sharing the updated CHM	No measurement taken on usage		Users per month	✓	✓	✓				
6.7 Review and update the information in curricular of primary, secondary, tertiary and adult education with regards to biodiversity and ecosystems, including facilitation of development of new curricular, educational material and delivery in outdoors	No. of curriculum revisions and new modules	Discussion on biodiversity is now included in curricula, but data provided on species, ecosystems and ecosystem services need updates		2 curricular revisions at all levels		✓	✓	-	2.0	NIE, MoEd	Uni, other professional training institutes
	No. of educational programmes conducted outdoors for children and young adults			Educational programmes conducted		✓	✓		5.0	MoE for coordination and technical guidance	

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					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 7. Apply necessary policy frameworks, legal and organizational arrangements for biodiversity conservation and sustainable use.											
7.1 Harmonising laws related to environment, biodiversity conservation, wise use and development are resolved through amendments to existing laws and adoption of new laws	Gap analysis report	Some overlaps and gaps in laws National biodiversity strategic action plan and policies and strategies exists in relation to biodiversity but not covered all aspects Overlaps and gaps in mandates		Gap analysis report		✓		14,15 (All targets)	3.0	MoE	Biodiversity and policy experts, LDD, CEA DWC, FD, CC&CRMD, DFAR, NARA, NAQDA
	National policy on Biodiversity Conservation and Sustainable Use adopted			National policy on biodiversity adopted	✓	✓					
	Amendments to existing laws including provisions for ESAs	Biodiversity not considered in the Patent Act		Resolution of gaps, overlaps		✓	✓		1.0	MoE, IPRO	
	No. of biodiversity related patents included in the Intellectual Property Act No.36			To include biodiversity in the IPR to protect biological resources		✓	✓		1.0		
7.2 Strategic Environmental Assessments (SEAs) for all provinces[37] are conducted, ensuring legal requirements[38] and integration into provincial and sectoral plans	SEA included in NEA	Draft is ready		Amendment of NEA incorporating SEA	✓	✓		15.9	15.0	CEA for conducting SEAs	Academic/ research institutes, INGOs, LDD
	No. of SEAs conducted	SEA done for northern province but fully used in planning. Others not done		SEAs conducted and used in conservation planning		✓	✓			PCs for integrating them into provincial plans	
7.3 Appropriate policy/ policy recommendations and regulatory mechanisms to manage perverse incentives, innovative financing mechanisms to generate sustainable self-financing for biodiversity conservation are introduced and practised	Review and recommend potential innovative financing mechanisms, MBI and removal of perverse incentives for biodiversity conservation	Perverse incentives such as fertilizer subsidy existed for many years and lack of initiatives to promote MBI for conservation objectives		Review report prepared Recommendations adopted 2 mechanisms are selected and proposed[39] to mainstream recommendations		✓	✓	12.2 14.1 14.2 15.1 15.2 15.5 15.5	2.0 For initiation 2.0	MoE	DWC, FD, MoF, INGOs

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
7.4 Guidelines for establishment and management of *ex-situ* conservation facilities are developed, adopted and practised	No. of rules and guidelines for establishment and management of *ex-situ* conservation facilities reviewed (DNZG Act[40] and DNBG Act[41])	DNZG and DNBG acts are available and need updating		Acts amended as needed. Rules and guidelines for establishing and managing *ex-situ* centres are developed to support strategy 5	✓	✓	✓	15.5	To be estimated	DNBG, DNZG	MoE, LDD
7.5 Review, amend and introduce laws and regulations, procedures, guidelines and benefit sharing mechanisms for genetic resources and establish institutional commitments	No. of amendments to relevant laws	Available but scattered Access and Benefit Sharing Policy is available		Legal instruments reviewed and update to support the ABS policy	✓	✓	✓	15.5	2.0	FD, DWC, DoA	MoE, DAyur, LDD, MoF
7.6 Gaps in enforcement of international conventions Sri Lanka is signatory to with regards to biodiversity and ecosystems are addressed and amendments are introduced aligned with international standards	Gap analysis report	There is a Biodiversity, Cultural and National Heritage Protection (BCNP) at the SLC has a detection database, DWC detection database		Report of gap analysis		✓		15.5	2.0	DWC, MoE, MEPA for detection in country	FD, SLPA, SLN, LDD
	No. of amendments to existing laws and regulations			Amendments to laws and regulations		✓	✓				
	No. of new conventions entry into force			New conventions SL enters into force		✓	✓			SLC for detections of exports and imports	
7.7 Inter-sectoral and inter-agency cooperation is fostered by institutionalising multi-stakeholder committees re-establish via functioning District Environment Committees (DEC)[42]	No. of district environment committees re-established and functioning	MoE has initiated this establishment in 2021		All DEC revived	✓	✓	✓		To be estimated	MoE, CEA	DS
	Matters from DEC included in DCC			Minutes of the DEC and DCC reflecting decisions on biodiversity conservation							

37 To identify best pathway to achieve developmental goals within minimal loss or fragmentation of ecosystems.

38 Ties in with Strategy 15.

39 PES Mechanisms for selected BES have been proposed, specially under the BIOFIN project but they are yet to be implemented. The possibility of introducing MBIs has been examined.

40 Government of Sri Lanka (1982). National Zoological Gardens Act, No. 41 of 1982.

41 Government of Ceylon (1928). The Botanic Gardens Ordinance No. 31 of 1928 as amended.

42 Ensure this at national level too

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					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
7.8 Inter-sectoral linkages among the various sectors of the economy and biodiversity resources are recognised and institutionalised	No. of environmental valuations dealt with under the proposed mechanism	PES, Tourism certification, Green Bonds established		Identify and implement 4 relevant linkages (water sector /forest)	✓	✓	✓	8, 13, 14, 15	2.0	MoE, Environmental economists	All natural resource related institutes in the country
	No. of relationships established in physical terms covering forest and health, forest and fishery and biodiversity and recreational income linkages[43]			04 number of linkages established covering forest and health, forest and fishery and biodiversity and recreational benefits	✓	✓	✓				WRB, ID, DWC, DFAR
7.9 Capacity is strengthened for effective biodiversity conservation and sustainable management in mandated agencies	No of agencies operating with full cadre	Currently the DWC and FD, are operating with only about 76% and 81% of their approved cadre strength.		DWC and FD operate at full cadre		✓	✓	14.2 14.5 All targets of 15	15.0	DWC, FD, CC&CRMD, DFAR, CEA	MoE, MWFC, MoF
	No. of officers per district and below (DWC, FD, CC&CRMD, DFAR) trained based on the capacity building plan, to update and upgrade their knowledge about biodiversity and genetic diversity			All conservation sector agency capacities strength and full carder is trained in modern methods of conservation		✓	✓				

43 This can be established as negative linkages as well. biodiversity depletion and health etc.

THEME 3
CLIMATE ACTIONS FOR SUSTAINABILITY

Global warming is caused by human activities, which cause emissions of greenhouse gases into the atmosphere, trapping the Earth's heat. Besides the direct impact of the rising temperatures on plant and animal life, global warming is causing a rise in sea level and changes in the Earth's weather. These changes are expected to increase rainfall in wet areas and to aggravate water shortages in dry areas. Although human-induced global warming is already established, the scale of its impacts will depend on the extent to which the global community adopts measures to restrict emissions. Sri Lanka recognizes its responsibility to uphold the Paris Agreement's underlying principle of limiting global warming to under 2°C. It will strive to steer development along a low-emission trajectory, that supports both mitigation and adaptation to climate change.

2.3.1 Overview

NASA (2021) defines climate change as 'a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates' and global warming as 'anthropogenic temperature increases'. Changes observed in Earth's climate since the early 20th century are driven primarily by human activities, particularly the burning of fossil fuels, which increases heat-trapping greenhouse gas levels in Earth's atmosphere, raising Earth's average surface temperature'. Natural processes such as El Niño and La Niña can also contribute to climate change (NASA, 2021). Established in 1988, the Intergovernmental Panel on Climate Change (IPCC) provides policy-makers with regular scientific guidance through their periodic assessments on climate change, its implications and potential future risks, as well as options for adaptation and mitigation.

Human activities continually emit greenhouse gases (GHGs) into the atmosphere, progressively causing global warming by entrapping the Earth's heat. Carbon dioxide (CO_2) causes the highest impact; the others are methane, oxides of nitrogen and chlorofluorocarbons. Besides the direct impact of the rise in temperature on plant and animal life, climate change will cause perturbations in the Earth's weather patterns and a rise in sea level.

The occurrence of this human-induced climate change is now inevitable, but its scale will depend on the extent to which the global community adopts measures to restrict the emission of greenhouse gases, as well as how well they understand potential effects and build resilience to those vulnerabilities and the anticipated changes. Since the genesis of United Nations' Framework Convention on Climate Change (UNFCCC) in 1992, there have been many global attempts to combat the challenge of climate change. Within the UNFCCC, the Kyoto Protocol of 1997 is notable as it globally reduced GHG emissions with limited success, while the Paris Agreement of 2015 obtained commitment by a majority of its member countries to contribute to the reduction of GHG and to build resilience to vulnerabilities through Nationally Determined Contributions (NDCs), which covered both adaptation and mitigation.

As a global citizen, Sri Lanka recognizes its responsibility to uphold the Paris Agreement's underlying principle of containing global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels. Sri Lanka will strive to steer development along a low-emission trajectory that supports both adaptation and mitigation to climate change, with a strong focus on reaching high income and human development during the next decade.

Temperature rise, changing patterns of rainfall, increased severity and frequency of extreme events and sea level rise are the anticipated climate consequences for Sri Lanka. The island's adaptive or coping capacity as a developing economy is very limited. These vulnerabilities are a result of climate-induced hazards such as floods, droughts, landslides, cyclones, and coastal erosion and inundation. Sri Lanka ranks within the first third of assessed countries as being vulnerable to climate change-induced hazards (Eckstein et al., 2021). Sri Lanka's important economic sectors are climate-sensitive and are impacted by increased irregularities of the normal monsoon pattern and rainfall intensities.

Historically, Sri Lanka's carbon footprint has been small. At 0.88 tonnes/per person (Worldometer, 2021), its per capita emissions are among the lowest globally, especially for a middle-income, high-human development country. However, Sri Lanka is still on an upward development trajectory with ambitions of achieving upper-middle-income status and further improving its human development outcomes. Demand for energy, clean water, efficient transportation, better connectivity and waste management is growing among both rural and urban populations. The government has pledged accelerated rural development and to provide better infrastructure for increasing urban centres.

The government's current policy framework/new development vision "Vistas of Prosperity and Splendour" highlights addressing issues of climate change, national policies for climate change and sustainable development and provides impetus for further culturally sensitive and environmentally sustainable development. Sri Lanka has some unique advantages and experiences in this journey. Historically, sustainable principles were

embedded in land management, agriculture and other economic practices, through prevalent religious and cultural practices, and values of simplicity, non-materialism and sustainable consumption.

In recent years, however, development investments have been eroded by floods, drought and landslides and in the past decade, the economy has been burdened hugely by disaster relief expenditure. Reflecting this trend, Sri Lanka's national climate change policy leans heavily on adaptation, with a vision to minimize climate change impacts on its economy.

2.3.2 Current Status

Prolonged drought, extreme rainfall and associated floods (river/flash), landslides, coastal erosion and inundation because of strong winds and cyclones and severe thunderstorms are some of the major impacts associated with climate change in Sri Lanka. Many economic sectors such as agriculture, livestock, fisheries, tourism, industry and the service sectors are highly vulnerable. Severe incidents of floods and landslides, which usually occur during southwest monsoon in the Southern, Western, Sabaragamuwa and Central provinces, have intensified in the recent years, The May 2017 impacts are notable, as floods affected 15 districts, killed at least 208 people and 698,289 people were affected, while 11,056 houses were partially damaged and another 2,093 houses completely destroyed. In contrast, increased and worsening of droughts are experienced in drier parts of the country. Severe saltwater intrusion into coastal aquifers, coupled with sea level rise and droughts are also a concern for domestic water supply in coastal areas.

Climate change will also have a wide range of other adverse impacts. The incidence of vector-borne diseases is expected to increase; harmful insect pests in the dry zone, benefiting from the rise in temperature, will grow in abundance; people in the dry zone – experiencing more prolonged dry weather – will have severe water and food shortages; and the fauna in the dry zone forests, including those in the national parks, will experience a shortage of food and water. In contrast, in the wet zone will experience increased rainfall and ensuing floods, there will be an increase in associated landslides in the hill county.

2.3.3 Policy and Legal Framework

To address the challenges posed by climate change, Sri Lanka has introduced national policies, strategies and actions. The National Climate Change Policy of Sri Lanka (2012); National Climate Change Adaptation Strategy for Sri Lanka 2011-2016 (2010); Sri Lanka's Second National Communication on Climate Change (2011); Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation and Mitigation (2014); the National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016-2025 (NAP) (2016); and the Nationally Determined Contributions under the Paris Agreement for Climate Change Sri Lanka (NDC) (2016); submitted to the UNFCCC are some notable actions.

With the overall policy framework 'Vistas of Prosperity and Splendour' guiding Sri Lanka along a low carbon development pathway with environmental sustainability, the country's Climate Change and National Sustainable Development Policies seek to mainstream climate change into key development sectors. Actions are being identified carefully in the path of low carbon development to reduce GHGs from the energy, waste, transport, forestry and agriculture sectors. These actions also include building climate resilience in nine vulnerable sectors: agriculture, biodiversity, coastal and marine, fisheries, health, livestock tourism, and urban and human settlements. Both adaptation and mitigation priorities have been addressed in detail under the submitted NDC review, with a detailed implementation and monitoring plan, covering the period 2021-2030 in progress.

2.3.4 Introduction to the Action Plan

Climate change is now considered the biggest challenge with which humanity is confronted. Therefore, no sector escapes the need for integrating climate change considerations into their planning. The NEAP's thematic area on Climate Action for Sustainability, therefore, can be considered an overarching section that captures the climate change essence of all sectors. The actions relating to NDC implementation are more fully presented in submitted NDC-related documents, while the NEAP provides higher-level actions for guidance. In order to reduce the adverse effects of climate change, many strategies and corresponding actions have been proposed within the above-mentioned framework.

Although not a significant contributor to emission of global GHG, Sri Lanka has mapped out strategies and a series of actions to contribute to addressing this global problem. These include a wide range of actions to reduce the GHG emission in the six sectors listed above. Investments in mitigation activities are prioritized according to their contribution to country's overall development and economic, social or environmental co-benefits derived from these investments.

As a country highly susceptible to climate-induced hazards, the National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016-2025 prioritizes adaptation needs and resilience-building activities, focusing on key sectors. Focusing on adaptation is critical to ensure that development investments are not eroded by constant exposure to weather and climate extremes; and to ensure that the country remains on an upward development trajectory in terms of economic growth and human development.

To achieve the targets of the NEAP, the Ministry of Environment will closely work with relevant ministries, sector agencies and provincial/district/local level authorities to embed presented interventions into the regular development planning framework at national and sub-national levels, ensuring that adaptation and mitigation priorities are integrated into regular work plans, annual budgets and donor proposals of these sectors/provinces.

2.3.5 Strategies for Management

Strategy 1. Strengthen enabling environment through policy support, legal and institutional framework related to climate change.

Strategy 2. Assess vulnerability and build resilience to address adverse impacts of climate change.

Strategy 3. Reduce greenhouse gas emissions through low carbon development pathways.

Strategy 4. Manage losses and damages due to climate-induced disasters.

Strategy 5. Enhance national capacity through the creation of awareness, education, research and development, technology transfers and information dissemination for climate change mitigation and adaptation.

Strategy 6. Strengthen partnerships and resource mobilization for adapting to climate change impacts and mitigating greenhouse gas emissions.

Of the above six strategies, certain actions of strategies 2, 3 and 4 are detailed in the national NDC Implementation Action Plan and therefore, only the actions at a broader level are indicated to avoid duplication in two important national documents.

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2.3.6 Action Plan for Climate Actions for Sustainability

Actions	Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Strategy 1: Strengthen enabling environment through policy support, legal and institutional framework related to climate change.											
1.1 Review and update the National Policy on climate change	Revised climate change policy	Existing climate change policy	Revised climate change policy		✓			13.2 Mitigation and adaptation NDCs of all sectors	0.5	MoE	Other relevant ministries and line agencies
1.2 Integrate climate change considerations into new policies, laws, acts and regulations or revision of existing ones	No. of climate change integrated new and revised policies and legislations	Existing policies, laws, acts and regulations requiring climate change integration	15 policies and legislations		✓	✓	✓	13.2 Mitigation and adaptation NDCs of all sectors	0.5	MoE	Other relevant ministries and line agencies
1.3 Integrate early warning to policies, enforceable legislations and implement action plans in all sectors	No. of early warning integrated policies, legislations and action plans	Existing policies, legislations and action plans requiring early warning integration	10 policies and legislations		✓	✓	✓	13.2 All adaptation NDCs	0.5	SMoDM	DMC, NBRO, MET, Relevant ministries and line agencies
1.4 Facilitate the preparation of provincial climate change adaptation plans	No. of provincial adaptation action plans prepared	01 Western Province, 01 in draft stage (Southern Province)	09		✓			13.2 Mitigation and adaptation NDCs of all sectors (Mainly focusing on building resilience)	10.0	MoE	MoPP&L, PCs, LAs
1.5 Facilitate the establishment of Provincial Climate Cells and Provincial Climate Units	No. of Provincial Climate Cells and Unit established	Initial discussions held	09 Cells 09 Units		✓			13.2 Mitigation and adaptation NDCs of all sectors (Mainly focusing on building resilience)	5.0	MoE	MoPP&L, PCs, LAs
1.6 Incorporate climate change aspects into the National Physical Plan	Revised National Physical Plan with climate change aspects incorporated	Existing National Physical Plan	Revised plan is in place		✓	✓	✓	13.2 Mitigation and adaptation NDCs of all sectors	No additional cost	NPPD	MoE, NPD, UDA, LAs
1.7 Enhance the resilience of human settlements and infrastructure through mainstreaming climate change adaptation into national, sub-national and local level physical planning (Covered by Theme 8)	Progress reporting to be done under Theme 8				✓	✓		13.2 Human settlement sector NDC 1	Included in Theme 8		
1.8 Establish multi-functional sectoral climate cells/ focal points or strengthen the existing ones	No. of sectoral climate cells established	Proposed planning and monitoring committees for NDC implementation 50 data sharing agencies supported	16 cells		✓	✓		-	0.5	MoE	All stakeholder institutions

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Actions		Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
						S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
1.9	Appoint a multi-disciplinary assessment team to assess the effects of Climate Change on health	Multi-disciplinary assessment team	None	Multi-disciplinary assessment team appointed		✓			13.2	No additional cost	MoH	MoE, DMC, PMoH, DivS, Relevant academics
1.10	Adopt policies and prepare action plans to establish a robust MRV system for climate change mitigation related interventions	Policies and action plans	Existing policies, and action plans	Policies and action plans are in place		✓			13.2, 13.3, 13.b All mitigation NDCs	No additional cost	MoE	Relevant ministries and line agencies
1.11	Establish climate resilient built environment by integrating climate risk projections into the strategies implemented by respective stakeholder institutions	Revised climate resilient design strategies	Existing climate resilient design strategies	Climate resilient design strategies reviewed and updated		✓	✓	✓	13.1 Human settlement sector NDC 3	To be estimated	UDA, LAs, UDA, MASL, academics	MoUDH, NBRO, GSMB, DMC, CEA, MoE, NPPD, LUPPD, CIDA, FD, CC & CRMD, DWC, USDA, MASL, SLTDA, professional organizations
		Human settlement plans prepared integrating climate resilient strategies	Existing human settlement plans without climate resilient strategies integrated	All new and existing human settlement plans integrating climate resilient strategies		✓	✓	✓				
		Sustainable built environment concepts in Architecture and Engineering curricula	Existing sustainable built environment concepts in Architecture and Engineering curricula	Sustainable built environment concepts introduced or revised in Architecture and Engineering curricula		✓	✓	✓				
1.12	Promote the use of wastewater for gardening, sanitary, construction and other purposes to reduce demand for treated water	Policy initiatives and enforceable legislations	None (There are voluntary initiatives by some private sector entities and LAs)	Policy initiatives and enforceable legislations introduced		✓	✓		6.3 Water sector NDC 4	To be estimated	MoWS, UDA, NWSDB, MoE	BoI, LAs, Academics, Research Agencies including IWMI, construction co (high rises), high water consuming industries, tourism sector agencies, MoH, SLLDC, MoInd, BoI, CEA, CIDA, SMEs
1.13	Integrate policy initiatives for enhancing climate resilience of the health sector	Climate resilience integrated policy initiatives	04 Policy initiatives in progress	04 Policy initiatives with climate resilience integrated		✓			13.2 Health sector NDC 1	2.0	MoH	MoE, MoInd, CEA, MET, other agencies within MoH
1.14	Adopt policies for enforcement of legislations and implementation action plans to support an environmentally sustainable transport (EST) system	Environmentally Sustainable Transport Policy	Draft transport policy	Environmentally Sustainable Transport Policy in place		✓			11.2 All Transport sector Mitigation NDCs	2.5	MoT	MoE, MoP, MoF, NPD, CEB, SLSEA, BoI, UDA, CTB, SLR, DMT, CTB, public bus operators' associations, relevant academics
1.15	Adopt policies for enforceable legislations and implement action plans to include climate change measures in maritime transport	Environmentally Sustainable Maritime Transport Policy	None	Environmentally Sustainable Maritime Transport Policy in place		✓	✓		11.2, 14.1 Transport sector NDC 13	2.5	MoPorts	MoE, MoF, MoD, NPD, SLPA, CC&CRMD, MEPA, SLN, SLCG, academics, shipping line associations

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Actions		Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
						S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Strategy 2: Assess vulnerability and build resilience to address adverse impacts of climate change.												
2.1	**Generic**											
2.1.1	Facilitate the implementation of National Adaptation Plan 2016-2025	Readiness plan	Readiness plan implementation initiated	Readiness plan implemented		✓	✓		13.1, 13.3	600.0	MoE	Relevant Ministries and line agencies
2.1.2	Review and update the National Adaptation Plan 2016-2025 covering the period 2026-2035	National Adaptation Plan 2026-2035	Existing National Adaptation Plan 2016-2025	NAP 2026-2035 completed		✓	✓		13.2	Included in 2.1.1	MoE	Relevant Ministries, line agencies and academics
2.1.3	Update sector vulnerability and climate change risk for all priority adaptation sectors	Climate change sector vulnerability / risk profiles	Existing climate change sector vulnerability / risk profiles	All sectors			✓	✓	13.3	Included in 2.1.1	MoE	DMC, NBRO, MET, relevant ministries, line agencies and academics
2.1.4	Conduct Technology Needs Assessment for all priority adaptation sectors	Technology Needs Assessment	Existing Technology Needs Assessment	Technology Needs Assessment conducted		✓	✓		13.3	5.0	MoE	Relevant ministries, line agencies and academics
2.2	**Agriculture**											
2.2.1	Promote Integrated Pest Management (IPM) and Integrated Plant and Nutrition Systems (IPNS) in agricultural areas of most vulnerable to climate change	No. of IPM and IPNS programmes	Existing IPM and IPNS programmes	All climate vulnerable agricultural areas		✓	✓		2.4 Agriculture sector NDC 2	20.0	DoA	
2.2.2	Develop/introduce varieties resistant/ tolerant to biotic and abiotic stresses targeting the most vulnerable agricultural crops to climate change	Varieties resistant/ tolerant to biotic and abiotic stresses	Existing research initiatives	Varieties introduced and developed		✓	✓	✓	2.4 Agriculture sector NDC 3	To be estimated	DoA	RRDI (Rice), FCRDI (OFC), HORDI (vegetables), FRDI (fruits)
2.2.3	Revisit the Agro-ecological Regions (AERs) map of Sri Lanka with current and future climate scenarios and recommend appropriate crops for different regions to reduce vulnerability to climate change impacts	Agro-ecological Regions (AERs) map Appropriate crops	Existing AERs map Current crops recommended	Agro-ecological Regions (AERs) map updated Appropriate crops recommended		✓	✓	✓	13.2, 13.3 Agriculture sector NDC 4	To be estimated	NRMC	MET
2.2.4	Enhance sustainable land and water management practices (SLMP) in areas where anticipated climate vulnerability is severe (Detailed info available in relevant NDCs)	% coverage of target area by SLMP	Existing coverage of target area by SLMP	100%		✓	✓	✓	15.1, 6.6 Agriculture sector NDC 5	To be estimated	NRMC, DAD	MASL, LUPPD, HBASL, PDoA, DoA, ID, TSHDA
2.3	**Biodiversity**											
2.3.1	Management of climate sensitive areas and restoration of degraded areas inside and outside the protected areas (PAs) network to conserve habitats which are highly vulnerable to climate change	Extent of managed climate sensitive areas % of restored degraded areas	No baseline	All climate sensitive areas managed 25% of degraded areas restored		✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5 Biodiversity sector NDC 1	To be estimated	MoE FD, DWC	MWFC, CC&CRMD, CEA, MEPA, academics and researchers, NGOs, MET, DMC, NARA, LAs

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
2.3.2 Increase connectivity in the zones that will be subjected to climate driven changes according to current predictions through landscape approaches	% of declared land extent out of identified climate sensitive corridors	No baseline	25% of declared land extent out of identified climate sensitive corridors		✓	✓	✓	15.3 Biodiversity sector NDC 2	To be estimated	MoE, FD, DWC,	MWFC, MASL, ID, DAD, SD, academics, research institutes, CEA, LAs, private sector
2.3.3 Expansion of Protected Area (PA) extent to enhance the ability of the PA network to function as a buffer for climate change	% of PAs extent declared and expanded	Existing PAs	25% of PAs extent declared and expanded		✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5 Biodiversity sector NDC 3	To be estimated	MWFC	FD, DWC, academics, MoE, research institutes, CC &CRMD, LRC, SD, ID, MASL, CEA, LUPPD
2.3.4 Strengthen *ex-situ* conservation programmes covering climate vulnerable taxa and regions	No. of programmes	Currently no focus on climate vulnerable taxa and regions	08 programmes		✓	✓	✓	15.1, 15.5 Biodiversity sector NDC 4	To be estimated	DNBG, DNZG, NARA, DWC, FD, VRI, DNM	PGRC, arboreta, LAs, LRC, academics, research institutions
2.3.5 Effective management of spread of Invasive Alien Species (IAS) triggered by favourable climatic conditions	Priority areas identified % of priority areas covered by interventions	Currently no focus on climate triggered spread of IAS	All priority areas identified 25% of priority areas covered by interventions		✓	✓	✓	15.8 Biodiversity sector NDC 5	To be estimated	MoE	FD, DWC, academics, research institutions
2.4 Coastal and Marine											
2.4.1 Establish an accurate sea level rise forecasting system for Sri Lanka	Sea level rise forecasting system	Existing sea level rise forecasting system	Accurate sea level rise forecasting system established		✓	✓		13.3 Coastal and marine sector NDC 1	To be estimated	NARA	CC&CRMD, SD, DMC, MET, SLPA, SLN
2.4.2 Prepare updated vulnerability and risk maps for the coastal belt of Sri Lanka	Vulnerability and risk maps for the coastal belt	Existing vulnerability and risk maps for the coastal belt	Vulnerability and risk maps for the coastal belt updated		✓	✓		13.3 Coastal and marine sector NDC 2	To be estimated	CC&CRMD	NARA, SD, academics, DMC, UDA, ID, DS
2.4.3 Adopt optimal shoreline management works/measures covering affected length of shoreline using a combination of hard and soft solutions to prevent coastal erosion in areas most vulnerable to SLR	Shoreline management works/ measures	Existing shoreline management works/ measures	Optimal shoreline management works/ measures adopted		✓	✓	✓	13.1, 14.5 Coastal and marine sector NDC 3	To be estimated	CC&CRMD	Academics, MEPA, NARA, GSMB, LAs, NGOs
2.4.4 Identify and declare coastal and marine natural areas of high priority for building resilience for climate change impacts	Coastal and marine natural areas	Currently such areas not identified	Coastal and marine natural areas declared		✓	✓		13.1, 14.5 Coastal and marine sector NDC 4	To be estimated	CC&CRMD	Academics, MEPA, NARA
2.5 Fisheries											
2.5.1 Adopt Ecosystem-based Approach to Fisheries Management (EAFM) in areas of high climate vulnerability to enhance resilience	No. of EAFM plans developed and implemented	Existing fishery management areas not managed under EAFM	05 EAFM plans developed and implemented		✓	✓	✓	14.2, 14.4, 14.6, 14.b, 14.c Fisheries sector NDC 1	To be estimated	DFAR	NARA, CC&CRMD, MEPA, academics, NAQDA, SLN, SLCG

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
2.5.2 Expand aquaculture and culture-based fisheries to address food security issues relating to climate change	No. of fish barricades established in perennial reservoirs No. of climate-tolerant fingerlings culture and stocking programmes	Existing barricades Currently no focus on climate tolerant species	50 fish barricades climate tolerant fingerlings culture and stocking programmes conducted		✓	✓		1.5, 14.b Fisheries sector NDC 2	To be estimated	NAQDA	MoFish, academics, NARA, CEA, CC&CRMD, ID, Chambers of Commerce, MoE, MASL, DAD, farmer org, DWC, private sector
2.5.3 Breeding of aquatic resources of commercial importance tolerant to changing climate	Climate tolerant fingerlings culture and stocking programmes	Currently no focus on climate tolerant species	Climate tolerant fingerlings culture and stocking programmes conducted		✓	✓		14.b Fisheries sector NDC 3	To be estimated	NAQDA	NARA, DFAR, academics
2.5.4 Increase the production capabilities of fisheries, aquatic resources in 30 lagoons which are highly vulnerable to (sea level rise and rain fall changes) climate change	Production capabilities of fisheries, aquatic resources in lagoons	Existing level of production capabilities of fisheries, aquatic resources in lagoons	Production capabilities of fisheries, aquatic resources in 30 lagoons increased		✓	✓	✓	14.b Fisheries sector NDC 4	To be estimated	NARA, DFAR	CC&CRMD, NGO, LAs, SD
2.5.5 Enhanced safety of fishermen at sea against climate change influenced extreme conditions	Early warning transmission systems for fishers (including small boats and traditional crafts) Insurance schemes Weather information management and communication system	Existing early warning transmission systems for fishers (including small boats and traditional crafts) Existing insurance schemes Existing weather information management and communication system	Effective early warning transmission systems for fishers (including small boats and traditional crafts) introduced New or improved insurance schemes introduced Efficient weather information management and communication system established		✓	✓		8.8 Fisheries sector NDC 5	To be estimated	DFAR	MoFish, SMoSVR&I, ITI, SLPA, SLN, DMC
2.5.6 Diversification of livelihoods of fisherfolk to build resilience to climate change	New livelihood options	Existing livelihoods	New livelihood options introduced		✓	✓	✓	1.5 Fisheries sector NDC 6	To be estimated	DFAR	SMoSVR&I, NARA, ITI, banks, insurance, EDB, diplomatic missions, BoI
2.6 Livestock											
2.6.1 Introduce adaptation measures to address adverse impacts of climate change on ruminant livestock	Adaptation measures	Education and awareness materials distributed	Adaptation measures introduced		✓	✓		13.1, 13.3 Livestock sector NDC 1	To be estimated	DAP&H	Provincial DAP&H, VRI, NLDB, academics, milk processing agencies NGOs, MoA, SMoLs, VICs
2.6.2 Introduction of technological innovations and interventions in building resilience in poultry and swine farming against climate change	Technological innovations and interventions	Existing technological innovations and interventions	Technological innovations and interventions introduced		✓	✓		13.1, 13.3 Livestock sector NDC 2	To be estimated	DAP&H	Provincial departments, NLDB, private sector farms, NERD, academics

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						S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
2.7	**Health**											
2.7.1	Improve capacity to manage Non-communicable Diseases (NCD) and health conditions directly attributable to climate change	A road map in managing climate change induced NCDs Management guidelines for the prioritized diseases and health conditions including clinical and preventive guidelines	Existing programmes and plans	A road map in managing climate change induced NCDs developed Management guidelines for the prioritized diseases and health conditions including clinical and preventive guidelines developed		✓	✓		3.d Health sector NDC 2	To be estimated	MoH	NCD Bureau of the MoH
2.7.2	Manage worsening of under-nutrition and malnutrition due to climate change	Programmes	Current programmes not focused on climate change	Programmes conducted		✓	✓		1.5 Health sector NDC 3	To be estimated	MoH	DoM, MoEd, MoA
2.7.3	Strengthen surveillance and management of climate-sensitive vector and rodent borne diseases (Dengue, Malaria, Filaria, Leishmaniasis and Leptospirosis)	Programmes	Existing surveillance and management programmes	Programmes conducted		✓	✓		3.d Health sector NDC 4	To be estimated	MoH	PMoH, DMC, LAs, DoGI, MoE, MoEd, MoFish, MoD, MoUDH, Media, CEA, MET, Health Promotion Bureau
2.7.4	Reduce morbidity and mortality from extreme weather/climate events (floods, drought, landslides and other climate related emergencies)	Morbidity and mortality	Existing level of morbidity and mortality	% reduction of morbidity and mortality		✓			3.1, 3.2, 3.4 Health sector NDC 5	To be estimated	MoH	Health Promotion Bureau, media unit of MoH, RDHS, DMC, DS, DoGI, MoE
2.8	**Tourism**											
2.8.1	Build resilience through sustainable tourism practices and improved risk preparedness in destinations of highest climate change vulnerability	Sustainable tourism practices and risk preparedness	Existing programmes	Sustainable tourism practices promoted and risk preparedness improved		✓	✓		8.9 Tourism sector NDC 1	To be estimated	MoE, Ministry of Toursim	SLTDA UDA, CEA, MEPA, CC&CRMD, NARA, SDC, CCF, DWC, FD, DMC, MoPP & L, SLINTGLA, PCs, international education organizations, promotion bureau, SDC, private sector tourism associations, civil society partners, UNDP, IUCN
2.8.2	Promote climate resilience in tourism sector through introducing Green Building design to all new constructions and refurbishments	Green Building designs to new constructions and refurbishments	No. of new constructions and refurbishments adopting Green Building designs	No. of Green Building designs introduced to new constructions and refurbishments		✓	✓		7.3, 12.2, 13.1, 13.3 Tourism sector NDC 3	To be estimated	UDA, SLTDA	Ministry of Tourism, MoE, GBCSL, SLSEA, Tourism Advisory Committee, CEA, LAs, CC&CRMD, MEPA, NBRO

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						S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
2.9	**Human Settlement**											
2.9.1	Incorporate Disaster Risk Reduction (DRR) mechanisms into urban and human settlement planning / implementation in areas of high vulnerability to climate change risks (Connected to Theme 8)	DRR initiatives	Existing programmes	DRR initiatives incorporated		✓	✓		13.2 Human settlement sector NDC 2	To be estimated	MoUDH	MoPP&L, NBRO, UDA, NHDA, USDA, MoE, ID, RDA, CEA
2.10	**Water**											
2.10.1	Adopt Integrated River Basin Management (IRBM) approach in 15 prioritized river basins in Sri Lanka	IRBM	No. of existing rivers adopting IRBM	IRBM approach adopted in 15 river basins		✓	✓	✓	6.5 Water sector NDC 1	To be estimated	MoIrri, MoWS, State Min of Tanks, Reservoirs	ID, MASL, MoE, DoA, DAD, MET, WRB, PDoI, FD, NPPD, DWC, DCWS, NWSDB
2.10.2	Monitor ground and surface water in the Northern, North Central and North Western provinces and other areas of high drinking water vulnerability to drought	New monitoring programmes	Existing monitoring programmes	New monitoring programmes conducted		✓	✓	✓	6.1 Water sector NDC 2	To be estimated	NWSDB, DCWS, WRB	LAs, CEA, ID, plantation sector co, DAD, DoA, IWMI, NGOs, CBOs
2.10.3	Promote climate resilient water supply schemes	Climate resilient water supply schemes	Existing climate resilient water supply schemes	Climate resilient water supply schemes promoted		✓	✓		13.1, 13.3 Water sector NDC 3	To be estimated	MoWS, UDA, SMoDM, MoE	NWSDB, DCWS, CEA, LAs, IWMI, SLRWHF, WRB, ID, NBRO, DoM, MoH, FD, DWC, DoA, private sector
2.10.4	Establish salinity barriers in 03 rivers where intakes are subjected to climate change influenced saline water intrusion during the drought season (covering Kelani Ganga, Kalu Ganga, and Malwathu Oya)	Salinity barriers	No. of rivers with salinity barriers	Salinity barriers established in 03 rivers		✓	✓	✓	6.3 Water sector NDC 5	To be estimated	MoWS	NWSDB, ID, WRB, IWMI, PUCSL, CBOs, DoA, CEB, MASL, DCWS, NPPD
2.10.5	Restore, rehabilitate and augment 25 major /medium reservoirs and 300 minor irrigation systems and 200 km length of irrigation canals of Sri Lanka for enhancing climate resilience in agriculture sector	Restoration, rehabilitation and augmentation of major /medium reservoirs and minor irrigation systems and irrigation canals	No. of major / medium reservoirs and minor irrigation systems and length of irrigation canals	25 major /medium reservoirs and 300 minor irrigation systems and 200 km length of irrigation canals restored, rehabilitated and augmented		✓	✓	✓	6.6 Water sector NDC 7	To be estimated	DAD, ID, PDoI, MASL	CSIAP, NWPCP, NCPCP
2.10.6	Introduce or promote alternative water resources as a climate change resilience building intervention for domestic and supplementary irrigation	Alternative water resources	Existing systems	Alternative water resources introduced		✓	✓	✓	6.1, 6.4 Water sector NDC 8	To be estimated	ID, WRB	SLRWHF, NWSDB, DCWS, DAD
2.10.7	Enhance water management in 40 irrigation schemes	Enhancement of water management in irrigation schemes	No. of irrigation schemes	Enhance water management in 40 irrigation schemes enhanced		✓	✓		Water sector NDC 9	To be estimated	ID, DAD, MASL	DoA, PDoA, PDoI, private sector

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
2.10.8 Assess river floods and mitigation measures and early warning systems for possible flash floods for five priority basins (covering Kelani Ganga, Attanagalu Oya, Kalu Ganga, Kirindi Oya and Malwathu Oya on pilot basis)	Floods early warning and mitigation measures implemented for priority basins	Existing systems	05 priority basins		✓	✓	✓	13.3 Water sector NDC 10	To be estimated	ID	MET, DMC, NBRO, LUPPD
2.10.9 Store rainwater within subsurface for later use through Managed Aquifer Recharge scheme	No. of Managed Aquifer Recharge schemes	Monitoring of groundwater enhancement	14 sites to cover the aquifer systems (two sites per each aquifer system)			✓	✓	6.6	To be estimated	WRB and NWSDB	Relevant ministries and line agencies
Strategy 3: Reduce greenhouse gas emissions through low carbon development pathways.											
Generic											
3.1 Conduct Technology Needs Assessment for all priority mitigation sectors	Technology Needs Assessment	Existing Technology Needs Assessment	Technology Needs Assessment conducted		✓	✓		13.3	5.0	MoE	Relevant ministries, line agencies and academics
Energy											
3.2 Implementing mitigation actions in the energy sector to reduce greenhouse gas emissions	GHG reduction	BAU scenario of the Long-Term Generation Expansion Plan 2013-2032 of CEB published in October 2013	25% (5% unconditionally and 20% conditionally) 49,093,000 MT of CO_2 equivalent (9,819,000 MT unconditionally and 39,274,000 MT conditionally)		✓	✓	✓	7.2 and 7.3 All mitigation NDCs of Energy sector	To be estimated	CEB and SLSEA	MoP, relevant academics
3.2.1 Enhance renewable energy contribution to the national electricity generation mix by increasing solar PV, wind, hydro and sustainable biomass-based electricity generations	Renewable energy capacity addition in MW	Renewable energy capacity considered in business-as-usual scenario	3,867 MW over the renewable energy capacity considered in business-as-usual scenario		✓	✓	✓	7.2 Energy sector mitigation NDC 1	To be estimated	CEB	SLSEA, MoP, relevant academics
3.2.2 Implement Demand Side Management measures by promoting energy efficient equipment, technologies and system improvements in a national energy efficiency improvement and conservation programme	Energy saving in GWh	Baseline to be established	7,800 GWh		✓	✓	✓	7.3 Energy sector mitigation NDC 2	To be estimated	SLSEA	CEB, MoP, relevant academics
3.2.3 Improve transmission and distribution network efficiency	Energy saving in GWh	Baseline to be established	1,850 GWh		✓	✓	✓	7.3 Energy sector mitigation NDC 3	To be estimated	CEB	SLSEA, MoP, relevant academics
3.2.4 Convert existing fuel oil-based power plants to LNG and establishment of new LNG plants	LNG capacity in MW	Baseline to be established	1,300 MW		✓	✓		7.3 Energy sector mitigation NDC 4	To be estimated	CEB	SLSEA, MoP, relevant academics

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.2.5 Conduct R & D activities to implement pilot scale projects for non-conventional renewable energy (NCRE) sources that have not yet reached commercial maturity and develop other grid supporting infrastructures[44]	Appropriate NCRE and supporting infrastructure	In R&D or planning stage	Appropriate NCRE harnessed and supporting infrastructure developed		✓	✓	✓	7.2 Energy sector mitigation NDC 5	To be estimated	CEB	SLSEA, MoP, relevant academics
Industry											
3.3 Implementing mitigation actions in the industry sector to reduce greenhouse gas emissions	GHG reduction	BAU scenario	7% (4% unconditionally and 3% conditionally) 3,570,000 MT of CO_2 equivalent (2,088,000 MT unconditionally and 1,482,000 MT conditionally)		✓	✓	✓	3.9, 4.7, 6.2, 6.3, 6.4, 7.1, 7.2, 7.3, 8.3, 8.4, 8.8, 8.9, 9.3, 9.4, 9.c, 11.6, 11.c, 12.2, 12.4, 12.5, 12.6, 12.7, 12.8, 13.3, 17.18	To be estimated	MoI, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA	MoE, MoP, SLTB, TRI, SLTDA, DCS, CIAs
3.3.1 Promote the use of sustainable biomass energy and improve user efficiency	% of industries having access to sustainable biomass	Baseline to be established	100%		✓	✓	✓	7.2 and 7.3 Industry sector mitigation NDC 1	150.0 (Pvt)	SLSEA, CEA, SLSI, MoE	MoInd, MoE, MoP, SLTB, TRI, SLTDA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, relevant CIAs
	No. of user efficiency improvements	500	300								
3.3.2 Enhance the application of Resource Efficient Cleaner Production (RECP) practices	% of relevant industries engaged in: Energy use efficiency Water use efficiency Material use efficiency Waste minimization	Baseline to be established	50% relevant industries		✓	✓	✓	6.3, 6.4, 7.1, 7.2, 7.3, 9.4, 12.2, 12.4, 12.5 Industry sector mitigation NDC 2	To be estimated	SLSEA, MoInd, CEA, NWS& DB	MoP, SLTB, TRI, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, NERD, GBCSL, SLTDA, DAP&H, CDA, RRI, ITI, SLEMA, service providers of EE, RE, SCP&WM, CIAs

44 Such as geothermal energy, ocean thermal energy (OTEC), ocean energy (Wave) Pumped storage hydro power plants and pilot scale storage systems such as Behind the Meter and Grid Scale Battery Energy Storage)

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.3.3 Promote eco-industrial parks (E-IPs)	No. of existing BOI EPZs transformed to eco IPs	0	04 (BOI to upgrade existing infrastructure of waste water treatment plants in Seethawaka, Horana, Koggala and Mawathagama EPZs)		✓	✓	✓	9.4, 9c, 12.4 Industry sector mitigation NDC 3	4,000.0	BoI	CEA, NCPC, ITI, MoPP& L, CECB, service providers of SCP, WM& ICT, CIAs, academics
	% of existing non-BOI IPs transformed to eco IPs	0	50% Non-BOI IPs		✓	✓	✓			RISC, IDB, ISB, LINDEL, UDA	MoInd, CEA, NCPC, ITI, MoPP&L, CECB, ICTA, service providers of SCP, WM& ICT, CIAs, academics
	Establishing new E-IPs	0	All new IPs		✓	✓	✓			BOI, MoInd	RISC, IDB, ISB, LINDEL, UDA, CEA, NCPC, ITI, MPP&L, CECB, ICTA, service providers of SCP, WM& ICT, CIAs, academics
3.3.4 Introduce Circular Economy concept	% of relevant industries engaged in Waste minimization Waste reuse Waste recycling Resource recovery	Baseline to be established	50% relevant industries		✓	✓	✓	8.8, 9.4, 12.4 & 12.5 Industry sector mitigation NDC 4	365.0 (Facilitation) + To be estimated (private sector)	MoInd, CEA	NCPC, RISC, IDB, NEDA, ISB, UDA, SLSI, service providers of EE, SCP& WM, CIAs
3.3.5 Introduce "Tri-generation" facilities	Pilot tri- generation facility established	0	1		✓	✓	✓	7.2 and 7.3 Industry sector mitigation NDC 5	08 state sector 39,000.0 private sector	SLSEA, BoI, MoInd	CIAs, academics
3.3.6 Reduce industrial process GHG emissions	GHG reduction in clinker production in cement industry	BAU scenario	180,034 tCO_2/year		✓	✓	✓	3.9, 7.2, 7.3, 9.4, 12.4, 12.5 Industry sector mitigation NDC 6	To be estimated	MoInd, MoE, CEA, SLSI	SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics
Waste											
3.4 Implementing mitigation actions in the waste sector to reduce greenhouse gas emissions	GHG reduction	BAU scenario	11% (8.5% unconditionally and 2.5% conditionally) 2,549,000 MT of CO_2 equivalent (1,969,000 MT unconditionally and 580,000 MT conditionally)		✓	✓	✓	2.3, 2.4, 6.3, 6.4, 7.1, 9.4, 11.6, 12.2, 12.3, 12.4, 12.5	To be estimated	SMoUD, CEA, WMAWP, MoE, LAs	MoInd, MoUDH, MoPP&L, BoI, RISC, IDB, ISB, LINDEL, UDA, MoH, PMoH, NWPEA, service providers of WM, CIAs

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.4.1 Improve "Circular economy" practices in all MSW generation sources	Reduced MSW generation growth	To be established	Reduced MSW generation growth by 10%		✓	✓	✓	6.3, 6.4, 11.6, 12.3, 12.5 Waste sector mitigation NDC 1	To be estimated	MoE, CEA	WMAWP, NSWMSC, MoInd, CIAs
	% of segregation	60%	75% by 2025								
	No. of segregation categories at source	2	3 in all LAs by 2027								
	Increased waste collection percentage (on generation basis)	To be established	Up to 75% in Western Province and 60% in other provinces								
	Increased percentage of waste recycled (on collection basis)	2%	7% in Western Province and 5% in other Provinces by 2030								
	No. of high wastes generating products regulated	To be established	15 high wastes generating products								
3.4.2 Manage biodegradable waste component through biological treatments (composting and biogas)	Composted as a percentage of collected waste i) Western Province ii) Other Provinces No. of biogas units	15% 03% Approximately 10,000	30% 30% 15,000		✓	✓	✓	2.3, 2.4, 7.2, 7.4, 12.4 Waste sector mitigation NDC 2	To be estimated	DoA, SLSEA, LAs	CEA, WMAWP, NSWMSC, MoInd, BoI
3.4.3 Introduce resource recovery from non-recyclable waste which cannot be managed by other means	Resource recovery using non-recyclable, and waste	Baseline to be established	70% of resource recovery using non-recyclable, and waste		✓	✓	✓	11.6, 12.5 Waste sector mitigation NDC 3	To be estimated	SLSEA, CEA, SMoUD	WMAWP
3.4.4 Increase the use of sanitary landfills for the disposal of residual waste	Disposal of residual waste to sanitary landfills	Current level 5% on weight basis	100% on weight basis		✓	✓	✓	6.3, 11.6, 12.3, 12.4 Waste sector mitigation NDC 4	To be estimated	SMoUD, CEA, LAs	MoE, WMAWP, NSWMSC, MoInd, UDA
Transport											
3.5 Implementing mitigation actions in the transport sector to reduce greenhouse gas emissions	GHG reduction	BAU scenario	4% (1% unconditionally and 3% conditionally) 5,348,000 MT of CO_2 equivalent (1,337,000 MT unconditionally and 4,011,000 MT conditionally)		✓	✓	✓	3.6, 11.2, 11.6, 12.c	To be estimated	MoT, CTB, SLR, DMT, RDA	MoPE, MoE, MoF, MoUDH, MoPP&L, NTC, LAs UDA, SLSEA, CEB, private bus operators' associations, relevant academics
3.5.1 Improve systems in the transport sector to avoid the need to travel	% reduction of number of trips per person	Baseline to be established	20%		✓	✓	✓	3.6, 11.2, 11.6, 12.c Transport sector mitigation NDC 1	To be estimated	MoT, ICTA	MoE, MoUDH, MoPP&L, NTC, LAs UDA, private bus operators' associations, relevant academics

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.5.2 Promote public passenger transport	% of passengers shifted from individual to public transport	Baseline to be established	30%		✓	✓	✓	11.2, 11.6, 12.c Transport sector mitigation NDC 2	To be estimated	MoT, CTB, SLR	MoP, MoE, MoF, MoUDH, MoPP&L, NTC, LAs UDA, private bus operators' associations
3.5.3 Shift freight to efficient modes	Freight shifted from road to rail in ton km	Baseline to be established	Covered by relevant NDC in detail		✓	✓	✓	3.6, 11.6, 12.c Transport sector mitigation NDC 3	To be estimated	MoT, SLR	Relevant private companies
3.5.4 Introduce rapid transport for passenger transport	Distance covered/ Passengers served by functioning light rail transit	Non-existent	Target to be established		✓	✓	✓	3.6, 11.2, 11.6, 12.c Transport sector mitigation NDC 4	To be estimated	MoT	MoF, MoE, MoUDH, NTC, UDA, CEB
3.5.5 Promote non-motorized transport modes	Distance covered (km) by new bicycle lanes No. of cycle parking established, number of cities covered and total capacities No. of school transports replaced and number of students using bicycles Length of improved facilities for pedestrian walkways or number and number of cities covered	Baseline to be established	Target to be established		✓	✓	✓	11.6, Transport sector mitigation NDC 5	To be estimated	UDA, LAs	MoT, MoE, MoF, MoUDH, MoPP&L, RDA
3.5.6 Introduce inland water transport modes	No. of km in canal transport No. of boats in service No. of passenger-km / year	Baseline to be established	Target to be established		✓	✓	✓	11.2, 11.6, 12.c Transport sector mitigation NDC 7	To be estimated	ID, MASL, SLN	MoT, MoE, MoUDH, MoPP&L, LAs, UDA
3.5.7 Modernize and upgrade suburban railway	Electrification of railway New railway lines and expansion of existing railway network	Baseline to be established	Covered by relevant NDC in detail		✓	✓	✓	11.2, 11.6, 12.c Transport sector mitigation NDC 8	To be estimated	MoT, SLR	MoF, MoUDH, UDA

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.5.8 Promote electric mobility and hybrid vehicles	Increased tax concessions for electric and hybrid vehicles, vehicle import statistics and percentage No. of charging stations, mechanism for battery swapping and replacements No. of batteries import using new HS code	Baseline to be established	Target to be established		✓	✓	✓	11.2, 11.6, 12.c Transport sector mitigation NDC 9	To be estimated	MoT, CTB	MoP, MoE, MoF, MoUDH, MoPP&L, NTC, LAs, UDA, SLSEA, CEB, PUCSL, relevant academics
3.5.9 Improve vehicle fleet efficiency	Improvement in fuel economy	Baseline to be established	40%		✓	✓	✓	11.2, 11.6, 12.c Transport sector mitigation NDC 10	To be estimated	MoT, CTB, SLR	MoPE, MoE, CPC, SLSEA, private bus operators' associations, relevant academics
3.5.10 Develop road infrastructure	Length of provincial and rural road network resurfaced and modernized Length of expressway roads developed	Baseline to be established	Target to be established		✓	✓	✓	3.6, 11.2, 11.6, Transport sector mitigation NDC 11	To be estimated	MoT, RDA	MoUDH, MoPP&L, LAs, UDA
3.5.11 Change the existing vehicle emission charging system from the present vehicle based to vehicle type, fuel used and emission-based system plus the total km travel.	Upgraded system	Existing vehicle emission charging system	Upgraded system in place		✓			11.2 Transport sector NDC 6	To be estimated	DMT	MoT, MoE, CEA
3.5.12 Restrict the entry of individual modes of transport to sensitive areas and congested areas of major cities during the peak hours	% reduction of vehicles entering in to restricted zones	Baseline to be established	Target to be established		✓	✓	✓	11.2 Transport sector NDC 6	To be estimated	LAs	UDA, MoPP&L
3.5.13 Develop park and ride infrastructure facilities combined with cordon-based pricing mechanism	No. of facilities developed and average No. of vehicles parked per time	01 in Makumbura	Target to be established		✓	✓	✓	11.2 Transport sector NDC 6	To be estimated	MoT	MoPP&L, LAs, UDA, CTB, SLR, private bus operators' associations

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.5.14 Reduce GHG emission from marine sector	Annex VI of MARPOL convention ratified Impact of shipping on GHG emission studied/published No. of containers (20 or 40ft) transported through coastal shipping per year No. of energy efficiency programmes introduced, number of fishing boats/ vessels covered by the programmes	BAU scenario	Target to be established		✓	✓	✓	11.6, 12.c, 14 Transport sector mitigation NDC 12	To be estimated	MoPorts, MEPA	MoE, CC&CRMD, CFHC, MoFish, SLN, SLCG
Forestry											
3.6 Implementing mitigation actions in the forestry sector to reduce greenhouse gas emissions	Increase of carbon sequestration	BAU scenario	7% (2% unconditionally and 5% conditionally) 2,357,000 MT) of CO_2 equivalent (705,000 MT unconditionally and 1,652,000 MT conditionally)		✓	✓	✓	15.1 and 15.2	To be estimated	FD	MoE, MoPla, MASL, RPCs, ID, DAD, RDA, LAs, UDA
3.6.1 Increase forest cover including plantations by strengthening the catchment protection of major rivers and cascade systems of Sri Lanka	Increase of forest cover	29.2%	32%		✓	✓	✓	15.1, 15.2 Forestry Mitigation NDC 1 and 3	To be estimated	FD	MoE, MoPla, MASL, RPCs, ID, DAD
3.6.2 Improve quality of growing stock of natural forests and plantations	Reduction of degradation index	Baseline to be established	200,000 ha		✓	✓	✓	15.1, 15.2 Forestry Mitigation NDC 2	To be estimated	FD	MoE, MoPla, MASL, RPCs
3.6.3 Promote tree planting along roadside, urban forestry, religious, schools and other government lands, home gardens	Increase of forest cover	Baseline to be established	Target to be established		✓	✓	✓	15.1, 15.2 Forestry Mitigation NDC 4	To be estimated	FD, RDA, UDA	MoE, MASL, RPCs, LAs
3.6.4 Adopt policies and enforceable legislations for the promotion of urban forestry and establish a robust MRV system for forestry related interventions	Policies and enforceable legislations MRV system	Recognized in "National Policy Framework" MRV development initiated	Specific policies and enforceable legislations adopted MRV system established		✓	✓	✓	15.1, 15.2 Forestry Mitigation NDC 5	To be estimated	MoE	FD, MASL, RDA, UDA LAs

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Agriculture and Livestock											
3.7 Implementing mitigation actions in the agriculture sector to reduce greenhouse gas emissions	GHG reduction	BAU scenario	7% (4% unconditionally and 3% conditionally) 4,335,400 MT CO_2 equivalent (2,477,400 MT unconditionally and 1,858,000 MT conditionally)		✓	✓	✓	2,4, 6.4, 6.5, 7.2, 12.3, 12.4, 13.1, 13.2, 13.3, 14.2, 14.4, 14.b, 15.9	To be estimated	MoIrri, DoA, DAP&H DoF, NAQDA, NEDA, NARA	MoA, MoE, SMoLs, DoM, MoF, CC&CRMD, DMC, SLSEA, CEB, IDB, PMoA, PMoLs, NFS, RoP, relevant academics
3.7.1 Reduce post-harvest losses	% reduction of losses	Existing level of losses	50%		✓	✓	✓	12.3 Agriculture Sector Mitigation NDC 1	To be estimated	DoA	MoA, DAD, PMoA
3.7.2 Increase agriculture productivity of crops	% increase of productivity	Existing level of productivity	Target to be established		✓	✓	✓	2.4 Agriculture Sector Mitigation NDC 2	To be estimated	DoA	MoA, DAD, PMoA
3.7.3 Improve adoption of renewable energy for crop farming/value addition	No. of farmers using renewable energy	Existing number of farmers using renewable energy	Target to be established		✓	✓	✓	2.4, 7.2 Agriculture Sector Mitigation NDC 3	To be estimated	DoA	MoA, DAD, PMoA, SLSEA, CEB
3.7.4 Improve dairy sector productivity	% increase of productivity	Existing level of productivity	Target to be established		✓	✓	✓	2.4 Agriculture Sector Mitigation NDC 4	To be estimated	DAP&H	SMoLs, PMoLs
3.7.5 Improve the productivity of monogastrics	% increase of productivity	Existing level of productivity	Target to be established		✓	✓	✓	2.4 Agriculture Sector Mitigation NDC 5	To be estimated	DAP&H	SMoLs, PMoLs
3.7.6 Improve adoption of renewable energy for livestock applications	No. of farmers using renewable energy	Existing number of farmers using renewable energy	Target to be established		✓	✓	✓	2.4, 7.2 Agriculture Sector Mitigation NDC 6	To be estimated	DAP&H	SMoLs, PMoLs, SLSEA, CEB
Strategy 4: Manage losses and damages due to climate-induced disasters											
4.1 Conduct a gap analysis to assess the current status and understand loss and damage, weather and climate related extreme events, slow-onset disasters and natural processes attributed to climate change	Gap analysis	DESINVENTAR[45] database	Gap analysis conducted		✓			1.5, 3.9, 3.d, 11.c, 11.9, 13.1, 13.2, 13.3	To be estimated	DMC	SMoDM, MoIrri, MoH, DoM, NBRO, PMoH, DivS, relevant LAs
4.2 Strengthen the existing weather and climate forecasting system	Weather and climate forecasting system	Existing weather and climate forecasting system	Weather and climate forecasting system strengthen		✓	✓		1.5, 3.9, 3.d, 11.c, 11.9, 13.1, 13.2, 13.3	To be estimated	MET	SMoDM, MoIrri, MoH, NBRO, DMC, PMoH, DivS, LAs

45 DesInventar is a Disaster Information Management System under Sendai framework operated under UNDRR

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
4.3 Improve sector wise data management systems to record loss and damage, taking 2015 as the base year	Data management systems	DESINVENTAR database	Data management systems improved		✓	✓		1.5, 3.9, 3.d, 11.c, 11.9, 13.1, 13.2, 13.3	To be estimated	DMC	SMoDM, MoIrri, MoH, MET, NBRO, PMoH, DivS, LAs
4.4 Establish an overarching nationally appropriate, functional institutional mechanism for loss and damage in line with the 'Warsaw International Mechanism for Loss and Damage'	Institutional mechanism	Non-existent	Institutional mechanism established		✓	✓	✓	1.5, 3.9, 3.d, 11.c, 11.9, 13.1, 13.2, 13.3	To be estimated	DMC	SMoDM, MoF, MoIrri, MoH, DoM, NBRO, DMC, PMoH, DivS, LAs
4.5 Develop a Comprehensive Risk Management Framework founded on the provisions of the 2005 Disaster Management Act	Risk Management Framework	Comprehensive Disaster Management Programme 2014	Risk Management Framework developed		✓	✓	✓	1.5, 3.9, 3.d, 11.c, 11.9, 13.1, 13.2, 13.3	To be estimated	DMC	SMoDM, MoIrri, MoH, DoM, NBRO, PMoH, DivS, LAs
Strategy 5: Enhance national capacity through the creation of awareness, education, research and development, technology transfers & information dissemination for climate change mitigation and adaptation.											
5.1 Establish a national clearing house for climate change mitigation and adaptation related information	National clearing house	Existing CCS website National data sharing network	National clearing house in place		✓	✓		12.8, 13.2, Mitigation and adaptation NDCs of all sectors	To be estimated	MoE	Relevant line agencies
5.2 Establish a national network of institutions for the facilitation of technology transfer	Technology transfer network	Isolated interventions	Technology transfer network in place		✓			17.6, 17.7, 17.8, Mitigation and adaptation NDCs of all sectors	To be estimated	SMoSVR&I	MoE, SLSEA, ITI, academics
5.3 Establish a R& D promotional mechanism	R&D promotional mechanism	Isolated interventions	R& D promotional mechanism established		✓			17.6, 17.7, 17.8, Mitigation and adaptation NDCs of all sectors	To be estimated	SMoSVR&I	MoE, MoEd, SLSEA, ITI, relevant academics
5.4 Make a national database for climate change information in various forms for the benefits of various target groups	National database	Existing CCS website National data sharing network	National database in place		✓			17.6, 17.7, 17.8, 17.18, Mitigation and adaptation NDCs of all sectors	To be estimated	MoE	To be identified
5.5 Introduction of technological innovations and interventions in building resilience in poultry and swine farming against climate change	Technological innovations and interventions	Not focused on climate change	Number of technological innovations and interventions introduced		✓	✓		13.3 Livestock sector NDC 2	To be estimated	DAP&H	Provincial DAP&H, VICs, NLDB, private sector farms, private feed manufacturers
5.6 Improve research, education, awareness, and capacity building for climate change adaptation in livestock sector	No. of programmes conducted	To be established	To be set		✓	✓	✓	13.3 Livestock sector NDC 3	To be estimated	DAP&H	Provincial DAP&H, VRI, NLDB, DAD, NGOs, farmer organizations, private sector breeder farms
5.7 Build capacity of the water sector personnel and raise awareness of the public in building resilience to climate change	No. of programmes conducted	To be established	To be set		✓	✓	✓	13.3 Water sector NDC 6	To be estimated	MoWS, MoIrri	NWSDB, ID, MASL, DCWS, academics, international organizations, NGOs, private sector including plantation companies, PUCSL, LAs, CBOs, IWMI, CEA, BoI, MoInd, SLSI, CIDA

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Actions		Key Performance Indicators (KPIs)	Baseline	Target		Time Frame (in years)			Relevant SDG Target/s & NDC	Indicative Budget (LKR M)	Implementation Responsibility	
						S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
5.8	Conduct fisheries and aquatic resources research targeting building resilience to climate change	Fisheries and aquatic resources research	Not focused on climate change	No. of Fisheries and aquatic resources research conducted		✓	✓	✓	14.a Fisheries sector NDC 7	To be estimated	NARA	Academics
5.9	Enrich the climate change concepts in the curricula of school, higher education and professional groups by giving more emphasis to real life practical aspects (Covered by Chapter 5)	Curricula of schools, higher education and professional groups	Existing modules	Curricula of schools, higher education and professional groups enriched		✓	✓		4.7, Mitigation and adaptation NDCs of all sectors	To be estimated	NIE, UGC, relevant professional groups	MoEd, MoE, relevant academics
5.10	Conduct a national level public awareness campaign through print and electronic media	Public awareness on climate change	Present level of public awareness on climate change	Increased public awareness on climate change		✓	✓	✓	4.7, 12.8, Mitigation and adaptation NDCs of all sectors	To be estimated	MoE	Media
Strategy 6: Strengthen partnerships and resource mobilization for adapting to climate change impacts and mitigating greenhouse gas emissions.												
6.1	Strengthen national and international cooperation and partnerships to combat climate change	No. of partnerships strengthened	Existing partnerships	15 Partnerships strengthened		✓	✓	✓	13.1, 13.3, 17.6, 17.7, 17.8, 17.16, 17.17, 17.18	To be estimated	MoE	MoF, MoFA, ERD, NPD
6.2	Increase women's participation to combat climate change	Women's participation to combat climate change Gender aspect included to the new policies and plans related to Climate Change	Present level of women's participation to combat climate change	Increased women's participation to combat climate change Gender aspect included to all the new policies and plans related to Climate Change		✓	✓	✓	5.5, 5.b, 13.b	To be estimated	MoE	SMoWCP&P, CBOs, NGOs
6.3	Strengthen the participation of state and non-state actors including the community to combat climate change	Participation of state, non-state actors and community in programmes coordinated by CCS	There are instances where all 3 parties did not participate	Participation of state, non-state actors and community in programmes coordinated by CCS strengthened		✓	✓	✓	13.1, 13.2, 13.3, 17.17	To be estimated	MoE	State and non-state actors (private sector, CBOs, NGOs, service providers)
6.4	Mobilize national and international financial resources required for addressing climate change	No. of project proposals submitted Financial resources mobilized	Existing number of projects and financial resources committed	10 project proposals submitted Financial resources mobilized		✓	✓	✓	13.a, 17.1, 17.2, 17.3	15.0	MoF, MoE	MoFA, ERD, NPD, relevant line agencies

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THEME 4
CONSERVATION AND SUSTAINABLE USE OF MARINE AND COASTAL RESOURCES

Sri Lanka's coastal and marine resources and biological diversity, as well as the coastal and marine environment, provide a range of critical ecosystem services that benefit the people, sustaining livelihoods, as well as playing a vital role in economic development and strengthening protection from natural disasters. Sri Lanka's coastal zone is also under threat from increasing population pressure and unmanaged human activities that cause coastal water pollution, coastal erosion, sedimentation and siltation, habitat destruction, resource depletion and loss of biodiversity. These threats are exacerbated by climate change that affects coastal ecosystem health, livelihoods (e.g., fisheries, aquaculture, and tourism) and the increased frequency and severity of natural hazards - such as storm surges and storm waves. This theme's action plan addresses these issues.

2.4.1 Overview

Sri Lanka's coastal zone is defined in the Coast Conservation Act No 57 of 1981 as the "area lying within a limit of three hundred meters landwards of the mean high-water line and a limit of two kilometres seawards of the mean low-water line. In the case of rivers, streams, lagoons, or any other body of water connected to the sea either permanently or periodically, the landward boundary shall extend to a limit of two kilometres measured perpendicularly to the straight baseline drawn between the natural entrance points thereof and shall include the waters of such rivers, streams and lagoons or any other body of water so connected to the sea". The Coast Conservation (Amendment) Act No. 49 of 2011 has incorporated 100 m of riparian land of the water bodies that connect to the sea within the coastal zone. However, the coastal region that influences the coastal marine environment comprises all parts of the 74 Divisional Secretary areas with coastal boundaries and extends about 50 km inland from the coast, which is approximately 23% of the total land area of the country (IUCN, 2018), accommodating over 33% of the population (World Bank, 2017a).

Sri Lanka's Maritime Zones Law No. 22 of 1976 proclaims several areas of national maritime jurisdiction, in conformity with the provisions of the United Nations Convention on the Law of the Sea, 1982. The Exclusive Economic Zone which extends 200 nautical miles from the base line include the Internal waters (waters landward of the baseline), Historic waters (Palk Bay, Palk Strait and Gulf of Mannar), Territorial Sea (extends to a distance of 12 nautical miles from the baseline) and the Contiguous Zone (extends to a distance of 24 nautical miles from the base line). The total sea area of 530,817 km^2 under the jurisdiction of Sri Lanka is approximately eight times that of its total land area.

Sri Lanka's coastal and marine resources, biodiversity and ecosystems provide a range of critical ecosystem services that benefit the people - sustaining livelihoods, contributing to economic development and strengthening protection from natural disasters. Blue carbon ecosystems are invaluable for combating the impacts of climate change (Conservation International, 2019).

Coastal and marine fisheries, tourism, industry, maritime transport (ports and shipping), are some major economic activities associated with the coastal and marine environment. Among all economic activities, fisheries and tourism are the most dependent on the natural resources of the coast. Together, these two sectors generate 10% of Sri Lanka's foreign exchange earnings and account for 6.7% of employment (DCS, 2020).

Marine fisheries contribute only 1.1% to the national GDP but play an important role in food security and livelihoods. There are 185,390 fishing households and 224,610 active fishers in the marine fisheries sector, sustaining a coastal population of over 800,000 in 2019 (MoFish 2020). The marine fish catch of 415,490 Mt in 2019 was equivalent to 82% of the total fish produced in the country. Export of tuna, shrimp, lobster, chank, sea cucumber and marine aquarium fish earned over 350 million USD in 2019 (MoFish, 2020). Recent initiatives to expand brackish water aquaculture include the establishment of aquaculture industrial parks, crab cities - which are initiatives by NAQDA and NARA to mobilize the private sector (including under a foreign investment) and communities in seaweed farming, sea-cucumber breeding, as well as sea-bass culture and farming (NAQDA, 2018).

Tourism is the fifth largest income earner for Sri Lanka, contributing 4.3% to the GDP and providing direct and indirect employment to 402,607 persons (SLTDA 2019). Over 75% of tourism infrastructure (18,800 hotel rooms) in 2018 was located within the coastal region (IUCN, 2018). There is substantial investment in new hotels with the opening of the east coast and Kalpitiya, in the north-western coast for resort-type hotel projects. Sri Lanka has also become a major global attraction and destination for watching whales and dolphins (IUCN, 2018).

The coastal region is also the hub of industrial production in the country and houses approximately 62% of all industrial units - mostly in the districts of Colombo, Gampaha, Kalutara, Galle, Matara and Puttalam. The Colombo and Gampaha districts account for 42% of the small industries and nearly 59% of the medium and large industries (CZ&CRMP 2018). The coastal zone also assumes high importance in maritime trade and

transportation. There are five major seaports located in Colombo, Galle, Trincomalee, Kankasanthurai and Hambantota. Close to 4,000 vessels berthed at these ports in 2019 and sea traffic is increasing continuously. The boat and shipbuilding sector is identified as an emerging export sector in the National Export Strategy, 2018-2020 (EDB, 2021).

Sector agencies work very closely with regional and international organizations such as the IOTC, FAO and IMO to promote sustainable resource management and environment conservation. Sri Lanka is also embracing new technologies and concepts in the management of coastal and marine resources - such as the use of satellite-based vessel tracking in fisheries, use of remote sensing for fisheries forecasting, the green harbour concept and adoption of 'Blue Economy', an emerging concept which encourages better stewardship of ocean or 'blue' resources (World Bank, 2017b).

Sri Lanka's coastal and marine environment and resources are under threat from increasing population pressure and unmanaged human activities and exacerbated by the impacts of climate change. This National Environment Action Plan provides a platform to all stakeholders, for greater integration and coordination for sustainable use of coastal and marine resources, as well as the conservation of the coastal and marine environment.

2.4.2 Current Status

Habitat destruction and fragmentation for conversion to various other land uses are by far the most widespread and damaging threats across all coastal ecosystems such as mangroves (Weragodatenna and Gunaratna, 2015; Bournazel et al., 2015 and Udagedara and Kumara, 2013), coral reefs (Weerakoon et al., 2018), and lagoons, with adverse impacts not only the habitats themselves but also on their flora and fauna (Weerakoon et al., 2018 and Dahdouh-Guebas et al., 2005). The status of fishery resources in many lagoons were deemed "bad" by Silva, et al. (2018) because of overexploitation and destructive fishing practices. Other causes of ecosystem damage include pollution due to the inflow of sewage; untreated industrial effluents; discharges from shrimp farms; the retting of coconut husks; urban wastes and waste oil; the spread of invasive alien species; unauthorized encroachment and the impacts of climate change.

Small whales and dolphins are landed as incidental catches and/or harpooned during large-mesh drift gillnet fishing operation (Dayaratne & Joseph, 1993 and Miththapala, 1998), but there are no recent published data to assess the effectiveness of regulations enacted since 1990s, which banned the capture, possession, transport and sale of marine mammals. Harassment of whales during commercial whale-watching operations is another area of concern because monitoring and enforcement of the regulations "Sea Mammals (Observation, Regulation and Control) Regulations, No. 1 of 2012" seems to be weak (Buultjens et al., 2016).

Sri Lanka is a signatory to the MOU on the Conservation and Management of Dugongs which operates under the United Nation's Environment Program (UNEP) and Convention of Migratory Species (CMS). Under the Dugong and Seagrass Conservation Project, supported by the UNDP/GEF Phase 6 programme, a dugong seagrass conservation management plan for Sri Lanka was formulated, but has not yet been implemented fully.

Sharks, skates and rays are landed as incidental catches, mainly in drift gillnet fisheries. Targeted fisheries for rays are reported from Palk Bay and Gulf of Mannar (DFAR, 2018). Five shark species are currently protected under Sri Lanka regulations. All the shark species currently banned under Sri Lankan regulations, and all manta rays and devil rays appear in Appendix II of CITES, where international trade is regulated. In spite of decades long legal protection, marine turtles continue to be exploited by coastal communities for their eggs, meat and carapace, while there is also entanglement of turtles in gillnet fisheries (IUCN, 1999). Most of the existing turtle hatcheries are not managed scientifically but operate more as commercial enterprises. Release of hatchlings to the sea is delayed for maximum economic benefits, compromising their survival (Amarasooriya, 2000, & DWC & IUCN, 2005).

Sri Lanka's marine fisheries are conducted largely under an "open access" environment resulting in excess fishing pressure on many resources (NARA, 2018). Under foreign funded projects, there have been many attempts to promote community-based and collaborative fisheries management, however, these have not been sustained after the completion of those projects, implying that these management concepts are not institutionalized within DFAR. Enforcement activities are compromised, as the 132 fisheries field officers attached to the 15 coastal districts are called upon to play diverse and conflicting roles *viz à viz* the fishing communities. Despite regulations banning the use of resources and/or environmentally harmful fishing gear and methods, these are still being practised at different levels of intensity, both in the sea and lagoons.

With the rapid growth of the population and urbanization, environmental pollution by solid waste has become a serious problem in Sri Lanka, including in the coastal areas. Many local authorities lack adequate facilities and financial resources for efficient solid waste management. Waste is often disposed in open dumps, nearly 30% of which are located in low-lying marshy lands within the coastal region.

Industrial effluents with little or no treatment are discharged frequently into near shore waters, lagoons and estuaries through run-off, leakage and seepage (CZ&CRMP, 2018). Major commercial ports contribute to pollution of coastal waters because of the accidental release of oil. Out of the 21 fishery harbours, only the Dikovita fishery harbour is reported to have a waste management system and oil spill protection equipment. Waste oil from service stations also ends up in coastal waters. Spills of crude oil in Sri Lanka's marine waters were reported in 1994, 1998, 1999 (Joesph, 2004) and more recently in 2020, when MT Blue Diamond, an oil tanker transporting crude oil, caught fire 38 nautical miles off east of Sri Lanka and was contained successfully. However, the container ship MV X-Press Pearl caught fire, spilled tons of toxic acid, chemicals and plastic into the sea and sank in the outer harbour of Colombo Port in early June 2021, creating Sri Lanka's worst maritime disaster.

Investigations on coastal water pollution have been largely isolated, single-effort initiatives and published literature rather limited. However, the few that are available provides clear indications of increasing coastal water pollution[46] over time (Jayaweera, 2003; Jayawardhane et al., 2015; Bandaranaike et al., 2014; Hettige et al., 2014 and Weerasekara et al., 2015). Ballast water discharge from ships typically contains a variety of biological materials, including plants, animals, viruses, and bacteria. Some species of zooplankton and dinoflagellates, which have not been recorded previously from the inner harbour area, have been traced to ballast water samples (MEPA, 2013).

Microplastic pollution of ocean waters is now becoming an environmental challenge of unprecedented proportion. The annual plastic consumption around the world has now reached over 340 million tons and an estimated 5.25 trillion plastic particles weighing 268,940 tons are currently floating at sea (Arterbury, 2020). Microplastics are lethal to a wide spectrum of marine life. NARA (2018) has reported the presence of polythene and plastic waste in the gut contents of yellowfin tuna caught by Sri Lanka boats.

Sri Lanka's 103 river basins receive wastes such as agrochemicals, industrial effluents and domestic sewage. These are extremely relevant in the context of non-point source pollution in coastal waters. The need for a landscape approach that addresses conservation and sustainable use from 'ridge to reef' has now become critical.

Sand dunes, barrier beaches, etc. are degraded because of the expansion of human settlements, unplanned siting of hotels and agricultural activities. Beaches are also treated as dumping grounds for solid waste, particularly in urban areas. Natural causes and anthropogenic interventions undermine beach stability, resulting in loss of beaches and damage to public and private properties and infrastructure. Reduction in supply of sand to the beaches is identified as one of the crucial factors affecting beach stability. Priority action is needed to obtain a clear understanding of the extent of sand mining in and outside the coastal zone, strict enforcement of guidelines, as well as the search for an alternative to river sand for the construction industry.

46 Oil, effluents, faecal pollution

The potential climate change effects, especially the global warming-induced impacts will have negative impacts on coastal processes, ecosystems and human well-being, emphasizing the need for regular monitoring, establishing systems for timely adaptive and mitigatory action and coastal community resilience programmes.

The conservation and sustainable use of coastal and marine resources suffers from weak institutional integration and inadequate community participation. There is insufficient inter-agency coordination. All coordination efforts between agencies are *ad-hoc* without institutionalized mechanisms to ensure accountability and sustainability.

2.4.3 Policy and Legal Framework

The UN Convention on Biological Diversity (CBD) of 1992 sets the context for managing biological resources. The National Biodiversity Strategic Action Plan 2016-2022 (NBSAP, 2016) is implemented in response to the CBD.

National legislation such as the Maritime Zones Act No. 22 of 1976, Fisheries and Aquatic Resources Act No. 2 of 1996, Coast Conservation Act No. 57 of 1981 and the Marine Environment Protection Act 2008 are compatible with the international law on the subject, introduced by UNCLOS III. The 1995 Code of Conduct for Responsible Fisheries remains the key to achieving sustainable fisheries and aquaculture. The UN Sustainable Development Goal 14, Life Below Water - Conserve and Sustainably Use the Oceans, Seas and Marine Resources (UN, 2021) - guides the strategies of this theme. Other international conventions important for this theme are the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which deals with international trade in specimens of wild animals and plants; the Convention on Migratory Species (CMS), which deals with terrestrial, aquatic and avian migratory species; the Basel convention on the control of transboundary movement of hazardous waste and their disposal; the Warsaw convention, which regulates liability for international carriage of persons, luggage, or goods performed by aircraft for reward; and the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Sri Lanka has also ratified important international conventions related to fisheries - such as the UN Fish Stocks Agreement 2001, FAO Compliance Agreement 2003 and the Port State Measures Agreement 2016. Sri Lanka intends to ratify some important conventions of the International Maritime Organization (IMO) related to Dumping of waste, Ballast Water management, Oil Pollution Preparedness, Limitation of Liability for Maritime Claims, Control of Harmful Anti-fouling paints on Ships and, Annex VI of the MARPOL Convention, which addresses air pollution from ocean-going ships.

The Fauna and Flora Protection Ordinance (1938 and its amendments) provides for the declaration of marine national parks and marine reserves as protected areas and the provision to protect certain categories of animals and plants, including threatened species of corals, fish, turtles and all marine mammals in Sri Lanka's waters. Mangroves come under the purview of the Forest Department, and many have been and are being declared as Forest Reserves under the Forest Ordinance (Amendment) Act, No. 65 of 2009. The Customs Ordinance, as well as several other related enactments enable the Department of Sri Lanka Customs (SLC) to enforce various statutes relating to biodiversity, at the point of importation and exportation, both locally and internationally.

The Fisheries and Aquatic Resources Act (FARA) No. 2 of 1996 is the primary legislation governing fisheries in Sri Lanka. FARA was amended in 2013 to enable wider stakeholder participation in applying the ecosystem approach[47] to fisheries management. The Sri Lanka National Plan of Action - Sharks 2018 - 2022 was developed in response to the International Plan of Action for the Conservation and Management of Sharks

47 'The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. . . It recognizes that humans, with their cultural diversity, are an integral component of ecosystems' (CBD, 2021).

(IPOA-Sharks) of FAO (MFAR/DFAR&NARA, 2018). The Sri Lanka National Plan of Action to prevent, deter and eliminate Illegal, Unreported and Unregulated Fishing reflects the intent and actions promoted in the FAO's 2001 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU).

The National Environmental Act No: 47 of 1980 (NEA) serves as the principal legislation for environmental protection and pollution control. The Act and its amendments in 1988 and 2000 include provision for the EIA process for "Prescribed Projects" through designated Project Approving Agencies as prescribed by the Minister. Under the NEA, there are Regulations for obtaining Environmental Protection Licenses and the Waste Management Regulations which aim primarily to prevent pollution of inland waters by prescribed activities and irresponsible disposal of waste. The North-western Province (NWP) Environmental Authority acts as "project approving agency" and administers IEE's and EIAs for the NWP.

The Coast Conservation Act No. 57 of 1981 established the legal basis for coastal area management under CC&CRMD. The Coastal Zone and Coastal Resources Management Plan (2018) and the establishment of Special Management Areas (SMAs) represent important management tools for mobilizing community and other stakeholders in coast conservation. The Marine Environment Protection Act No. 35 of 2008 provides for the prevention, control and reduction of pollution in the territorial waters of Sri Lanka or any other maritime zone, its foreshore and the coastal zone of Sri Lanka. The Merchant Shipping Act No.52 of 1971 applies to all vessels (local and foreign) within Sri Lanka territorial waters. It allows the Merchant Shipping Secretariat (MSS) to check foreign vessels on compliances related to certification, safety aspects, conventions etc. (Port State Control, 2016).

The Urban Development Authority (UDA) mandate extends one kilometre from the beach inland and the Urban Development Authority Law No. 37 of 1978 provides for the development of environmental standards and schemes for environmental improvement in areas identified as UDA areas. The Department of Coast Guard Act, No. 41 of 2009 allows the Sri Lanka Coast Guard to assist relevant agencies in prevention and control of marine pollution, conservation of marine species, etc.

The National Climate Change Policy of Sri Lanka, 2012 and the National Climate Change Adaptation Strategy for Sri Lanka, 2011-2016, provide guidance and directions for all stakeholders to address the impacts of climate change, with detailed strategies for climate change adaptation, etc.

2.4.4 Introduction to the Action Plan

The action plan for this theme has been developed within the existing policy framework of relevant sector agencies, as well as local initiatives such as a Sustainable Environmental Policy integrating balanced social and economic practices towards sustainable development. This plan also complies with national and international laws and conventions.

2.4.5 Strategies for Management

The main national strategy for alignment of actions is sustainable utilization of Ocean Resources and Environmental Education as articulated in the "Vistas of Prosperity and Splendour", as well as international initiatives of the UN Sustainable Development Goals –SDG 14 – Life below in Water, which seeks to promote sustainable utilization of coastal and marine resources, conserve marine biodiversity and, minimize adverse impacts on coastal and marine environment.

The nine strategies are as follows;

Strategy 1. Conserve, manage and sustainably use coastal and marine ecosystems.

Strategy 2. Conserve marine mammals and other threatened species.

Strategy 3. Conserve, sustainably develop and manage coastal and marine resources.

Strategy 4. Administer and manage affected areas along the coast.

Strategy 5. Control coastal and marine pollution.

Strategy 6. Control sand mining and manage extraction of other mineral resources to enhance beach stability, habitat and biodiversity conservation.

Strategy 7. Adapt to climate change and natural hazard impacts on coastal features, infrastructure, coastal communities and livelihoods.

Strategy 8. Carry out research and development to support the conservation and sustainable use of coastal and marine resources.

Strategy 9. Strengthen policy, legal and institutional framework for coastal and marine resource conservation and sustainable use.

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2.4.6 Action Plan for Conservation and Sustainable use of Marine and Coastal Resources

Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 1: Conserve, manage and sustainably use coastal and marine ecosystems.											
1.1 Identify, declare and manage ecosystems of special importance (e.g., blue carbon ecosystems and lagoons)[48] as protected/managed areas	No. of marine protected areas managed by DWC No. of mangrove forests declared and protected as Reserved Forests by FD No. of FMAs declared and managed by DFAR	Some coastal and marine areas and ecosystems protected and/or declared under DWC/ FD/ and DFAR (FMAs)		27 MPAs are protected and managed by DWC 20 mangrove forests (Reserved Forests) managed by FD 07 FMAs managed by DFAR	✓	✓	✓	14.2	10.0 - DWC 35.0 - DFAR	DWC, FD, CC&CRMD, DFAR	CEA, MoE
1.2 Identify and use sound ecological practices to restore damaged coastal ecosystems island wide e.g., mangroves, coral reefs and seagrass meadows	Extents and ecosystems restored by DWC Extents and ecosystems restored by MEPA Extents and ecosystems restored by FD Extent and ecosystems restored by CC&CRMD	FD is currently carrying out a district-wise mangrove restoration programme		Restoration of 6000 m^2 of coral; 10.5 ha of mangrove by MEPA. Restoration of 1000 ha of mangroves by FD	✓	✓	✓	14.2	100.0 -DWC 60.0 - MEPA 200.0 - FD 50.0 - CC&CRMD	DWC, EPA, FD, CC&CRMD	CC&CRMD, FD, MEPA, MoE, communities, INGOs, private sector, NARA
1.3 Curtail dumping of solid waste into coastal and marine areas, designated protected areas, sensitive areas, critical habitats and declared SMAs through inter-agency collaboration	No. of coastal cleaning programmes undertaken No. of awareness programmes for stakeholders No. of joint inspections and actions taken against violators No. of waste traps deployed to trap waste entering the sea	SMA concept has little or no legal mandate at present No joint strategies/actions at present		20 coastal cleaning programmes conducted. 20 awareness programmes conducted. 30 waste traps deployed Legal mandate for SMA strengthened	✓	✓	✓	14.1	60.0 - CC&CRMD	MEPA, CC&CRMD, DWC	SLC, CEA, FD, LAs, DFAR, MoPP&L, WMAWP, CFHC
Strategy 2: Conserve marine mammals and other threatened species.											
2.1 Conserve the natural habitat of dugongs in Palk Bay/Gulf of Mannar area	No. of protected areas established in Palk Bay/ Gulf of Mannar area No. of awareness creation programmes targeting all stakeholders No. of MOUs signed between stakeholders	No. of PAs of dugong habitat in Palk Bay /Gulf of Mannar area		03 protected habitats for dugong in Palk Bay /Gulf of Mannar area established and managed with community/ stakeholder collaboration	✓	✓	✓	14.2	50.0	DWC	DFAR, NARA, MoE, conservation NGOs, private sector, INGO, Uni
2.2 Implement regulations for whale and dolphin watching activities to minimize stress on these animals	No. of awareness creation programmes among stakeholders No. of MOUs between DWC and tour operators Increased monitoring and enforcement of regulations	Regulations exist but are not strictly enforced No recorded data on incidences of harassment		10 awareness creation programmes for stakeholders conducted. MOUs with all tour operators established. Monitoring reports obtained from observers on board	✓	✓	✓	14.4	1.0	DWC	SLTDA, MoE, conservation NGOs, SLN, SLCG

48 Either as traditional protected areas under the jurisdiction of the DWC or FD (only state land) or as SMA/ FMAs /EPA or ESAs (with a different model of management with private lands and participatory management.) This strategy and some actions are also presented in Theme 2. For further discussion see under Theme 2

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
2.3 Provide protection to breeding grounds of turtles and their hatcheries	All turtle breeding grounds enumerated and listed No. of hatcheries registered with the DWC No. of regulations formulated for management, with penalties for infractions and requirement for 90% of hatchlings to be released to sea within three days of hatching No. of awareness programmes No. of DWC inspections /No. of penalties imposed	Irresponsible behaviour such as allowing tourists to touch and release hatchlings into the water, delayed release of hatchlings, keeping large marine turtles in tanks, although they are protected under the FFPO etc		Enumeration and listing of all breeding grounds. Registration of all hatcheries enabling scientific management. Legislation enacted to strengthen management Awareness creation conducted for community and stakeholders	✓	✓	✓	14.4	10.0	DWC	SLP, LAs, NGOs,CBOs, MoE, NARA
2.4 Minimize target and non-target removal of protected coastal and marine species[49]	No. of awareness programmes conducted Established collaboration with conservation-related NGOs No. of arrests and convictions	No recent published data or reports available on the extent of removals		15 awareness programmes on marine mammals and turtles conducted. Active collaborations with NGOs commenced Increased enforcement	✓	✓	✓	14.4	4.0	DFAR, DWC	NARA MoE Conservation NGOs
2.5 Implement Sri Lanka National Plan of Action (SLNPOA –Sharks 2018 – 2022) for conservation of sharks	No. of gazette notifications, including protection for CITES listed species under FFPO Improved monitoring Improved shark statistics No. of published research articles on skates and rays	Shark and skate catches lumped together in national statistics and also not identified up to species level Targeted fisheries not monitored		Legislation enacted. Targeted fisheries monitored. Species-wise shark/skate catches reported.	✓	✓	✓	14.4	10.0 - DFAR	DFAR, DWC	NARA SLC MoE
2.6 Control targeted removal of highly vulnerable marine resources/species (lobster, chank, sea cucumber, marine aquarium fish, etc.)	No. of regulations/ statutes of existing laws amended No. of raids / No. of convictions No. of awareness creation activities	Existing regulations are not strictly enforced Little or no community participation		Existing laws strengthened. Enforcement activities increased. Community participation mobilized.	✓	✓	✓	14.4	5.0	DFAR	NARA, NAQDA, MoE, NGOs, CBOs, Private sector
Strategy 3: Conserve, sustainably develop and manage coastal and marine resources.											
3.1 Establish and implement EAFM[50] approach to fisheries management for selected marine and lagoon fisheries	No. of managed fisheries No. of management plans prepared and gazetted No. of outcomes of management plans achieved No. of stakeholder meetings /trainings (minutes/attendance)	Past initiatives not sustained. On-going initiatives at two lagoons.		07 coastal and lagoon fisheries managed applying EAFM	✓	✓	✓	12.2 /14.4	35.0	DFAR	CC&CRMD, NARA, DWC, FD

49 including but not limited to marine and coastal vertebrates including reef fish, migratory birds, invertebrates including coral

50 Ecosystem Approach to Fisheries Management

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
3.2 Manage high seas and EEZ fisheries in compliance with IOTC guidelines on species, fishing gear, etc	No. of high seas boats No. of positive vessel inspection reports No. of additional staff allocated	1,189 high seas boats and 3,696 EEZ boats in 2020		1,189 High seas and 3,696 EEZ fishing boats are managed in compliance with IOTC guidelines and catch quotas	✓	✓	✓	12.2 / 14.4	750.0	DFAR	MoFish NARA, BoI, SLN, SLCG
3.3 Improve and strengthen fisheries data collection systems to support sustainable fisheries management	No. of tablets used in EEZ and High seas fisheries Separate data collection and reporting systems developed for High seas, EEZ and Lagoon fisheries	Pilot testing of tablets on-going High seas and EEZ data lumped Lagoon catch data lumped with coastal catch data		Provide electronic tabs for 1,189 High Seas boats and 3,696 EEZ boats Develop 3 separate annual statistics reports for High Seas, EEZ and lagoon fisheries	✓	✓	✓	14.4	15.0	DFAR	MoFish NARA, NAQDA, Uni, INGO
3.4 Minimise illegal, unregulated and unreported (IUU) fishing	Increased staff and facilities for the Investigation Division No. of raids conducted and prosecutions under different fisheries	06 Officers in 2020		15 officers deployed to the Investigation Division / 10 district-wise annual reports prepared on raids and prosecutions	✓	✓	✓	14.4	10.0	DFAR	MoFish, SLN, SLCG, SLP, SLC, MoFA, BoI
3.5 Develop and promote community-based and nature-based, sustainable tourism contributing to biodiversity conservation and economic enhancement of coastal communities	No. of coastal communities selected and no. of sustainable, nature-based products developed No. of awareness programmes and No. and types of skills development programmes conducted No. of community groups supported	Tourism development plans recognizes communities as active participants in all aspects of the tourism development process.		30 - new community-based ecotourism programmes implemented SLTDA, donor agencies, INGOs/ NGOs support community-based ecotourism programmes	✓	✓	✓	14.7	270.0	SLTDA	Donor agencies, INGOs, NGOs, Private sector
3.6 Expand nature-based, sustainable tourism through promotion of ship-wreck targeted dive tourism	Improved database on shipwrecks Guidelines developed on operations and protection of shipwrecks in consultation with dive groups Database on local and foreign visitors to shipwrecks	On-going activity by few diver groups		Nature-based dive-tourism established at 06 new shipwreck sites within 30-40 m depth, under agreed guidelines and active participation of dive groups and visitors	✓	✓	✓	14.7	5.0 DWC 114.0 SLTDA	SLTDA	DArch, DWC, Private sector
Strategy 4: Administer and manage affected areas along the coast.											
4.1 Regulate, administer and manage coastal areas declared as affected areas	No. of Affected Areas declared /gazetted No. of boundary demarcations of affected areas Prepared management guidelines No. of SMA sites managed by CC&CRMD	02 sites gazetted / 05 sites to be gazetted 40 SMAs listed in coastal zone and Coastal Resources Management Plan, 2018		07 Coastal affected areas managed through legal and administrative provisions 20 SMA sites managed by CC&CRMD	✓	✓	✓	14.2	12.5	CC&CRMD	MoUDH, LA's, SLCG
4.2 Restore coastal affected areas through hard and soft solutions	No. of coast protection structures built No. of sand nourishment programmes undertaken Length of coastline rehabilitated	Continuous programme since 1980s		Completion of 10 coast protection structures and 5 sand nourishment programmes along 600 km of coastline	✓	✓	✓	14.2	6,000.0	CC&CRMD	MoUDH, DMC

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
4.3 Develop guidelines for reclaiming coastal frontages for development possibilities and provide additional nature-based buffers	No. of conceptual plans developed No. of development guidelines prepared No. of sites provided with nature-based buffers			5 conceptual plans and 5 development guidelines developed to reclaim coastal frontages. 10 sites provided with nature-based buffers	✓	✓	✓	14.2	45.0	CC&CRMD	UDA, SLLDC
Strategy 5: Control coastal and marine pollution.											
5.1 Support to control discharge of effluents degrading ambient water quality of coastal waters from high polluting industries	No. of high polluting industries identified No. of outreach programmes conducted on pollution abatement and cleaner production technologies No. of industries supported for pollution abatement	NEA, Waste Management Policy. The National Policy and Strategy for Cleaner Production 2005 provides for the industrial processes to be focusing on the output to have minimum impact on the environment		Survey to find high polluting industries 20 outreach programmes for pollution abatement conducted 15 industries supported in pollution abatement	✓	✓	✓	9.4 /14.1	10.0	MEPA, CEA	MoInd, MoE, BoI, LA's
5.2 Promote Ocean related industries under the concept of "Blue Economy" for sustainable use of ocean resources while preserving the health of ocean ecosystem	No. of signed partnerships established between ocean resource users and economies. No. of signed MOUs between sectors and affected groups for economic development and environment sustainability	Very little inter-sectoral collaboration and community participation in the context of "Blue Economy"		04 homogenous, sectoral and agency partnerships established. 04 MOUs formulated among agency/ sectoral partnerships and affected other stakeholder groups	✓	✓	✓	9.4 / 14.1	6.0	MEPA	MoPorts, MoFish, MoFA, DFAR, CFHC, MoE, CEA, NARA, CC&CRMD, SLTDA
5.3 Carry out customized training/ awareness programmes for all relevant target groups (including competitions for school children) and beach management (pollution abatement) programmes through inter-agency and private sector participation	No. of customized programmes for different target groups No. of training and awareness programmes and competitions conducted No. of beach management programmes held	Sector agencies conduct their own sector-specific awareness programmes and *ad-hoc* beach management programmes		06 customized programmes for different target groups prepared. 3920 awareness programmes conducted by MEPA. Beach management programmes at 120 sites conducted by MEPA	✓	✓	✓	14.1	558.4	MEPA, CEA	CC&CRMD, private sector, DWC, FD
5.4 Support studies and agency linkages to minimize coastal and marine pollution caused by illegal activities through information exchange and joint operations	No. of reports documenting land-based pollution No. of joint operations Database	Very little inter-agency linkages, information exchange and joint operations on pollution control		08 reports prepared by MEPA 20 joint operations conducted to minimize illegal activities	✓	✓	✓	14.1	20.0 1.0 DWC	MEPA, DWC	CC&CRMD, CEA, SLCG
5.5 Facilitate adoption of Green Harbour concept for fishery harbours to reduce negative impacts on the environment	No. of signed MOUs No. of fishery harbours adopting ISO 14001/ waste management (re-cycling, composting etc.)	MEPA has prepared waste management plans for 21 fishery harbours		Green harbour concept adopted in 21 fishery harbours	✓	✓	✓	9.4 / 14.1	40.0	MEPA, CFHC, CC&CRMD	MoFish, CEA, fisher CBOs, MoE, SLCG, LAs, SLSI
5.6 Facilitate application of business and environment management practices for local fishing boat industry to control land-based pollution	No. of awareness creation programmes conducted No. of MOUs signed with boatyards No. of boatyards adopting 5S and ISO 1400-1	72 registered boatyards. Few boatyards exporting boats are adopting business and environment management practices		10 awareness creation programmes conducted and 72 MOUs signed with boatyards All 72 boatyards adopted 5S and ISO 1400-1	✓	✓		9.4 /14.1	5.0	DFAR, MoFish	MEPA, CFHC, CEA, MoE, SLSI, LAs, boat builders association

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
5.7 Apply polluter pay principle in coastal and marine pollution control	Guidelines developed on environmental loss/ damage assessment No. of new regulations gazetted for punitive action and provisions for restoration of affected environment/ecosystems No. trained on new and innovative polluter pay initiatives	Very limited application at present		Develop environmental loss / damage assessment guidelines Enact 02 new regulations 03 no of agencies train 09 no of officers Develop and implement 05 new polluter-pay strategies	✓	✓	✓	14.1	6.0	MEPA, CEA, CC&CRMD	MoE, SLCG
Strategy 6: Control sand mining and manage extraction of other mineral resources to enhance beach stability, habitat and biodiversity conservation.											
6.1 Conduct a survey on sand mining in the Coastal Zone; as well as landward and seaward of the Coastal Zone (including rivers upstream), covering mining techniques, compliance with regulations on mining and transportation etc. in collaboration with relevant institutions	No. of participated agencies No. of sites covered No. of reports prepared	No national report available		National report on sand mining in Sri Lanka integrating all site reports from participating agencies	✓			12.2 /14.2	60.0	GSMB, CC&CRMD	MoE, CEA, SLLDC
6.2 Prepare strategy for enforcement of Guidelines for Sand Mining in the Coastal Zone; as well as landward and seaward of the Coastal Zone (including rivers upstream), in collaboration with relevant state agencies	Integrated strategy developed to enforce guidelines on sand mining No. of enforcement activities conducted No. of actions taken against violators	Adherence to existing guidelines unsatisfactory		Integrated strategy for more stringent enforcement developed. Guidelines for Sand Mining developed	✓			12.2 /14.2	60.0	GSMB, CC&CRMD	DS, DivS, LAs, MoE, CEA, NBRO
6.3 Promote sustainable extraction of offshore sea sand in construction industry	Reports on sand extraction studies in West, South and East coasts Cubic metres of sea sand extracted Cubic metres of sea sand used in the construction industry annually	Offshore sand used in construction industry since 2013 Over 600,000 m^3 used in 2017 and 2018		Sea sand to become the sole source of sand for the construction industry by 2023	✓	✓	✓	12.2 /14.2	90.0	SLLDC	GSMB, CC&CRMD, CEA
6.4 Promote sustainable extraction of other mineral resources in the coastal and marine areas	No. of evaluation reports on heavy mineral availability No. of exploration licenses issued No. of environmental assessments conducted	Heavy mineral sand concentrations occur along NE and NW coasts. Extraction largely limited to NE		Exploratory surveys on heavy mineral resources conducted. Environmental assessments conducted. Exploration licenses for extraction at new sites issued	✓	✓	✓	12.2	To be estimated	NARA, GSMB, CC&CRMD, MEPA	CEA, SLCG

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 7: Adapt to climate change and natural hazard impacts on coastal features, infrastructure, coastal communities and livelihoods.											
7.1 Increase monitoring activities related to climate change parameters in the marine environment	No. of sites covered No. of voyages by RV Samudrika No. of monitoring reports published	NARA monitors sea surface temperatures, sea level rise and ocean acidification from onshore sites with inadequate facilities and using RV Samudrika		Sea surface temperature recording stations increased from 2 to 4. Sea level monitoring stations increased from 3 to 7. RV Samudrika voyages increased from 2 to 3	✓	✓	✓	13.3	105.0	NARA	MET CC&CRMD, Uni
7.2 Analyse impacts of climate change/ natural hazards in the coastal zone and establish mechanisms for timely adaptive and mitigatory action through inter-agency collaboration	No. of district-wise maps /tables on potential climate change and natural hazards related disasters No. of adaptive and mitigatory mechanisms established	Available data needs updating		Climate change/natural hazards impacts analysed and adaptive and mitigatory mechanisms for all 15 coastal districts established	✓	✓	✓	13.3	10.0	MoE	MET, NERD, CC&CRMD, DS, DivS
7.3 Develop mechanisms for recovery of losses and damages due to impacts of climate change and natural hazards in coastal areas	Strategies and guidelines available for speedier assessment of damages/losses Detailed compensation packages available on loss and/or damages to households and assets/ livelihoods etc. Inter-agency mechanism for compensation established. Access to funds	Currently implemented in an ad-hoc manner due to lack of standard mechanisms		Guidelines and strategies for speedier damage/loss assessment and compensation based on standardised packages on type and level of damage/loss available	✓	✓		13.3	To be estimated	DMC, NDRSC, NDMC	DS, DivS LAs MoE, MoF, MoUDH, DSS
7.4 Initiate collaborative coastal community resilience programmes based on early designation of coastal hazard-prone areas	Most critical coastal hazard-prone areas identified No. of coastal communities mobilized No. of community resilience programmes developed	Coastal hazard- prone areas need updating		05 programmes developed to meet challenges of coastal hazards in all critical coastal hazard-prone areas	✓	✓	✓	13.1/13/3	75.0	DMC, MoE	CC&CRMD, DS, DivS
7.5 Establish an Incident Command System (ICS) to command, control, and coordinate emergency responses, to manage marine hazards leading to environmental pollution/ destruction	ICS is in place to manage marine hazards	Currently the concept of ICS is not practised in Sri Lanka		ICS is legalized for managing marine hazards	✓	✓		13.1	To be estimated	DMC	MEPA, CC&CRMD, SLCG, SLPA, MoFish, CFHC, MoE, DS, DivS LAs
7.6 Use nature-based solutions or green-grey solutions to enhance ecosystem resilience to natural hazards	No. of restoration programmes undertaken	Few restoration activities		06 nature-based solutions developed and implemented to enhance ecosystem resilience to natural hazards	✓	✓	✓	14.2	50.0	DWC	MEPA, CC&CRMD, INGOs, private sector

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 8: Carry out research and development to support the conservation and sustainable use of coastal and marine resources.											
8.1 Identify and prioritize research on marine biodiversity and coastal ecosystems	No. of project proposals submitted for funding No. of research projects completed No. of reports / publications No. of linkages established with NGOs involved in research and surveys on critical marine species	Current focus more on corals and mangrove Less attention to other ecosystems such as seagrass meadows as well as marine biodiversity		05 research proposals prepared, submitted, funded and results published. Collaborative research linkages established with 03 conservation NGOs	✓	✓	✓	14 A / 15.5	20.0	NARA	DWC, NSF, BDS, Uni, conservation NGOs
8.2 Establish regional research facilities to enhance research and monitoring in coastal and marine sector	No. of new research facilities established	NARA has 03 regional research facilities in South/ Southwest and Northwest		One regional research facility in East Coast		✓		14 A	25.0	NARA	Uni, MoFish, DWC, CC&CRMD, MEPA, NAQDA, MoE
8.3 Promote research on lesser-known marine and coastal species	No. of research studies conducted and reported No. of new groups studied No. of new taxons identified	Red Listing of many coastal and marine species is not possible due to lack of data		50% more studies on lesser-known species and groups are conducted and reported, highlighting new taxa	✓	✓	✓	14 A	65.0	NARA	NSF, Uni, MoE, DWC, NAQDA
8.4 Develop and promote local, international and regional research collaborations on ballast water, bio fouling species, bio-toxins, micro plastics, etc.	No. of collaborative research conducted No. of publications No. of marine IAS identified	Preliminary investigations conducted on ballast water and plastic pollution		05 collaborative local, regional and international research conducted. 05 publications by NARA 09 publications by MEPA	✓	✓	✓	14 A	8.0 - MEPA 50.0 - NARA	MEPA, NARA	CEA, MoE, NSF, INGOs, MoFA
Strategy 9: Strengthen policy, legal and institutional framework for coastal and marine resource conservation and sustainable use.											
9.1 Strengthen institutional capacity of relevant agencies for maritime surveillance activities	No. of trainings and workshops conducted for capacity building (HRD) No. facilities upgraded No. of new regional stations established	Agencies have on-going programmes and facilities		48 training workshops for conducted for HRD New technology, database, ISO certification introduced 02 new regional stations	✓	✓	✓	14.1 /14.2 / 14.4	634.0 - MEPA 34.0 - CC&CRMD	MEPA	CC&CRMD, SLN, SLCG
9.2 Build institutional capacity to facilitate and promote ecosystem approach (EAFM) to fisheries co-management	Dedicated co-management sub-units at Head Office and District Offices for coastal and marine fisheries Increased staff and facilities for Brackish Water Unit at Head Office	No co-management sub-unit for coastal and marine fisheries Small Brackish Water fisheries sub-unit at Head Office		Dedicated and separate co-management sub-units with adequate staff and facilities at Head Office and 15 district offices established for coastal/ marine and brackish water fisheries	✓	✓	✓	14.4	30.0	DFAR	MoFish
9.3 Strengthen and widen implementation of the National Oil Spill Contingency Plan (NOSCOP)	No. of trainings conducted and trainees for capacity building of agencies National Oil Spill Contingency Plan (NOSCOP) revised to include chemical spills List of equipment purchased	Chemical spills not included in the Plan		NOSCOP revised to include chemical spills 48 training drills, workshops conducted and equipment purchased.	✓	✓	✓	14.1	2,020.6	MEPA	SLPA, SLCG, CEA

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
9.4 Strengthen regulatory mechanisms related to offshore oil and other natural resources exploration and extraction within Sri Lanka waters	No. of gazette notifications No. of standards, guidelines published	Existing regulatory mechanisms inadequate		Regulations, standards and guidelines formulated on exploration and extraction of offshore oil and other natural resources within Sri Lanka waters	✓	✓		14.1	1.0	MEPA	CC&CRMD, CEA
9.5 Implement Dumping Regulation and ratify international conventions related to pollution from ships	No. of regulations enacted No. of implementation activities against specific conventions	Few conventions related to marine pollution ratified including Annexes I - V of MARPOL convention		05 conventions and Annex VI of MARPOL convention ratified and Dumping Regulation updated	✓	✓		14.1	30.4	MEPA	MoE, MoFA, SLC
9.6 Strengthen coastal and marine water quality monitoring facilities of relevant agencies	No. of laboratories upgraded and/or newly established No. of accredited laboratories No. of monitoring stations established	Water quality monitoring undertaken by agencies with inadequate facilities		04 laboratories upgraded 02 new laboratories established 36 water quality monitoring stations established	✓	✓	✓	14.1	60.0 - MEPA 45.0 - NARA	MEPA, NARA, CC&CRMD, CEA	
9.7 Develop and implement a joint mechanism for coastal and marine water quality monitoring (sites, methodologies, publications, policy advocacy, etc.)	No. of Inter-agency MOUs No. of joint published reports capturing high incidence of pollution types, causes and areas Coastal and marine water quality standards established	Currently no integration between agencies involved in coastal and marine water quality monitoring		02 inter-agency MOUs on monitoring protocols (sites, methodology, publications, advocacy, etc.)	✓	✓	✓	14.1	10.0	MEPA, CC&CRMD, CEA	NARA, Uni
9.8 Promote inter-agency collaborative research on surface water bodies conveying pollutants into coastal waters and water quality improvements in such water bodies	No. of Inter-agency MOUs No. of report/s with estimates of pollution loads No. of report/s on marine pollution pathways from non-point sources No. of improvements affected and impacts	Water quality data available for some surface water bodies		02 inter-agency MOUs formulated. 03 joint reports prepared on estimates of pollution loads in critical water bodies. 3 joint reports prepared on marine pollution pathways from non-point sources. 10 no of advocacy interventions conduced	✓	✓	✓	14.1	10.0	MEPA, CEA	NARA, CC&CRMD, NSF, Uni, NWSDB
9.9 Promote inter-agency collaboration for monitoring and control of land-based pollution and dumping of solid waste in the coastal zone	No. of committees established at local/district levels No. of attendees and minutes of committee meetings No. of published reports on solid waste in sensitive and critical areas No. of assessment reports on dumping of solid waste	Data on land-based pollution and dumping of solid waste in coastal zone available at Local Authority level No effective inter-agency collaboration		83 inter-agency committees established 1,660 bi-annual meetings of the 83 committees conducted 830 annual reports on solid waste in sensitive and critical areas prepared. 830 annual assessment reports prepared on dumping of solid waste	✓	✓	✓	14.1	16.0	MEPA, CEA, CC&CRMD	LAs, DS, DivS, MoE, SLLDC, WMAWP

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
9.10 Establish clear legal and institutional mechanisms for implementation of international commitments	No. of areas of ambiguity identified in implementing existing national laws and regulations on international commitments No. of amended national regulations strengthened to meet international commitments No. of new national regulations formulated to meet international commitments No of agencies strengthened for effective implementation of regulations related to international commitments	Inadequate legislative and institutional responses to international commitments		Inter-agency review of all international commitments related to C&M resources and environment conducted and protocols for implementation established. Existing regulations strengthened and new regulations on international commitment formulated. Agencies strengthened for effective implementation of regulations	✓	✓		14 C	To be estimated	MEPA, MoE, SLC	MoFA, AGD, LDD, MSS, DFAR

THEME 5
SUSTAINABLE LAND RESOURCES MANAGEMENT

Land is a fundamental natural resource on which life depends. Land resources refer to the terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including near-surface climate, terrain forms, hydrology, the soil, near-surface layers, fauna, flora, human settlements and infrastructure. Land is the most vital natural resource and foundation, as well as the key driver of Sri Lanka's economic productivity, well-being and livelihoods. Land resources are used by several economic sectors such as agriculture, plantation, forestry, irrigation schemes, human settlements, industries and infrastructure and include many types of landscapes and ecosystems. It is known that healthy ecosystems provide food, shelter, clean air and water as well as the capacity to assimilate and recycle wastes. Hence, ensuring sustainable land management is the focus of this theme's action plan.

2.5.1 Overview

Land is one of the most vital natural resources and the foundation for economic productivity, human well-being and livelihoods. Sri Lanka, with an area of 65,610 km^2, is endowed with a rich natural resource base that sustains the nation. It is also rich in historical evidence of a hydraulic civilization and socio-ecological production landscapes (Herath et al., 2019). The climate of Sri Lanka is governed by tropical monsoon influences, northward and southward migrations of the inter-tropical convergence zone over Sri Lanka, El Niño-southern oscillation (ENSO) effects, marine influence, influence of its geographic location, elevation and internal typography. Therefore, spatial and temporal variability of climate is high within Sri Lanka (Malmgren, et al., 2003).

The unique landscape of the country is characterized by a variety of landforms, ranging from flat plains, to a very complex assemblage of mountains, ridges, plateaus and valleys. Occupying the southern central region of the country, central mountainous massif rises up to 2,524 m at its peak. Sri Lanka has 103 river basins, of which the Mahaweli river basin is the largest, spreading from central highlands through the north central area to the eastern coast, covering approximately one sixth (10,448 km^2) of the island (Shelton & Lin, 2019). The remaining river basins are connected to the central land massif, spread over the wet zone (in the western and south-western region), north-central, eastern, part of north-western and western regions. Ancient sustainable production agro-ecosystems - village tank cascade systems (VTCS) are found in river basins, which are not connected hydrologically to the central land massif (Ratnayake et al., 2021).

Land resources are used by many economic sectors such as nature reserves, forestry and plantations, agriculture, irrigation schemes, human settlements, industries and infrastructure and consist of many types of landscapes and ecosystems (Kochtcheeva & Singh, 2000). Land use changes have transformed natural land cover (forests and other natural ecosystems) to farmlands, human settlements and urban centres. Many studies have highlighted strong linkages in present trends of land-use changes with deforestation, biodiversity loss and land degradation (Bandara, 2013 and Maitima, 2004). Increased population pressure on different types of natural lands has resulted in many consequences and impacts on the ecological environment. Unsuitable and unplanned land use changes aggravate land degradation, reducing the capacity of on-site and off-site ecosystem functions, and in turn the services they provide. Between 2000 and 2010, about 79 km^2 (0.5%) of forest land was converted to other land use types (LND, 2017). In addition, the productivity of 34% of the land area of the island is either declining or under stress (LDN, 2017). Among the most significant impacts of land degradation are the increased poverty, reduced land productivity and loss of biodiversity. Therefore, it is important to identify the status of land resources and trends in land resource processes and pressures, to reverse negative trends with sustainable management responses, focusing on critical gaps in allocation and management of land resources, and responding to address externalities as detailed in Figure 2.5.1.

Best Principles Towards the Approach

- Looking at 'land' as a 'resource system' with 'resource units' and with 'values'.
- Land is the foundation and a key diver of Sri Lanka's the economic productivity.
- Land and the services it provides are critical to the Sri Lankan people's well-being attributes – their livelihoods, spiritual, emotional and physical – 'land and people' or 'land with people' concepts. For a couple of millennia, Sri Lankan people lived in harmony with land resources have also shaped the land according to their needs and even today continue to shape it, with sometimes dramatic consequences.
- Evaluate land processes and interrelated environment aspects.
- This theme crosscuts with many other thematic areas of the NEAP particularly water, biodiversity, climate actions etc, and to obtain complete insight, the SLRM section must be read in confection with other thematic sections of NEAP.

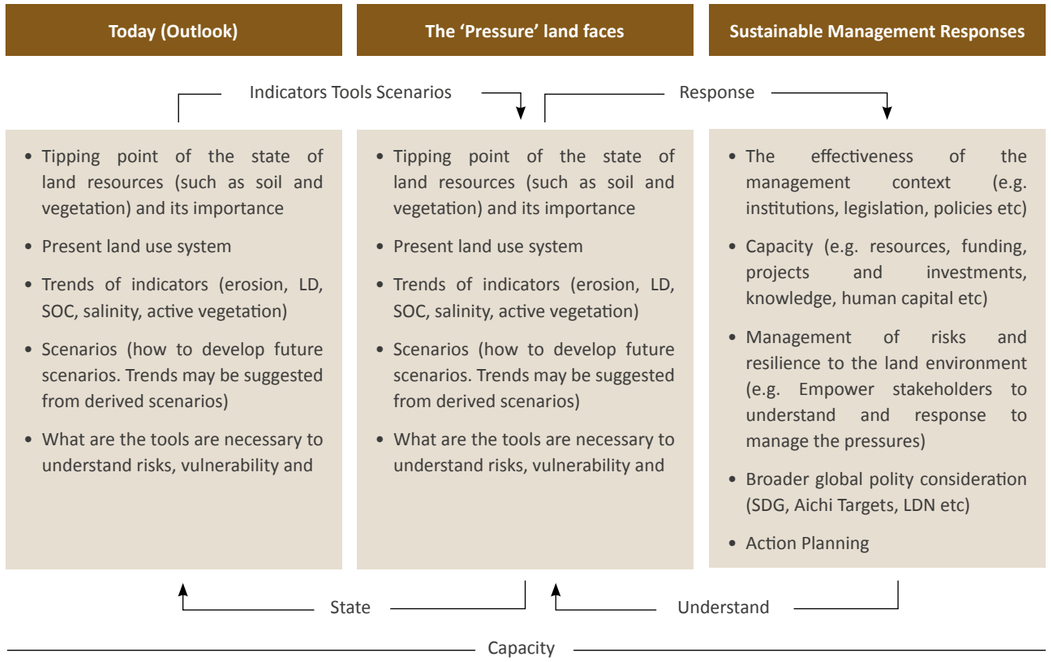

Figure 2.5.1.Base principles and approach and development of the action plan

2.5.2 Current Status

Although there are several policies, strategies and action plans for promoting sustainable land use, because of weak enforcement, land degradation continues significantly in Sri Lanka. Degradation of land is driven mainly by anthropogenic influences. In Sri Lanka, major degradation processes such as soil erosion, fertility decline, salinization/alkalization, sealing and crusting, compaction, water logging, soil subsidence, mass movement, aridification and pollution. Unsustainable agricultural practices, deforestation, lack of adoption of land use planning policies, cultivation of erosive crops in high elevation lands (which experience high rainfall regimens) degrade the land resource (Nayakekorala, 1998; MoE, 2014; Krishnasoban and Ruzaik, 2020).

According to the Global Assessment of Soil Degradation (GLASOD), about 50% of land in Sri Lanka is degraded (GEF, 2014). The area affected by soil fertility decline is 61% of the total agricultural lands and the area affected by soil erosion is nearly 33%, with the Colombo district reporting the lowest level with 2.3% and the Nuwara Eliya district the highest, of 58%.

Some studies have shown that in the example of tea cultivation, a loss of one centimetre of topsoil cover is associated with a decline in yield of 44 kg/ha/yr, while for rubber, the decline in yield could be nearly 174 kg/

ha/yr (MoE, 2014). The highest soil erosion rates are recorded in the hill country, where the elevation is 448-2,200 m above mean sea level. On these sloping lands, very high soil erosion rates (in the range of 18-70 t/ha/yr) have been reported with crops, such as carrots and capsicum. Vegetable and potato crops grown in the districts of Nuwara Eliya and Badulla are irrigated using a very primitive method, and this results in very high rates of soil erosion. (In this practice, running water is thrown on to vegetable beds.) Estimates show that on average, 147 kg of soil is lost per irrigation per hectare from these vegetable fields. This amounts to nearly 1.5 t/ ha/ 3-4 months duration crop-eroded materials from these lands deposited on low lying areas, roads, reservoirs and farmlands. It is estimated that soil transported through run off is 13,000-83,000 t/yr in the Upper Mahaweli catchment area. Soil nutrient replacement costs have been calculated and have shown high values. It has been estimated that the Randenigala Reservoir is losing its electricity generation capacity at a rate of 0.25 GW/yr because of siltation. Soil erosion also increases water turbidity and affects downstream dwellers. It is estimated that in the Nuwara Eliya district, where the highest rainfall regimens are experienced, and soil erosion rates are recorded, erosion is 75 t/ha/yr. A study conducted in 1992, revealed that economic loss due to soil erosion in the hill country amounts to 2.4 billion LKR (MoE, 2008). Land degradation causes significant on-site and off-site impacts on productivity, quantified productivity loss because of erosion and on-site and off-site productivity loss because of soil erosion was estimated as 3,529 and 3,952 LKR /ha/yr as, summarized in the table 2.5.2.1 (UNCCD, 2000).

Table 2.5.2.1.: Economic Cost of Soil Erosion in Sri Lanka (reported in year 2000)

(Sources: MoSD, 2018; UNCCD, 2000)

Cost Category	Cost (LKR)
Onsite Costs	
Value of loss of productivity	3,529 ha/yr
Value of loss of nutrients	5,068 ha/yr
Estimated cost due to nutrient loss in Upper Mahaweli watershed	953 M
Off-site cost	
Based on value of loss of productivity	3,952 ha/yr
Based on value of loss of nutrient	5,481 ha/yr
Estimated loss in hydro-power production and irrigation from the Upper Mahaweli Watershed	15.0 M/yr

Gem mines and pits created in the process of brick-making have become a serious environment problem in the wet zone. Gem mining is a historical activity, which was practised with minimum environmental damage. However, modern mining practices, which use heavy machinery, are responsible for range of problems such as soil erosion, sedimentation, water pollution, removal of vegetation cover, flooding, risk and/or damage to wildlife, reduction of irrigation efficiency, reduction of potential of agricultural lands, damage to man-made structures. In some areas, gem mining has been identified as main cause of land degradation. In 2020, in the Bogawanthalawa GN division, it was reported that approximately 30% of gem mining activities contributed to 52% of soil degradation, while vegetable cultivation and tea cultivation were identified as the other main causes of land degradation (Krishnasoban and Ruzaik, 2020). Mining of sand from rivers, water streams, tank beds and agricultural lands has increased and is increasing because of the associated increasing demand for sand for the construction industry. This has resulted in indiscriminate mining of sand from wherever possible. Loss of agricultural lands, depletion of ground water because of deepening of river and stream beds, river and stream bank erosion and sea water intrusion into rivers are all the deleterious effects of this activity. Heavy earth excavations - common in road and other construction projects and associated with various development projects - are increasing at an alarming rate. Excavations are also carried out to obtain land filling material for various projects. It is evident that severe soil erosion occurs at these sites and sedimentation occurs in surrounding areas, degrading the land.

Environment assessments are carried out in such development activities and mitigation options are proposed to prevent ill effects, but the contractors often neglect mitigation options and therefore, constant supervision is required to assure that these proposed mitigation activities are implemented.

Ten districts, namely Nuwara Eliya, Kandy, Ratnapura, Badulla, Hambantota, Matara, Galle, Kalutara, Kegalle and Matale are prone to landslides. Of these, Nuwara Eliya, Kandy, Ratnapura and Badulla districts are heavily prone to landslide disasters. Approximately 32,375 km^2 are designated as being vulnerable to landslides (UNCCD, 2000), in areas that receive high annual rainfall. A combination of heavy rainfall, favourable geology and unsuitable land use practices has led to landslides in these districts. Landslides occur because of natural reasons but, in the recent past, human activities have exacerbated the incidence of landslides in the country. By disturbing the equilibrium of slopes, road and building construction and clearing of forests for cultivation and development projects often pave the way for mass landslides. Landslides degrade land by causing offsite damages, such as siltation of agricultural lands and water bodies.

Although there are many operational programmes for promoting sustainable land management by many sectoral agencies, their successfulness is questionable because of the lack of a proper coordination mechanism among stakeholders. Therefore, disconnected land governing responsibilities, overlapping mandates and weak institutional coordination are areas that must be addressed for an effective and efficient national programme to combat land degradation.

2.5.3 Policy and Legal Framework

Clean environment is one of the prominent national desirable objectives of 'Vistas of Prosperity and Splendour', the National Policy Framework of Sri Lanka for 'Reconstructed Country with a Future'. The main focus has been given for ensuring the environment protection in all national development plans; optimize agriculture ecosystems to obtain maximum benefits to people, while reducing the impact on environment; using sustainable land and water resource management, while taking proactive measures to increase national forest cover; establishing settlements in the most potential areas and not allowing large-scale developments in identified environmentally sensitive areas; increasing awareness and active engagement of communities for environment protection; and using a people-centric economic approach for shared responsibility and conservation of countries heritage for future generation. Further, the 'Vistas of Prosperity and Splendour' stresses the need of protecting forest cover, rivers, streams and wildlife, while using land resources for maximizing human benefits, through properly aligned with environment-friendly land governance at national, regional and local level.

The National Agriculture, Food and Nutrition Strategy (1984) proposed land use planning and watershed management as two important strategies for sustainable land management. The National Conservation Strategy (1988) stressed the need to restore sustainable development in the country. The National Policy Framework – Ministry of Agriculture, Lands and Forestry (1995) identified the degradation of land resources because of over use and mismanagement and declared that, for several decades, haphazard allocation of state lands to the landless under the land alienation programme, without proper and systematic land use planning, has caused enormous damage to the land resources in the country and consequently, to the environment. The framework also stated that "given the fragile nature of this scarce natural resource, which are vital for the continuing subsistence of life in all its forms, it is essential that we manage it with care and efficiency, so that its benefits would accrue not only to our generation but also to generations yet to come on whose behalf we hold it in trust".

The National Physical Planning Policy and Plan (2020 - 2030) states that all lands in the country cannot be put into economic use; some lands must be protected to fulfil certain objectives that will benefit the country and contribute to sustainable management. These lands include watershed areas; areas with rare ecosystems and ecosystems of exceptional diversity; areas with concentrations of economically important or potentially important species of varieties and threatened species; fragile areas that may be easily degraded; and important aesthetic, cultural, historical and recreational areas. The policy, therefore, recommends that

a protected area network be established that will integrate all the areas within the country that need to be conserved. The areas included in the network will be divided into two categories depending on the level of protection afforded. The category one will comprise areas that will be preserved strictly to protect biodiversity, soil, water, historical, cultural, religious and aesthetic values and scenic beauty. These will include all wildlife reserves; all conservation forests identified by the Forest Department; degraded forest areas that will be restored for ecological reasons; areas of archaeological and historical value where there are no development activities; areas of natural beauty and natural features of exceptional value; environmentally and hydrological important lands in the hill country; areas where landslides are to be expected; un-utilized lands in areas of high rainfall intensity with slopes of over 60% and highly erodible soils; and all natural and man-made water course and water bodies, as well as their reservations and catchment areas. The National Physical Planning Policy and the Plan (2021- 2050), is the updated National Physical Policy and Plan declared under No.03- Extra ordinary Gazette No.2127/15 dated 12th June 2019, with the broad objective ". . . to provide the Government of Sri Lanka with a guide to develop a physical environment that will facilitate Sri Lanka to become a smart nation and a competitive economy of the world within the next decade and remain thereafter; ensuring the optimum and sustainable use of the available assets and infrastructure, unexplored resources and the potentials of its land and ocean space; exploiting the opportunities provided by the on-going economic, political and technological advances around the globe; and harnessing the potentials attributed by its strategic geographic location in the Indian Ocean". Key guiding policies included are: 1) Conservation of the Critical and the Unique; 2) Promotion of the Liveability for humans; 3) Exploration of the Potentials, Opportunities and the Enhancement of use; and 4) Optimization of the Availability. Special attention has been paid to conservation of fragile zones and zone-based logical spatial strategic holistic planning concepts.

The National Watershed Management Policy (2004) stresses the need of resolving degradation occurring in the upper watersheds of the country, which has manifested through denuded forest cover, with the exposed slopes prone to landslides, soil profiles truncated by erosion and poor in fertility, increasing fragmented and uneconomic land holdings worked on by the people, the silting of rivers and reservoirs, and the frequent and costly floods in the coastal plains.

The Land Use Policy (2007) aims to ensure suitable land use, food security, economic development and the maintenance of the productivity of the land in the country. It also promotes protection, conservation and sustainable use of the land resource and offers ideal framework that will best meet the needs of the present generation, while safeguarding the needs of the future generation. The Land Use Policy Planning Department which is the responsible agency for implementation of the policy. The policy is very ambitious and aimed at directing land use in the direction of scientific land use. Mitigation of land degradation has been given high priority in policies and suggest enhancing peoples' participation in the sustainable use of land resources, rehabilitation of degraded lands, avoidance of type of land use that constrain sustainable development, preventing encroachment on state lands, creating of awareness on scientific land use, implementing effective conservation measures for agricultural land use, rehabilitating marginal and uncultivated lands, protecting environmentally sensitive areas, protecting and conserving land above 1600 m elevation, conserving slopes exceeding 60% situated 1,600 m above mean sea level, using reforestation or agroforestry, and identifying landslide prone areas to introduce appropriate conservation measures.

As summarized in the National Report on Desertification/land Degradation in Sri Lanka (UNCCD, 2000), two types of legislative strategies have been adopted by the government to address the problem of soil erosion. One is to incorporate environmental safeguards in legislative enactments pertaining to the development of land and water resources. The other is to introduce legislation designed specifically to prevent or mitigate soil erosion. Key legislations SLRM related sections are summarized in table 2.5.2.2.

The Soil Conservation Act. No. 25 of 1951, as amended in 1996, empowered the Director General of Agriculture to undertake surveys and investigations for the purposes of ascertaining the nature and extent of land degradation due to various factors including floods, droughts, salinization, desertification, siltation and soil erosion, to declare "erodible areas" to specify measures regulating the use of land and to acquire land for carrying out measures to prevent erosion. Several decades later, the government realized that the

provisions laid out in this Act were inadequate to meet current demands for a number of reasons. The main reasons were: i) the identification of conservation activities, as an extension function; ii) The implementation of the provisions of the Act and regulations could not be undertaken by normal extension staff of the Department of Agriculture, as extension and regulatory functions are not compatible; iii) at the time the Act was enacted, all land matters were handled by one ministry. As time passed many ministries and agencies were given the responsibility for the management of land. This prevented the Director of Agriculture from adequately exercising his authority and functions under the Act to achieve the objectives of the Act; and iv) the institutional support made available under the Act was considered inadequate. The deficiencies in the 1951 Act have been rectified in the Amended Act of 1996. There has also been a shift in focus from the control of soil erosion to land resource management.

Natural forests in Sri Lanka are owned, managed and protected by the Forest Department (FD) or the Department of Wildlife Conservation (DWC), and account for about 35% of the total land area of Sri Lanka (MoMD&E, 2016). The FD and DWC are guided by two legal enactments the Forest Conservation Ordinance and the Fauna and Flora Protection Ordinance. Under the Forest Conservation Ordinance of 2009, natural forests coming under the jurisdiction of the Forest Department are designated as Conservation Forests, Reserve Forests or Village Forests and the ordinance has provision to protect these forests and their produce. The Fauna and Flora Protection Ordinance No 02 of 1937 and subsequent amendments provide for the protection of six categories of natural ecosystems under the jurisdiction of the Department of Wildlife: strict natural reserves, national parks, nature reserves, corridors, and sanctuaries.

In the Land Development Ordinance No.19 of 1935, Section 8 states that "state land may be mapped out by the Government Agent[51] for any one or more of the following purposes: (g) prevention of the erosion of the soil and (d) the maintenance of reserves for the preservation of the sources and courses of streams and for the prevention of erosion of the soil".

In the State Lands Ordinance No. 8 of 1947, Section 49 says: "Subject as hereinafter provided, the Minister may, by Notification published in the Gazette, declare that any state and is constituted a State reservation for any one or more of the following public purposes; (6) the prevention of the erosion of the soil".

Section 12 of the Water Resources Board Act No. 29 of 1964 states that "it shall be the duty of the Board to advise the Minister on the following matters and on any other matters that are referred to the Board for advice by the Minster; (d) the control of soil erosion".

The Land Grants (Special Provisions Act) of 1979 provided for the transfer to the State land vested in the Land Reform Commission and the transfer of this vested land free of charge to landless persons. The transfers were subject to certain conditions, one of which was the stipulation that the transferee should carry out on his land, such soil conservation measures, which the District Secretary of the District may require from time to time.

Section 34(2) of the Agrarian Services Act No.58 of 1979 and subsequent amendments, states that "the owner, cultivator or occupier of any agricultural land shall, in addition to such other duties as the Commissioner may in his discretion specify, ensure that: (d) the land is properly maintained in order to ensure the maximum conservation of soil and water".

Section 13 of the Mahaweli Authority of Sri Lanka Act No.23 of 1979 states that "Notwithstanding the provisions of any other law and without prejudice to the generality of the powers conferred on the Authority by this Act, the Authority shall in or in relation to any Special Area have the power: (3) to take such measures as may be necessary for watershed management and control of soil erosion".

51 Now District Secretary

Section 22 of the National Environment Act No. 47 of 1980 and subsequent amendments states that the CEA "in consultation with the Council shall, with the assistance of the Ministry charged with the subject of Soil Conservation, recommend soil conservation programmes including therein the identification and protection of critical watershed areas, encouragement of scientific farming techniques, physical and biological means of soil conservation, and short term and long-term research and technology for effective soil conservation".

The National Watershed Management Policy of 2004 conserves, protects, rehabilitates, sustainably uses and manages the watersheds, while maintaining their environmental characteristics with the involvement of people.

The Government Extraordinary Gazette number 1894/3 of 2014/12/22 under the policy on conservation of Water Sources and Water Spouts of 2014 protects and conserves all water sources, their reservations, conservation areas and immediate catchment areas to ensure the existence of the water sources.

2.5.4 Introduction to the Action Plan

As guiding principles for formulation of strategies and deciding priorities for the action plan formulation process, the main focus has been a) Previous planning documents which have been formulated based on existing policies; b) Desirable objectives of 'Vistas of Prosperity and Splendour' the National Policy Framework of Sri Lanka for 'Reconstructed Country with a Future'; c) The special priorities related to land management responsible institutes identified under recently restructured ministries and state ministries sited in Extraordinary Gazette No. 2187/27–2020; and d) Priorities identified in Sustainable Land Management related international initiatives (SDG, LDN targets, etc.).

2.5.5 Strategies for Management

Strategy 1. Align policy and legislative support for sustainable land management.

Strategy 2. Practise sustainable management of lands in critical natural ecosystems and environmentally sensitive areas.

Strategy 3. Ensure sustainable land use in agriculture.

Strategy 4. Conserve and practise sustainable management of grasslands (pathana, savanah, damana, villu and production grasslands).

Strategy 5. Minimize disaster impacts on land resources.

Strategy 6. Facilitate sustainable land management through Information and Communication Technology (ICT) options.

Strategy 7. Mobilize resources for SLRM (institutional strengthening, governance, capacity building and awareness creation).

Strategy 8. Promote sustainable management of mineral resources.

Strategy 9. Strengthen international cooperation for SLRM.

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2.5.6 Action Plan for Sustainable Land Resources Management

Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Strategy 1: Align policy and legislative support for sustainable land resources management.											
1.1 Review and identify gaps in sustainable land resources management related policies	No. of SLRM related policies reviewed	Existing policies and policy review reports		Policy review document with gaps identified along with recommendations available	✓			15.1, 15.2, 15.3, 15.4	5	MoE	MoLands NPPD, LUPPD, DWC, MoA, FD, NBRO, MoPla, MoI
1.2 Revise policies or introduce new policies/ regulations to address gaps in SLRM related policies	No. of policies revised or introduced new policies	Not available		Revised/new polices related to SLRM available	✓	✓		15.1, 15.2, 15.3, 15.4	8	MoLands	MoE NPPD, LUPPD, DWC, MoA, FD, NBRO, MoPla, MoI
1.3 Identify legislative/law enforcement gaps in SLRM	No. of interim reports on identified gaps	Existing legislations		Document to address legal gaps in SLRM available	✓	✓	✓	15.1, 15.2, 15.3, 15.4	30	MoLands	MoE, NPPD, LUPPD, MoA, DWC, FD, NBRO, LRC, SLLDC, MoPla
1.4 Facilitate the revision of SLRM legislations	No. of Act revised No. of regulations amended	Not available		Revised SLRM legislations available	✓	✓	✓	15.1, 15.2, 15.3, 15.4	50	Mo Land	MoE, NPPD, LUPPD, DWC, MoA, FD, NBRO, MoPla
Strategy 2: Practise sustainable management of lands in critical natural ecosystems and environmentally sensitive areas.											
2.1 Develop an integrated SLRM plan for the central highland as declared under the Soil Conservation Act (SCA) as well as an implementation mechanism	Spatial information related to Central Highland collated Integrated management plan (IMP) prepared for Central Highland area as declared under SCA Implementing mechanism for IMP available	Highland soil conservation area declared Conservation guidelines available		GIS based information portal available Integrated SLRM plan adopted Implementation mechanism in place for IMP	✓	✓		2.4, 2.5, 6.6, 15.1, 15.2, 15.3, 15.4	50	DoA, NPPD	MoE, HBASL, UDA, RDA, LUPPD TRI, PDoA, FD, DWC, CEA, NBRO MASL, ID
2.2 Identification of highly sensitive riparian areas of streams and rivers that are vulnerable to land use changes	Map indicating sensitive buffer zones prepared No. of workshops conducted to disseminate findings to assist effective enforcement	Regulations for conservation stream reservations available with limited enforcement		Up-to-date spatial information available for sensitive riparian areas Highly sensitive buffer area identified and characterized Findings disseminated through 10 workshops	√	√		2.4, 2.5, 6.1, 6.6, 15.1, 15.2, 15.3, 15.4	50	ID, MASL	MoE, CEA, DAD, PAs, FD, DWC, MASL, SLLDC, CECB
2.3 Reforest denuded hilltops by hilltop planting in areas above 1000 m of mean sea level	No. of ha reforested	Identified denuded hill tops		Restored 1000 ha of hilltops	✓	✓	✓	6.6, 15.2, 15.3, 15.4	200	FD, DWC	NGOs, CBO, MASL

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Strategy 3: Ensure sustainable land utilization in agriculture.											
3.1 Prioritize areas for soil conservation and rehabilitation	Maps and report on degradation status prepared Priority areas for conservation planning identified Sector-wise SLRM recommendations prepared and disseminated	SLRM interventions are not being focused on priority basis		Up-to-date spatial information available on land degradation and rehabilitation Report on priority areas for soil conservation and rehabilitation Sector-wise recommendations prepared and adopted	✓	✓	✓	6.6, 15.1, 15.2, 15.3, 15.4, 15.5	20	DoA	HBASL, TSHDA, PDoA, LUPPD, MoPla, MoA, MoE, TRI, RRI, CRI, DEA
3.2 Develop sector-wise investment plans for implementation of SLRM	Sector-wise plans prepared	Not available		Sector-wise investment plans available for SLRM	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5	10	DoA	HBASL, TSHDA, PDoA, LUPPD, MoPla, MoA, MoE, TRI, RRI, CRI, DEA
3.3 Develop an inventory of underutilized agriculture lands to facilitate rehabilitation and crop diversification	Full inventory of underutilized agricultural lands prepared Development plans for underutilized agriculture lands are formulated	Information on underutilized lands available for some districts (LUPPD)		Underutilized agriculture land inventory and description available Recommendations formulated and adopted to develop underutilized agriculture lands	✓	✓		15.1, 15.2, 15.3, 15.4, 15.5	20	LUPPD, DoA	DoA, FD, DEA, MoPla, MoE, MASL, DAD, JEDB, LRC
3.4 Rehabilitation of saline-affected agriculture lands	% saline affected areas rehabilitated	Technologies available for saline affected lands		30% of saline affected agricultural lands rehabilitated	✓	✓	✓	6.6, 15.1, 15.3, 15.4, 15.5	50	DoA	MASL, WRB, PDoA, ID, DAD
3.5 Promote site-specific fertilizer application (SSFA) to overcome soil pollution	No. of soil test kits provided	Soil testing programme available on request		Soil test kits available for all key agencies	✓	✓	✓	2.4, 2.5, 6.3, 6.6, 12.4, 15.1, 15.2	100	DoA, DEA, MoPla	HBASL. DAD, MASL, PDoA, TRI, RRI, CRI
	No. of soil fertility tests % of farmers adopted SSFA	GN division level recommendations available for paddy		Soil test-based fertilizer recommendation established 50% farmers adopted SSFA							

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.6 Conversion of marginal/ unproductive tea lands to other perennial crops	Inventory of unproductive tea lands produced % area under crop diversification	Unproductive/ marginal tea lands reported		Up to date inventory of marginal/ unproductive tea lands available 50% of marginal tea land converted to other perennial crops (spices)	✓	✓	✓	15.1, 15.3, 15.4, 15.5	50	MoPla, DoA, DEA	TSHDA, TRI, MoPla HBASL, MASL, LUPPD
3.7 Support resource poor farmers to combat land degradation	Land inventory of resource poor farmers prepared No. of ha lands conserved	Resource poor farmers rarely practice SLRM		Inventory of farmers need support to engage in SLRM available 4000 ha per year conserved	✓	✓	✓	15.1, 15.3, 15.4, 15.5	2,800	DoA, PDoA	HBASL, DEA, TSHDA
3.8 Establish and implement quality control system for organic and bio-fertilizers (check for heavy metals and pollutants)	Quality standards for organic and biofertilizer formulated Quality control system for organic fertilizers established and maintained	Standards for some types of organic fertilizer available		Quality standards adopted for organic/ bio fertilizer Quality control system for organic fertilizers adopted Mechanism for regular monitoring of quality adopted and implemented	✓	✓	✓	15.1, 15.3, 15.4, 15.5	1,000	SLSI, NFS & DoA	PDoA, MASL, DEA, MoPla, DAD
3.9 Promote eco-friendly non-chemical agriculture practices	% of farmers adopt non-chemical agriculture practices (bio-pesticides, on-farm compost production)	Cabinet decision ban chemical fertilizer and to promote organic agriculture 2021-04-27		75% of farmers adopted	✓	✓		15.1, 15.3, 15.4, 15.5	200	MoA, MoPla	PDoA, MASL, DEA, TSHDA, DAD
Strategy 4: Conserve and practise sustainable management of grasslands (pathana, savanah, damana, villu and production grasslands).											
4.1 Generate baseline data on the extent, types and status of grasslands in the country and map their geographical distributions	No. of new maps prepared on grasslands	Classified extent and status of grasslands not available		Maps on extent, types and status of grasslands available	✓	✓		15.1, 15.2, 15.3, 15.4, 15.5	5	FD, LUPPD	DWC, DoA, DAP&H, LRC, JEDB

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
4.2 Create awareness to prevent pernicious practices such as cultivation of temporary erosive crops and setting fire to natural grasslands	No. of awareness programmes conducted No. of fire incidence recorded in grassland	Available records on grassland fires		20 awareness programmes/ year conducted in potential areas Incidence of fires in natural grasslands reduced	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5	10	FD	DWC, DS, DAP&H
4.3 Establish fire belts/live fences to protect fires	% extent of fire belts/ live fence	Reported fire data		50% extent of grasslands have fire belt /live fences	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5	15	FD, DWC	MoA, Provincial Council
4.4 Conversion of under-utilized land into grassland for promotion livestock	Prepare inventory of under-utilized land Area converted into grasslands for livestock	Under-utilized lands available for alternative uses		Map/inventory of under-utilized lands available Under-utilized land converted to new grasslands	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5	100	LUPPD, DAP&H	DoA, MoA, MoLands, LRC, JEDB
Strategy 5: Minimize disaster impacts on land resources.											
5.1 Assessment of climate change risk on land use and land productivity	High risk LU sectors for CC impacts identified and mapped	District-wise climate vulnerability maps and reports available		Assessment report on CC impact on land use and land productivity	✓	✓		1.5, 15.1, 15.2, 15.3, 15.4, 15.5	10	MoE	CEA, DoM, MoA, NBRO, DMC, LUPPD, MoPlan
5.2 Develop and promote guidelines and tools for land use planning in CC vulnerable agriculture land uses	Guidelines for CC impact mitigation in agriculture sector prepared Awareness programmes for dissemination of CC impact mitigation technologies commenced	Climate smart technologies currently available.		Guidelines and manuals for climate smart agriculture prepared Awareness programme for climate smart agriculture initiated and continued	✓	✓	✓	1.5, 15.1, 15.2, 15.3, 15.4, 15.5	30	DoA, TRI, CRI, RRI	LUPPD, HBASL, PDoA, TSHDA, MASL, DAD, ID, MoE, NBRO, DMC
5.3 Develop and promote guidelines, tools for land use planning in landslide prone areas	Landslide mitigation guidelines and tools prepared No. of capacity building programmes conducted on new guidelines and tools	Landslide mitigation guidelines available		New guidelines and tools for land use planning for landslide prone areas available	✓	✓		1.5, 2.4, 2.5, 15.1, 15.2, 15.3, 15.4, 15.5	30	NBRO	DMC, Provincial Councils, NPPD, CEA
5.4 Introduce ecosystem-based disaster risk reduction (Eco-DRR) approaches to SLRM	Eco-DRR guidelines adopted for Sri Lanka Eco DRR initiatives introduced	Nature based solutions such as Eco-DRR are gaining attention but not mainstreamed yet		National Eco-DRR guidelines formulated Eco-DRR initiatives carried out in of landslide prone areas	✓	✓		2.4, 2.5, 15.1, 15.2, 15.3, 15.4, 15.5	50	DMC, UDA	NBRO, PCs

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
5.5 Enhance landslide mitigation programme for road sites cut slopes and embarkments	% of road sites slopes stabilized	Selected no. of landslide locations have been mitigated		50% of the unstable slopes are stabilized	✓	✓	✓	15.1, 15.2, 15.4	3000	RDA, NBRO	UDA, MoE, CEA, DMC, LUPPD, NPPD
5.6 Establish and continue the coordination mechanism to implement the National Drought Management plan	National Drought Management coordination mechanism established National Drought Management Plan (NDMP) implemented	National Drought management plan		Coordination mechanism in place and continued Progress reports on NDMP implementation	✓	✓	✓	6.6, 12.2, 15.1, 15.2	100	MoE	DMC, CEA, LUPPD, NPPD, MoA, SMoPC&LG
5.7 Assess seismic hazards and planning for Seismic Hazard Management	Seismic hazard map prepared	Available seismic data		Map and guidelines to manage seismic hazards	✓	✓		15.1, 15.2, 15.4	75	GSMB	DMC, MoE
Strategy 6: Facilitate sustainable land resource management through Information and Communication Technology (ICT) options.											
6.1 Strengthen national SLRM programme through integrated spatial information system	Information system available for monitoring and reporting SLRM programmes conducted by different agencies	No. coordination of SLRM programmes of different agencies		Operational information system for national SLRM programme available	✓	✓		15.1, 15.2, 15.3, 15.4, 15.5	15	DoA	ICTA HBASL, PDoA, MASL, LUPPD, TSHDA, DEA, MoPla
6.2 Develop ICT-based spatial information system to support land governance of landslide prone areas	Web-based ICT system available with landslide prone areas	Landslide prone area maps available		Operational ICT system to support land governance of landslide prone areas established	✓	✓		15.1, 15.2, 15.3, 15.4, 15.5	30	NBRO, ICTA	DMC, CEA
6.3. Develop monitoring and coordination mechanism to support land governance decisions for relevant agencies through spatial information system	Spatial information system available to consolidate SLRM related land governance for relevant agencies	No. spatial ICT based coordination mechanism available		Operational spatial information system available to consolidate SLRM related land governance for relevant agencies	✓	✓		15.1, 15.2, 15.3, 15.4, 15.5	20	DoA	ICTA, HBASL, PDoA, MASL, LUPPD, DEA, MoPla
6.4 Monitor and report the status of land degradation periodically	Information system e on land cover, SOC and land productivity available No. of status reports produced	Commitment to report land degradation in every 04 years to UNCCD		Operational system available for land degradation monitoring Assessment reports submitted to UNCCD in every four years	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5	20	MoE, DoA	LUPPD, FD, Uni

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
6.5 Develop and implement zone-based land use plan to promote SLRM	No. of districts covered by zone-based maps	Limited information available zone-based land use planning		Completed zone-based plan available for all 25 districts to promote SLRM	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 15.5	20	LUPPD, NPPD	DoA, MoA UDA, CEA
Strategy 7. Mobilize resources for SLRM (institutional strengthening, governance capacity building and awareness creation).											
7.1 Review the status of implementation of NAP and identify constraints	Review of NAP implementation progress	NAP is available National Steering committee appointed		Review report on the NAP with recommendation for implementation.	✓	✓		15.1 12.8, 15.1, 15.2, 15.3, 15.4	10	MoE	DoA, PDoA, DAD, DEA, MASL, TSHDA
7.2 Review the existing institutional arrangements for effective implementation of SLRM	Review of institutional arrangements for effective SLRM	Existing Institutional arrangement		Review report with recommendations	✓			15.1, 15.2, 15.3, 15.4	3	MoA	MoE, DoA, PDoA, MASL, DAD, MoPla, ID, LUPPD, MoLands
7.3 Establish and strengthen institutional coordination mechanism for SLRM based on the review report	Establish/ strengthen institutional coordination mechanism for SLRM	Not available		Institutional coordination mechanism for SLRM available	✓	✓	✓	15.1, 15.2, 15.3, 15.4	10	MoA	MoE, DoA, PDoA, MASL, DAD, MoPla, ID, LUPPD, MoLands
7.4 Conduct Training of Trainers (TOT) programme SLRM	No. of trainers trained on SLRM	Available training programmes for TOT		100 trainers trained per year	✓	✓	✓	15.1, 15.2, 15.3, 15.4	40	MoA	MoE, DoA, HBASL, LUPPD
7.5 Promote community participation in sustainable land resource management	No. of Training programmes conducted	Conduct 25 training programmes for 1,000 farmers annually		100 training programmes for 5000 farmers annually	✓	✓	✓	12.8, 15.1, 15.2, 15.3, 15.4	30	MoA	MoE, FD, DWC, PDoA, LUPPD, MASL, DoA, CEA, HBASL, DS, SMoDM
7.6 Promote involvement of the private sector in the rehabilitation and management of degraded forest land	No. of ha degraded forest land rehabilitated by private sector	Degraded forest lands identified for restoration		5,000 ha of degraded forest land rehabilitated	✓	✓	✓	15.1, 15.2, 15.3, 15.4	To be estimated	FD	Private sector, NGOs, MoWFC
7.7 Facilitate SLRM research	Identify research needs on SLRM No. of SLRM research symposia conducted No. of SLRM studies carried out/ no of SLRM technologies resealed	Limited on-going SLRM research programmes		Research agenda for SLRM prepared 01 research symposium on SLRM/ yr New SLRM technologies available	✓	✓	✓	1.5, 2.2, 11.3, 11.5, 11.A, 15.1-5	100	SLCARP, NSF, NRC	DoA, TRI, CRI, RRI, Univ
7.8 Provide extension and support services for agroforestry and woodlot establishment programme while ensuring gender mainstreaming	No. of programmes initiated with the involvement of women participation	Woodlots / agroforestry programme		Woodlots established in 5000 ha	✓	✓	✓	12.8, 15.1, 15.2, 15.3, 15.4	300	FD	DWC, NGOs, CBOs

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
7.9 Create awareness among stakeholders and community on SLRM through web, mass media, social media, etc.	No. of programme conducted	No. of programmes conducted during 2019-2021		Stakeholders and community aware on SLRM	✓	✓	✓	15.1, 15.2, 15.3, 15.4	1,000	DoA	MoA, MoE, NRMC, HBASL
Strategy 8: Promote sustainable management of mineral resources.											
8.1 Survey, map and quantify mineral resources stocks	Resources stocks identified; ground verified and quantified	Currently available survey data and maps		Identification of sustainably extractable resources (annual updates)	✓	✓	✓	15.1, 15.2	10	GSMB	LUPPD, CEA, DArch, FD, ID, CEA, MASL, MoE, NBRO, DS
8.2 Ensure sustainable extraction of minerals through proper assessments	All new mineral extractions are subject to appropriate environmental assessment	Mineral extractions assessment site reports		All new mineral mining sites are operational with approvals under SEA, EIA, IEE, AIA	✓	✓	✓	15.1, 15.2, 15.3, 15.4	1,000	CEA, DArch	GSMB, FD, DWC, CC&CRMD, NBRO, WRB, MASL, ID, DS
8.3 Strengthen regulatory and monitoring mechanisms for sustainable extraction and transportation of minerals	Regulatory mechanisms strengthened District and National level monitoring committees established	Available licensing system and statistics Existing enforcement setup Estimated existing level of illicit mining and transportation		Minimizing illicit mining by the application of electronic devices Monitoring committees in operation	✓	✓		15.1, 15.2, 15.3, 15.4	10	GSMB, MoE	CEA, FD, DWC, CC&CRMD, NBRO, DArch, WRB, MASL, ID, CEA, SLP, TRC, ICTA, DSs
8.4 Introduce and promote eco-friendly methodologies and best practices for minerals extraction and mineral mined site rehabilitation	No. of eco- friendly methodologies identified No. of sites rehabilitated (Percentage of bank, guaranties released)	Economic viability report required Restoration policy and guidelines available Haritha weli thotupola guideline for sand mining riverine stability		All new mining licenses adhere to best practices proposed 80% of bank guarantees released upon restoration of mines 80%-90% riverbanks restored under the guidelines of Haritha Weli Thotupala	✓	✓	✓	12.1, 15.1, 15.2, 15.3, 15.4	1,000	GSMB, NGJA	NGJRI, MoE, CEA, Uni, research institutes, NSF, NRC, project proponents

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
8.5 Promote alternatives for construction materials	Introduce appropriate alternatives for geo-substances used in the construction industry. No. of programmes conducted to promote identified alternatives	Quantity of offshore sea sand produced in 2020,		Introduction of appropriate alternatives for sand and aggregates used in construction industry Offshore sea sand used in all Government building constructions	✓	✓	✓	9, 12	50	GSMB	SLLDC, MoE, DB, CIDA, NERD, Uni, NARA, CC&CRMD
8.6 Introduce new technologies/ methodologies in construction sector for minimizing / optimizing the usage of geo-materials	No. of new adoptable technologies and methodologies introduced	Technologies and methodologies developed with minimum geo-material usage or no usage of them.		New technologies and methodologies introduced	✓	✓		12, 9, 15	100	DB, SEC, RDA	GSMB, CIDA, SLLDC, MoE, NERD, Uni
Strategy 9: Strengthen international cooperation for SLRM.											
9.1 Establish effective coordination and reporting system for (UNCCD)	All reporting requirements met on time	UNCCD reporting guidelines		Reporting requirement of UNCCD complied with on time	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 17.16	20	MoE	ERD, MoFA, UNDP, FAO, IUCN
9.2 Facilitate commemoration of international days related to SLRM with national and international partners	Commemoration of soil day and desertification day at national level	Commemoration of annual events with limited participation		Annual commemoration soil day and desertification continued with wider participation	✓	✓	✓	15.1, 15.2, 15.3, 15.4	10	MoE	Uni, NGO, CBO, CEA, MoA
9.3 Comply with implementation of Multilateral Environment Agreements / Conventions related to SLRM	% compliance in implementation of UNCCD convention	Sri Lanka ratified UNCCD convention		100% compliance	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 17.16, 17.18	50	MoE	UNCCD Secretariat
9.4 Implement regional and international initiatives/projects	Timely delivery of projects / programmes related outputs	SAARC regional programme on disaster management. National Drought management plan		All regional and international initiatives / projects related obligations met	✓	✓	✓	15.1, 15.2, 15.3, 15.4, 17.16, 17.18	50	MoE	CEA, LUPPD, MoA, regional and international institutes dealing with SLRM programme
9.5 Initiate new projects for SLRM with international collaboration	No. of new projects developed with international collaboration	GEF, GCF		New projects developed on SLRM	✓	✓	✓	15.2, 15.3, 15.4, 17.16, 17.18	1,000.00	MoE	GEF, GCF, UNDP, FAO, IUCN, MoF

THEME 6
HOLISTIC WASTE MANAGEMENT

The severity of waste issues is attributed largely to the urbanization, industrialization and economic growth of human societies, and have both quantitative and qualitative implications. Today, the world generates over 2.0 B t of municipal solid waste (MSW) annually, and this is expected to grow to 3.4 B t by 2050, under a business-as-usual scenario.

2.6.1 Overview

Waste could be defined as any material, substance or by-product eliminated or discarded or as no longer required, at a particular time, place or form, and therefore, to be used either as a resource or, if it does not have a utility value, to be treated and disposed of in an environmentally-sound manner (MoE&WR, 2019). The severity of waste issues is attributed largely to the urbanization, industrialization and economic growth of human societies, and have both quantitative and qualitative implications. Today, the world generates over 2.0 B t of municipal solid waste (MSW) annually, and this is expected to grow to 3.4 B t by 2050, under a business-as-usual scenario. In low-income countries this quantity is expected to increase by more than three times, while in South Asia, by two times. The global average per capita daily generation of MSW is about 0.75 kg, yet, country level waste generation rates fluctuate widely from about 0.1 to 4.5 kg depending on the levels of income and urbanization. Waste collection rates too vary widely by income levels. Low-income countries tend to collect about 50% of waste in cities, but outside urban areas, only about 25%. At present, about 70% of MSW still ends up on landfills/uncontrolled dumpsites, 20% undergoes materials recovery through recycling/composting, and 10% is treated through modern incineration (WB, 2018).

This situation is further aggravated with changing lifestyles and consumption patterns, together with the use of more chemicals/hazardous substances. Changing quantity, composition and characteristics of wastes have led to a complex situation, and this issue is deliberated more in cities and urban environments, particularly with associated MSW and industrial waste. As nations and cities become more populated, offer more products/services, and participate in global trade, they face corresponding amounts of waste to manage through treatment and disposal. The adverse impacts of waste have been witnessed increasingly in semi-urban and rural areas as well, even though there are more environmentally sensitive ecosystems in those regions. Poorly managed waste could lead to severe adverse impacts on air, surface and groundwater, soil, the coastal and marine environment, as well as the climate, and, in turn, on multiple fronts on public health, with corresponding economic implications (UNEP & ISWA, 2015).

The issue of waste has been on global agendas for decades, and a series of international conventions and treaties has been emerged over the years to address specific waste streams and/or impacts (local/global). A few examples are the: (i) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; (ii) Stockholm Convention on Persistent Organic Pollutants; (iii) Rotterdam Convention on the Prior Informed Consent Procedure for Hazardous Chemicals and Pesticides in International; (iv) Vienna Convention for the Protection of the Ozone Layer; (v) Minamata Convention on Mercury; and (vi) Paris Agreement on Climate Change. Further, the resolution adopted by the UN Human Rights Council (UNHRC) in 2018 on Human Rights and the Environment stresses that the unsound management of chemicals and waste may interfere with the enjoyment of a safe, clean, healthy and sustainable environment, and that environmental damage can have negative implications, both direct and indirect, for the effective enjoyment of all human rights (UNHRC, 2018). Further, under the theme 'implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes', the UNHRC advocates six areas of duties for the governments: (i) Respect, protect and fulfil; (ii) Protect the most vulnerable; (iii) Adopt fundamental approaches; (iv) Enact and enforce legislation; (v) Create effective institutions; and (vi) Enable people to claim and defend their rights (UNHRC, 2017).

The topic of waste has been emerged more significantly with the 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs), which signifies the links with a range of sustainable development challenges/goals, such as Health (SDG3), Clean water and sanitation (SDG6), Sustainable cities (SDG11), Sustainable consumption and production (SDG12), Climate change (SDG13), and Restoration of ecosystems and biodiversity (SDG14 and SDG15). Along with the SDGs, the Global Waste Management Outlook (GWMO) - a collective effort of the United Nations Environment Programme (UNEP), and the International Waste Management Association (IWMA) - set forth Global Waste Management Goals and a Global Call to Action to achieve those goals (UNEP & ISWA, 2015).

With the global level attention and local level implications, 'waste management' has become a catchphrase in almost every country, local government, industry and organization. This term could be defined as the management of interventions, activities and resources for proper control of waste streams and materials in preventing, minimizing or reducing the adverse impacts on the environment, society and/or economy. It should encompass all stages of the lifecycle (LC) of a given waste stream, including generation, collection, segregation, handling, storage, transportation, sorting, treatment, recovery and final disposal in an integrated manner, with an emphasis on maximizing resource-use efficiency; beyond regulatory compliance and consideration on socio-economic-environmental aspects. Accordingly, the concept of waste management hierarchy, illustrated in Figure 2.6.1, has been emerged as the main guiding principle.

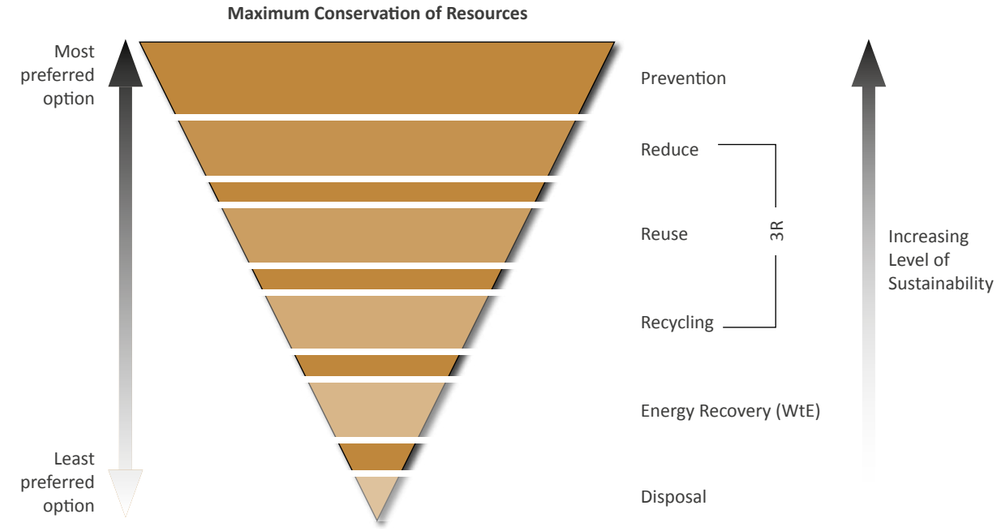

Figure 2.6.1: Waste management hierarchical system

Source: (UNEP, 2009)

Accordingly, waste management techniques have been evolved over the years, and presently, are centred on providing comprehensive solutions based on a holistic approach within sustainability frameworks, comprising all waste streams and all aspects during their LCs, in an integrated manner. The concept of Integrated Sustainable Waste Management (ISWM) brings together three dimensions: all physical elements (infrastructure), all stakeholders (actors) and all strategic aspects (political, health, institutional, social, economic, financial, environmental and technical facets). Thus, a framework for ISWM could be defined through the following essential components (listed with related drivers):

- Physical elements: Waste collection (driven primarily by public health), waste treatment and disposal (driven primarily by environmental protection) and the 3Rs – reduce, reuse, recycle (driven by the resource value of the waste and 'closing the loop' in order to return both materials and nutrients to beneficial use).
- Governance strategies: Inclusivity of stakeholders (focusing, in particular, on service users and providers), financial sustainability (requiring the system to be cost-effective, affordable and well financed) and sound institutions and proactive policies (including both the national policy framework and local institutions).

Therefore, along with the waste management hierarchy, ISMW and LC thinking have become guiding principles for the concept of holistic waste management (HWM), supporting business, local/regional authority and policy makers in finding resource efficient strategies to increase the economic, environmental and social performances.

2.6.2 Current Status

A steady increase in the generation of MSW, together with limited management practices and associated adverse impacts have been observed with urbanization and economic development in Sri Lanka, as with many other developing economies. Further, incidences associated with other waste streams, such as hazardous/ toxic waste materials, chemicals, e-waste and healthcare waste are also encountered. This topic has become a top item in political agendas as well, because currently, management practices of waste - particularly MSW - are insufficient and have resulted in growing health and environmental problems, as well as the annoyance of a growing number of citizens with a decreasing quality of life because of garbage in public spaces. The management of MSW is one of the key duties of the provincial councils (PCs) and local authorities (LAs), who are responsible by statute, for this issue. It is common for municipalities to spend a considerable portion of their budget on waste disposal (with considerable open dumping/ burning), even though a significant portion of the waste remains uncollected.

The country's data on generation, collection, composition and management pathways are not sufficiently comprehensive to generate accurate estimations of the waste management system. However, related publications and other information available with government agencies show that the total amount of MSW generation in Sri Lanka ranges from 8,000 to 9,000 t/day, with a per capita waste generation range from 0.2 kg/person/day in rural areas, to 0.85 kg/person/day in urban areas. The total generation in Western Province (WP) is about 3,500 t/day (with the contribution from daily commuters). About 60% of the waste generated in WP is collected by LAs, while in other provinces it is about 25%. In the WP, about 10% of the collected waste is recycled, 15% is composted and the balance is transferred to solid waste dump sites (SWDS). In other provinces, less than 5% is composted, about 7.5% is recycled and the balance is transferred to SWDS. The informal recyclers too contribute to significant amount of waste recycling, particularly from the waste that is not collected by LAs. There are about 340 SWDS in the country, with a few sanitary landfills. It is believed that 10% to 20% of the waste in SWDS is open-burned, which is also a common practice at the level of individual generators (households) (CCS, 2020).

By law, the management of chemical and hazardous waste (including healthcare waste) is the responsibility of individual generators. In case of healthcare waste, there is a central incineration facility, which caters mainly to government hospitals in the Western, Southern and Central Provinces, treating about 50% of the healthcare waste generated in the country. In addition, another industrial facility (INSEE Cement) manages about 50% of the other hazardous waste generated mainly from industries and residual waste from MSW *via* co-processing in cement kilns. Electronic waste collectors, registered under the Central Environmental Authority, annually export nearly over 3,000 t e-waste to other countries such as India, Germany, and Korea for recycling. Some industries export hazardous waste from their industries as per the agreements[52]. The information on other waste categories is very limited, indicating improper management practices.

For decades, the issue of MSW has been a recurrent discussion point among authorities and many interventions have been proposed, and some have been implemented. Most large-scale MSW management projects proposed by private parties are based on waste to energy (WtE) options with grid-electricity generation through standard power purchase agreement (SPPA) with Ceylon Electricity Board (CEB) under Non-Conventional Renewable Energy (NCRE) Tariff scheme. It seems that CEB's 20-year SPPA is the only major income source having guaranteed payment acceptable to financing agencies, so that the project proposal becomes bankable. However, even with such avenues, a noticeable progression in practical implementation is yet to be realized, except for one plant of 10 MW (700 t/day) capacity. Another 10 MW (500 t/day) plant is in the final approval stage and it is expected to be commissioned by the year 2024. Use of WtE as a priority intervention over other more sustainable options is questionable, when one refers to the main guiding principle of HWM illustrated in Figure 2.6.1. Apart from certain level of recycling, the other noticeable intervention is composting, which is implemented primarily by local governments.

52 which are requirements for the issuance of permits by CEA between industrial establishments and the Investor/Parent Company for the export of hazardous waste generated.

The recent programme on Climate Change Mitigation Assessments related to Revision of Nationally Determined Contributions (NDCs) in Sri Lanka in the waste sector, has provided opportunity to the sector agencies to understand and analyse the present status and future direction of the waste sector in the country. The waste sector NDCs, identified through a detailed stakeholder consultative process, reflects the identification and prioritization of mitigation actions, in line with the waste management hierarchy, as given below in the order of priority:

- Reduce MSW generation growth rate;
- Increase current recycling percentage;
- Increase the present level of compost preparation;
- Introduce central biogas systems;
- Introduce central sewage and wastewater treatment facilities;
- Establish WtE plants, considering the requirement (when other options are not feasible);
- Rehabilitate SWDS; and
- Reduce open dump burning in SWDS.

Another recent initiative is in the healthcare waste sector, where the Ministry of Health, with the assistance from United Nations Development Programme (UNDP), in which a rapid assessment was conducted to identify the present status and recommend a sound management plan. This study is to be followed by an implementation phase to address the sector issues.

2.6.3 Policy and Legal Framework

Conventionally, the formulation of national-level policies for SWM is a responsibility of the Ministry of Environment (MoE). However, with the recent re-assigning of cabinet portfolios, the subject of waste disposal has been assigned to the State Minister of Urban Development, Coast Conservation, Waste Disposal and Community Cleanliness (SMoUD). The National Policy on Waste Management provides the specific and comprehensive policy framework for the sector (MoE&WR, 2019). This policy provides a vision, a mission, a goal, eight objectives, eight guiding principles and a series of policy statements for each category of waste and each area of intervention. Further, it details stakeholder responsibilities and relationships to waste management.

In addition, policy directions for the waste sector are also provided by national development policies such as the National Policy Framework - Vistas of Prosperity and Splendour and National Policy and the draft Strategy on Sustainable Development for a Sustainably Developed Sri Lanka; as well as in several other sectoral policies and strategies including the draft National Environmental Policy (NEP); the National Policy on Sustainable Consumption and Production for Sri Lanka; and the National Climate Change Policy. In particular, the National Environment Policy (NEP), which is currently being updated, includes a policy statement on sustainable management of solid waste that refers directly to a holistic approach, while the policy statement on controlling of water pollution covers wastewater management.

The main legal and institutional framework for waste management is the National Environmental Act No. 47 of 1980 (NEA) and subsequent amendments, and the establishment of CEA to implement the provisions of the NEA. A series of regulations related to waste management have been gazetted by CEA, including National Environmental (Municipal Solid Waste) Regulations, No. 1 of 2009; National Environmental (Protection and Quality) Regulations, No. 1 of 2008 (on license for discharge, emission or disposal of waste/scheduled waste management); and Regulations on Polythene and Plastic Management 2017. In addition, there are regulations and legislations of Provincial Council and LAs – including the Municipal Councils Ordinance (1980), the Urban Councils Ordinance, Pradeshiya Sabhas Act No 15 of 1987 – that relate to waste management. According to

these legislations, all MSW generated within the boundary of LAs is their property, and the LAs mandated to remove and dispose of such waste materials, without causing any nuisance to the public.

The National Solid Waste Management Support Center (NSWMSC), established by the Ministry of Local Government and Provincial Councils in 2007, assists LAs to improve SWM in their administrative areas through technical, legal, and financial assistance. The Waste Management Authority of the Western Province (WMAWP) is responsible for providing technical and financial assistance to all LAs of the province to build their capacities, collecting waste data in WP, developing common final disposal sites to LAs and also assisting LAs to publicize and inculcate better methods of waste management discipline in the public.

2.6.4 Introduction to the Action Plan

The action plan of the Thematic Area 6: Holistic Waste Management is formulated with a set of guiding principles (including waste management hierarchy), aligned with those of the 2030 Agenda for Sustainable Development and SDGs, the National Policy on Waste Management, the National Policy on Sustainable Consumption and Production for Sri Lanka and the draft National Environment Policy (NEP).

Further, the strategies and activities are identified within the concept of holistic waste management, centred on the ISWM and LC-thinking, with consideration of inter-linkages of different waste streams, all physical elements, all stakeholders and all strategic aspects - thus providing directions to a circular economy, in a broader concept. Therefore, the proposed activity plan recognizes waste and resource management as a significant contributor to sustainable development in the local context. In particular, it recognizes that the development and implementation of holistic waste management plan should consider the local situation and particular circumstances, and thus, requires comprehensive data on present and anticipated waste situations, supportive policy and institutional frameworks, active engagement of stakeholders, knowledge and capacity to develop plans/systems, proper use of environmentally sound technologies (ESTs) with technology transfer, and sustainable financial instruments to support the implementation.

2.6.5 Strategies for Management

Shown below are the main strategies of the Thematic Area 6: Holistic Waste Management.

Strategy 1. Ensure a sound waste administration and operation for Integrated Sustainable Waste Management, while fostering governance, information, advocacy, compliance and stakeholder engagement.

Strategy 2. Effect maximum conservation of resources in waste management through prevention and reduction.

Strategy 3. Ensure sustainable management of plastics and other recyclables.

Strategy 4. Manage the biodegradable waste component through biological treatments.

Strategy 5. Exploit treatment with an energy recovery option for management of non-recyclable and non-usable waste.

Strategy 6. Manage final disposal sites.

Strategy 7. Manage hazardous waste.

Strategy 8. Foster innovation, research and development to support holistic waste management.

Strategy 9. Enhance global participation and collaboration for furthering holistic waste management.

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2.6.6 Action Plan for Holistic Waste Management

Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
Strategy 1: Ensure a sound waste administration and operation for Integrated Sustainable Waste Management, while fostering governance, information, advocacy, compliance and stakeholder engagement.											
1.1 Establish a high-level national entity with effective coordination mechanism and functional arrangement for (i) waste management authorities at all levels of governance, and (ii) effective mobilization of all other stakeholders including private sector, academics and the civil society organizations (CSOs)	Operational level of the national entity	No entity, but presidential committee is in effect to recommend overall strategy		Fully operational national entity	✓	✓		16.6	No additional cost	MoE	SMoUD, MoPP&L, WMAWP, NSWMSC, CEA
	Operational level of stakeholder mobilization mechanism			Fully operational stakeholder mobilization mechanism	✓	✓					
1.2 Develop and implement operational roadmap for Integrated Sustainable Waste Management considering the local circumstances, in consultation with all stakeholders, with particular emphasis on effective communication of information and advocacy at all governance levels and sectors	The roadmap	-		Operational roadmap	✓	✓		11.6 12.3 to 12.5	6.1	MoE	All the ministries listed in National Waste Management Policy, CEA, WMAWP, NSWMSC
	No. of meetings of the national entity held/yr	-		4	✓	✓	✓				
	No. of stakeholder consultation meetings held/yr	-		2	✓	✓	✓				
	No. of expert committee meetings held /yr	-		4	✓	✓	✓				
	No. of campaigns for information dissemination and advocacy	-		2	✓	✓	✓				
1.3 Establish and operationalize a sound information management system (IMS), with the engagement of all PCs and LAs and sectors for waste related data and indicators, with a data tier system based on importance and availability of data	No. of PCs covered	1 (WP - JICA Project)		9	4	6	9	16.10	53.2	MoE	ICTA, SMoUD, MoPP&L, WMAWP, NSWMSC, CEA
	No. of comprehensive surveys conducted/yr	-		1	✓	✓	✓	17.18			
1.4 Establish and implement monitoring, reporting and verification (MRV) schemes covering all sectors and waste streams, to ensure compliance with standards and regulations, while generating different strata of data to diagnose the ground realities	Level of operation of the MRV system	Yet to be established		Fully operational MRV system				2.4; 3.9; 12.2	66.6	CEA	SMoUD; MoE, MoInd, PCs, Chambers, WMAWP, NSWMSC
	No. of surveys conducted/yr			3	✓	✓	✓				
1.5 Develop and implement capacity building programmes on data management for effective and sustainable operations of the IMS and MRV schemes for all stakeholder institutions at all levels of governance	No. of capacity building campaigns conducted/yr	-		2	✓	✓	✓	16.6	105.0	MoE	ICTA, SMoUD, MoPP&L, CEA, WMAWP, NSWMSC

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
1.6 Promote dissemination of information covering both formal regular communications including advocacy and informal/non-formal communications for knowledge management, with an interactive platform for information sharing among interested parties	Communication strategy and roadmap	No strategy or Roadmap		Approved strategy and roadmap				16.6 16.10	305.0	MoE	CEA, NSWMSC, WMAWP
	No. regular communication campaigns conducted/yr	-		2	✓	✓	✓				
1.7 Develop and pilot a holistic waste management (HWM) plan for local governments covering all waste streams, including domestic hazardous waste with the emphasis on localization and ground level implementation	The plan	-		Adopted plan	´			3.9; 6.3; 11.6; 12.3 to 12.5	127.0	MoPP&L	CEA, WMAWP, NSWMSC, PCs. LAs
	Total no. of pilot projects conducted	-		5	2	5					
Strategy 2: Effect maximum conservation of resources in waste management through prevention and reduction.											
2.1 Formulate and operationalize a comprehensive behaviour change communication (BCC) strategy, together with a programme of actions for awareness creation across different strata of the society and other stakeholders to effectuate waste prevention and reduction, particularly through promoting sustainable, resource efficient lifestyles	No. communication campaigns held/yr	-		2	✓	✓	✓	11.6; 12.3; 12.5	205.0	MoE	SMoUD, CEA, WMAWP, NSWMSC, MoMM, PCs, LAs
	% reduction in the waste generation rate with respect to business as usual case	-		10%	2.5%	10%	10%				
2.2 Develop and implement a comprehensive education strategy, together with a programme of actions for knowledge management across all levels of formal education incorporating necessary curriculum changes (with particular emphasis on early childhood education)	No. of education campaigns held/yr	-		2	✓	✓	✓	11.6; 12.3; 12.5	110.0	MoEd	SMoWCP&P, MoE, CEA, MoH, NIE, SMoSVR&I; TVEC, Uni
	No. of ToT programmes conducted/yr	-		2	✓	✓	✓				
2.3 Conduct communication campaigns, with particular emphasis on social responsibility, ethical behaviour, human rights and respect to laws, for mainstreaming prevention and reduction of waste (link, but further, to Activity 2.1 above), with the use of effective communication tools for different target groups including effective use of social media / ICT	No. of media campaigns conducted/yr	-		2	✓	✓	✓	11.6; 12.3; 12.5	100.0 (Programme) + 1,000 (Implantation)	MoE	SMoUD, CEA, WMAWP, MoH NSWMSC, MoMM, ICTA, PCs, LAs, SMoSVR&I
	% no. of target groups focused in media campaigns	-		100%	50%	75%	100%				
	Minimum no. of social media platforms used	-		4	2	4	4				
2.4 Strengthen the regulatory framework effectively to guide society towards more sustainable, resource-efficient lifestyles (sustainable consumption) and to drive industries towards cleaner production (sustainable production) (link, but further, to Activity 2.1 above)	No. of regulations gazetted	8		15	10	15 (cumulative)	15 (cumulative)	11.6; 12.3; 12.5	-	CEA	MoE, MoInd, CCC
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓		40.0		
2.5 Introduce economic instruments to promote sustainable consumption and production, such as 'Polluter Pays Principle (PPP)', 'User Pays Principle (UPP)' and 'Precautionary Principle' (Link to Activity 3.4)	No. of economic instruments introduced	-		3	1	2	3	11.6; 12.3; 12.5	-	CEA	MoE, MoInd, CCC
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓		40.0		

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
2.6 Facilitate the introduction of alternative products and regulatory options that guide less use and generation of waste materials.	Minimum no. of alternatives identified	-		5	2	4 (cumulative)	5 (cumulative)	11.6; 12.3; 12.5	105.0	SMoSVR&I	MoE, MoInd, CCC, CEA, Univ
	% no. of alternatives introduced; Awareness campaigns conducted/yr	- -		100% 2	40% ✓	80% ✓	100% ✓				
2.7 Implement Road Map and National Action Plan on Prevention and Reduction of Food Waste (Link and further to Activities 2.1 to 2.4 above)	National Steering Committee for Food Waste Management appointed	-		Functional National Steering Committee	✓			11.6;12.3; 12.5	90.0	MoE	SMoUD, MoH, CEA, WMAWP, NSWMSC, MoMM, ICTA PCs, LAs, Uni
	No. of National Steering Committee meetings conducted/yr	-		4	✓	✓	✓				
	A digital food waste database established	-		Operational Food waste data -base	✓						
	No. of updates of the food waste database /yr	-		4	✓	✓	✓				
	No. of ToT programmes on food waste management developed for different target groups/themes	-		6	✓						
	No. of ToT programmes conducted/yr;	-		3	✓	✓	✓				
	Multi-actor training workshop on innovative business opportunities conducted/yr	-		1	✓	✓	✓				
	Multi-stakeholder dialogue conducted/yr	-		1	✓	✓	✓				
	Fund allocation for joint research projects conducted (M LKR/yr)	-		5	2	4	5				
	Communication, awareness and media campaigns conducted/yr	-		2	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
Strategy 3: Ensure sustainable management of plastics and other recyclables.											
3.1 Implement National Action Plan on Plastic Waste Management 2021-2030	National Steering Committee for Plastic Waste Management appointed	-		Functional National Steering Committee	✓			11.6;12.3; 12.5	20	MoE	MoInd, SMoUD, MoH, CEA, WMAWP, NSWMSC, PCs, LAs
	No. of National Steering Committee meetings conducted/yr	-		4	✓	✓	✓				
	National coordination mechanism for efficient use of funds and effective monitoring of activities related to plastics and plastic waste established	-		Operational coordination mechanism;	✓						
	System for tracking and monitoring of plastic flows into and within the country designed and operationalized	-		Adopted plastic flow tracking & monitoring system	✓						
	No. of updates of the tracking and monitoring system/yr	-		12	6	12	12				
	Plastic material flow inventory database established	-		Completed data-base on plastic material flow	✓						
	No. of updates of the inventory database system/yr	-		12	*6*	12	12				
3.2 Develop and implement nation-wide awareness programmes and media campaigns to motivate and facilitate segregation and recycling of plastics and other waste (link, but further, to Activity 3.1 above)	No. of segregation bins introduced							11.6;12.3; 12.5	140	NSWMSC	MoE, SMoUD, CEA, WMAWP, PCs, LAs
	(i) WP & MCs	2		3	✓	✓	✓				
	(ii) UCs/PSs	1		3	2	2	3				
	% no. of LAs using 3 bins	-		100%	40%	70%	100%				
	No. of media campaigns conducted/yr	-		2	✓	✓	✓				
	No. of capacity building campaigns conducted/yr	-		2	✓	✓	✓				
3.3 Enhance the resources (human, technical and financial)/ land resources and infrastructure of local governments for plastic management (link, but further to Activity 3.1 above)	Collection as a percentage generation							11.6;12.3; 12.5	15,000. (Collection) + 13,000 (Transport)	PCs & LAs	MoE, SMoUD, CEA, WMAWP, RDA, SLP, MoH, MoF, MoLands
	(i) WP	60%		75%							
	(ii) OPs;	25%		50%							
	Total amount collected (1,000 t)	16,750		20,500							
	% LAs complied	-		100%							
3.4 Manage recycling and up-cycling of plastics through regulatory interventions (enforcement of more stringent regulation and control mechanisms) (link, but further to Activity 3.1 above)	Recycling of plastics by LAs as a % total non-biodegradable collection							11.6; 12.3; 12.5	20	PCs & LAs	MoE, SMoUD, CEA, WMAWP, RDA, SLP, MoH, MoF, MoLands
	(i) WP	9%		24%	12%	15%	24%				
	(ii) OPs	7.5%		15%	10%	12%	15%				
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
3.5 Promote recycling and up-cycling of other recyclable components of waste categories (such as glass, metal, paper) through regulatory and other interventions	Minimum no. of other materials categories recycled	-		3	✓	✓	✓	11.6; 12.3; 12.5	10	PCs & LAs	MoE, SMoUD, CEA, WMAWP, RDA, SLP, MoH, MoF, MoLands
	No. of awareness campaigns conducted/yr	-		1	✓	✓	✓				
3.6 Introduce, facilitate and regularize/mandate of Extended Producer Responsibility (EPR) as an effective instrument to meet concepts such as 'Polluter Pays Principle (PPP)', 'User Pays Principle (UPP)' and 'Precautionary Principle'. (Link to Activity 2.5. and Activity 3.1 above)	Regularization of EPR	-		Mandated EPR					10.2	MoE	CEA, MoInd, CCC
	No. of awareness programmes conducted /yr	-		4	✓	✓	✓				
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
3.7 Promote and facilitate control of environmental pollutions in other solid waste streams (e.g. packaging waste, construction and demolition waste, marine waste, food, agriculture and livestock waste, slaughterhouse waste) (link to Activity 8.8)	No. of awareness programmes conducted /yr	-		4	✓	✓	✓	11.6; 12.3; 12.5	10.2	SMoSVR&I	MoE, MoInd, CEA, NERD, SLINTEC, Uni, CIDA
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
Strategy 4: Manage the biodegradable waste component through biological treatments.											
4.1 Promote composting at local governments, institutions and households, as a priority treatment for the management of biodegradable wastes, with particular emphasis on integrating with value-added composting, agro-ecological farming schemes through (i) introduction of regulations, guidelines and procedures, GMP (ii) certifications (SLS), (iii) technology assessment on composting, (iv) effective business models and (v) decentralized systems for optimum utilization	No. of awareness campaigns conducted/yr Amount composted as a % of total biodegradable collected	-		2	✓	✓	✓	2.3; 2.4: 12.4	20 (Awareness/ Training) + 6,750 (Investment for Composting)	SMoPSF&RCI	NFS, DoA, Fertilizer Secretariat, CEA, WMAWP, NSWMSC
	(i) WP	15%		30%	18%	23%	30%				
	(ii) OPs	3%		30%	6%	18%	30%				
	Total amount composted (1,000 t)	145/yr		4,150 in 10 yr	450 during 2 yr	850 during 3 yr	2,850 during 5 yr				
4.2 Introduce suitable treatment and disposal facilities for liquid waste, sewage, and night soil, incorporating appropriate commercial technologies including central / networked facilities	% treatment of liquid waste treated in centralized facilities	2.1%		6.6%	3.0%	5.0%	6.6%	6.3; 6.a	94	NWSDB	CEA, MoInd, BoI, NSWMSC, PCs, LAs, private sector
	Amount of wastewater treated (1,000 m^3) in centralized facilities	460		930	550	750	930				
4.3 Promote proper treatment and disposal of industrial wastewater in Board of Investment (BOI) zones, in non-BOI industrial parks and standalone industries (link to Theme 9: Greening of Industries)	No. of awareness programmes conducted/yr	-		4	✓	✓	✓	6.3; 6.a	10.2	NWSDB	CEA, MoInd, BoI, NSWMSC, PCs, LAs, private sector
	No. of training programmes conducted/yr	-		2	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
4.4 Promote and introduce biogas technology for the management and treatment of biodegradable waste, particularly where compositing is not practical, with an emphasis of harnessing triple benefits	No. of awareness programmes/yr	-		4	✓	✓	✓	7.2; 7.4	10.2 (Awareness/ training) + 2,500 (Investment for 10 m^3) + 80 (Investment for 200 m^3)	SLSEA	CEA, MoInd, BoI, UDA, WMAWP, NSWMSC
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
	No. of biogas units: (i) Domestic/ institutional (10 m^3)	10,000		15,000	11,500	12,500	15,000				
	(ii) LAs (200 m^3)	1 (Kaduwela MC)		5	2	3	5				
4.5 Explore the option of anaerobic digestion for production of biogas (methane) for (i) transport applications, and (ii) integrated to proposed Natural Gas in the energy sector	No. of feasibility reports	-		2	-	✓	-	7.2; 7.4	4.0	SLSEA	MoE, CEA, CEB, Uni
4.6 Promote and facilitate control of environmental pollutions in other liquid waste	No. of awareness programmes conducted /yr	-		4	✓	✓	✓	11.6; 12.3; 12.5	10.2	SMoSVR&I	MoE, MoInd, NWSDB, CEA, NERD, SLINTEC, Uni
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
Strategy 5: Exploit treatment with an energy recovery option for management of non-recyclable and non-usable waste.											
5.1 Establish a technology compendium in characterizing waste treatment technologies with energy recovery options to appraise the role of energy recovery, under local circumstances within HWM framework	No. of technologies characterized	-		5	✓	-	-	7,2; 7.a; 11.6; 12.5	4	SLSEA	CEA
5.2 Ensure proper operation and optimum utilization of the WtE plant already commissioned through monitoring and regulatory compliance. (Link to Theme 1 Activity 3.2.)	No. of performance audits conducted/ yr	No. regular audits		02	✓	✓	✓	7,2; 7.a; 11.6; 12.5	No additional cost	CMC	CEA, SLSEA, WMAWP
5.3 Ensure the other committed WtE and incineration plant/s complies with regulatory requirements during installation, commissioning, and operation, while embracing environmental best practices and best available technologies for pollution control (link to Theme 1 Activity 3.2)	List of regulatory requirements	Regulatory requirements of the commissioned plant		Enhanced regulatory requirements adopted		✓		7,2; 7.a; 11.6; 12.5	No additional cost (Karadiyana Plant Investment: 11,500)	CEA	SLSEA, WMAWP
	% of regulatory compliance	-		100%	-	100%					
5.4 Ensure the safe disposal of residues generated in WtE plants	% of residues generated in WtE plants disposed in sanitary landfill sites	-		100%	100%	100%	100%	7.2; 7.a; 11.6; 12.5	200 (1000 conversion of one cell in Aruwakkalu site)	SMoUD	CEA, WMAWP

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
Strategy 6: Manage final disposal sites.											
6.1 Characterize the performance of present SWDS/waste disposal sites and, in line with the Guideline for Safe Closure of MSW dumpsite in SL, and develop a plan/ roadmap for sustainable management	% of sites characterized	Guideline		100%	100%	-	-	6.3; 11.6; 12.3; 12.4	5	SMoUD	UDA, MoE, CEA
6.2 Rehabilitate existing SWDS, with proper monitoring mechanisms and safe closure of high-risk sites	% no. of sites rehabilitated:							6.3; 11.6; 12.3	1,700	SMoUD	CEA, UDA, WMAWP, NSWMSC
	(i) Large-scale	-		100%	20%	50%	100%				
	(ii) Small-scale	-		100%	5%	40%	100%				
6.3 Promote sanitary landfilling, while improving the performance of existing sites with optimum supply chain utilization, methane recovery and clustering of LAs	No. of sanitary landfills	05 Planned for 04 sites		10	06	10	10	6.3; 11.6; 12.3	300	SMoUD	CEA, UDA, WMAWP, NSWMSC
	% of LAs catered	-		100%	40%	100%	100%				
6.4 Support establishment of MSW Transfer stations (feasibility / implementation)	No. of transfer stations: Large-scale (WP)and medium-scale (UDA/OPs)	1		4	2	4	4	6.3; 11.6; 12.3	-	SMoUD	CEA, UDA, WMAWP, NSWMSC
6.5 Enforce the relevant regulations to prevent open burning in SWDS through sound technological and operational procedures (link to Activity 5.2)	% amount burned (as a Percentage dumped)							6.3; 11.6;12.3	No additional cost	CEA	SMoUD, UDA, WMAWP, NSWMSC
	(i) WP	10%		0%	08%	05%	0%				
	(ii) OPs	20%		0%	16%	10%	0%				
6.6 Monitoring of the environment performance of SWDS, particularly air pollution (Dioxine/Furan/NOx/SOx) (link to Theme 1 AQM)	No. of field audits/yr	-		3	✓	✓	✓	6.3; 11.6;12.3	No additional cost	CEA	SMoUD, UDA, PCs, LAs, WMAWP, NSWMSC
6.7 Facilitate LAs to minimize open dumping through identification of lands for proper disposal and awareness/training	% of open dumps remaining	A few (controlled dump site)		~100%	70%	30%	0%	6.3; 11.6;12.3	9	SMoUD	CEA, UDA, WMAWP, NSWMSC
6.8 Ensure no open dumping in LAs through enforcement (link to Activity 5.5)	% of open dumps remaining	99%		0%	70%	0%	0%	6.3; 11.6;12.3	No additional cost	CEA	SMoUD, UDA, WMAWP, NSWMSC
6.9 Promote prevention of open dumping and open burning of waste by individual generators through awareness and regulatory interventions	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓	6.3; 11.6;12.3	100	CEA	SMoUD, WMAWP, NSWMSC, MoInd, LAs
Strategy 7: Manage hazardous waste.											
7.1 Update and maintain the national hazardous waste profile on regular basis including data Quality Assurance & Quality Control with waste audits for MRV (link to Activities 1.2 and 1.3)	Database	1st generation inventory (2017)		Updated profiles			x	6.3; 11.6;12.4	90.2	CEA	MoE, MoH, MoInd
	No. of updates performed			At least 1	1in 2 yr	1in 3 yr	2 in 5 yr				
7.2 Further enhance and update characterization of waste treatment technologies for hazardous waste streams together with the development of best practice guidelines (e.g. HCWM Metamizer - residue)	No. of updates performed / yr	-		At least 1	✓	✓	✓	6.3; 11.6; 12.4	20	CEA	MoE, MoH, MoInd
	% of waste streams covered	-		100%	20%	50%	100%				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
7.3 Strengthen regulatory compliance monitoring and inspection of waste treatment plants/facilities, facilitated by tracking devices/sensor networks for online/real-time monitoring, where necessary (link to Theme – Greening Industries)	No. of audits conducted/yr	-		4	1	4	4	6.3; 11.6; 12.4	60	CEA	MoE, MoH, MoInd
	% of main treatment plants covered	-		100%	30%	100%	100%				
7.4 Strengthen the legislative environment for hazardous waste management, with particular emphasis to effect buy back of used products, including e-waste (particularly through EPR scheme)	Legislative level of EPR for hazardous waste streams	Study report		Mandated EPR for all waste streams;				6.3; 11.6;12.4	No additional cost	CEA	MoE, MoH, MoInd
	Schedule viii list updates	Draft		Approved list							
7.5 Develop and conduct a comprehensive knowledge dissemination capacity building/training programmes for the sector stakeholders on hazardous wastes and their management	No. of training campaigns conducted/yr	-		4	✓	✓	✓	6.3; 11.6;12.4	202	CEA	MoE, MoH, MoInd
7.6 Facilitate to apply principles of holistic waste management (HWM) including liquid treatment, thermal, landfill, to selected facilities in hazardous waste sectors/streams (covering procedural /management systems/guideline/best practices/condemning process)	No. of pilot projects conducted/ Facilities covered	-		5	1	3	5	6.3; 11.6; 12.4	25	CEA	MoE, MoH, MoInd
7.7 Introduce Integrated Hazardous Waste management Plan	The Integrated Plan	-		Approved Plan				11.6 12.3 to 12.5	0.4	CEA	MoE, MoInd, MoH, BoI
	No. of expert committee meetings held	-		8	✓						
	No. of stakeholder consultations conducted	-		4	✓						
7.8 Promote and facilitate management of radio-active waste through awareness, training and regulatory interventions	No. of awareness and training campaigns conducted/yr	-		2	✓	✓	✓	6.3; 11.6; 12.4	24	SLAEB	MoE, MoH, MoInd, CEA
7.9 Promote sustainable management of e-waste (particularly though implementation of National Plan)	No. of awareness and training campaigns conducted/yr	-		2	✓	✓	✓	6.3; 11.6; 12.4	24	CEA	MoE, MoH, MoInd
7.10 Promote sustainable management of other hazardous waste categories (eg.: mercury, hazardous liquid waste)	No. of awareness and training campaigns conducted/yr	-		1	✓	✓	✓	6.3; 11.6; 12.4	14	CEA	MoE, MoH, MoInd
Strategy 8: Foster innovation, research and development to support holistic waste management.											
8.1 Establish a research agenda for holistic waste management covering all waste streams and sectors	Development of the research agenda	-		Research Agenda				3.9; 9.5; 9.b	3	SMoSVR&I	MoE, CEA, NERD, SLINTEC, Uni
8.2 Formulate and prioritize research themes and topics to address the needs, challenges and gaps identified in each major waste stream/ sector, with annual updates	No. of updates performed/yr	-		At least 1	✓	✓	✓	3.9; 9.5; 9.b	4	SMoSVR&I	MoE, CEA, NERD, SLINTEC, Uni
8.3 Communicate the research agenda and prioritized themes/topics to universities, R&D institutes and waste management authorities	No. of communication conducted/yr	-		At least 1	✓	✓	✓	3.9; 9.5; 9.b	2.5	SMoSVR&I	MoE, CEA, NERD, SLINTEC, Uni
8.4 Establish a sustainable funding scheme for research and development in waste management and support research studies	No. of research funded conducted/yr	-		At least 2	✓	✓	✓	3.9; 4.b; 9.5; 9.b	75	SMoSVR&I	MoE, NSF, NRC, NERD, Uni

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					S 1-2	M 2–5	L 5-10			Lead agency	Other Key Agencies
8.5 Assess waste sector impacts (health, environmental, social and economic)	No. of impact assessments	-		8	2	4	8	3.9; 4.b; 9.5; 9.b	40	MoE	CEA; MoH; Uni
8.6 Establish and update online repository to collect and communicate waste related research studies (link to Activity 1.3)	No. of updates performed/yr	-		4	✓	✓	✓	3.9; 4.b; 9.5; 9.b	5	MoE	Uni, NSF, NRC, SLAAS, CEA
8.7 Promote innovations and creativity in waste management, with particular emphasis on solutions originated locally, while promoting related social enterprises, citizen science and community-based initiatives	No. of programmes conducted/yr	-		4	✓	✓	✓	3.9; 4.b; 9.5; 9.b	10	SLIC	MoE, CEA, NERD, Uni
8.8 Pilot waste management solutions to specific and emerging waste streams and sub-sectors (e.g. construction and demolition, food, marine, packaging, agricultural, slaughterhouse, e-waste)	Total no. of pilot projects conducted	-		5	1	3	5	3.9; 4.b; 9.5; 9.b	75	CEA	MoE, NERD, Uni
8.9 Introduce product certification on environment performance (product and packaging)	The certification procedures;	-		Approved certification procedures				11.6 12.3 to 12.5	0.4	MoE	CEA, SLSI, MoInd, MoH, BOI
	No. of expert committee meetings held	-		8	✓						
	No. of stakeholder consultations conducted	-		4	✓						
Strategy 9: Enhance global participation and collaboration for furthering holistic waste management.											
9.1 Strengthen implementation of International Conventions on Chemicals and Waste management and Facilitate the implementation of national obligation (e.g. the Basel Convention, the Stockholm Convention, the Rotterdam Convention and the Minamata Convention)	Total no. of conventions complied with	4		7	5	6	7	17.16	No additional cost	MoE	CEA, MEPA
9.2 Strengthen or establish formal partnership with international institutions (e.g. UNEP, UNIDO, GEF, UNDP, FAO, JICA, KOIKA, USAID Global Partnership on Waste Management-GPWM)	Total no. of partnerships established and/or strengthened	0		3	1	2	3	17.16	No additional cost	MoE	MoF, ERD, CEA, MEPA, Uni
9.3 Participate in regional and international initiatives/ projects (e.g. UNEP, FAO, UNDP, Global Methane Initiative, SACEP)	Total no. of projects/ programmes conducted	-		4	1	2	4	17.16	No additional cost	MoE	MoF, ERD, CEA, MEPA, Uni
9.4 Establish and maintain a central platform to record, coordinate (particularly donors) and follow-up the waste management programmes and projects implemented in the country by different agencies, with the observation of high-level national entity to ensure transparency and accountability (link to Activities 1.1 and 1.3)	No. of updates performed/yr	-		4	2	4	4	11.3	5	MoE	ERD, MoF, NSWMSC; CEA, MEPA, SMoUD, MoPP&L, NGOs, private sector

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THEME 7
INTEGRATED WATER RESOURCES MANAGEMENT

In Sri Lanka, the per capita water availability is about 2,500 m^3, well above the 1,700 m^3, which is the threshold of defining water stress. However, the spatial and temporal variability of rainfall has created an overall scarcity of water in the dry zone, where per capita water availability is only about 1,200 m^3. Except in few river basins, storage reservoirs with varying capacities and diversion schemes have been constructed over two millennia to address this issue of water scarcity in the dry zone. It is reported that there are nearly 30,000 reservoirs and tanks with a combined storage volume of 8.76 km^3 in the country, principally for the supply of irrigation water. The vast majority (98%) are classified as minor tanks with a combined storage volume of 1.4 km^3. There are 517 major and medium reservoirs with a storage volume of 7.3 km^3, of which 129 are classified as large dams with 7.2 km^3 of storage (ADB, 2014b).

2.7.1 Overview

Water is an essential component of the environment, which helps to sustain all forms of lives in the planet, including humans. This resource is considered finite and hence, the pressure on this resource is increasing, especially with the population growth, changes in lifestyles, increase industrialization and many other anthropogenic activities. The tendency is to divert water essential to sustain the environment to meet these additional demands. As a consequence, the environment will be severely and irreversibly affected unless measures urgent (discussed later in this section) are taken to contain these existing problems, and the limited water resources in the country are managed in a planned and scientific manner.

Annually, Sri Lanka receives about 112.3 km^3 of rainfall. The total annual surface water resources are approximately 52 km^3, of which 56% and 44% occur within the Maha[53] and Yala[54] seasons, respectively. The total annual groundwater is estimated to be in the order of 7.8 km^3 (Gunatilaka, 2008). About 3,540 water springs are spread all over the island and are used as water sources.

In Sri Lanka, the per capita water availability is about 2,500 m^3, well above the 1,700 m^3 which is the threshold of defining water stress. However, the spatial and temporal variability of rainfall has created an overall scarcity of water in the dry zone, where per capita water availability is only about 1,200 m^3. Except in few river basins, storage reservoirs with varying capacities and diversion schemes have been constructed over two millennia to address this issue of water scarcity in the dry zone. It is reported that there are nearly 30,000 reservoirs and tanks with a combined storage volume of 8.76 km^3 in the country, principally for the supply of irrigation water. The vast majority (98%) are classified as minor tanks with a combined storage volume of 1.4 km^3. There are 517 major and medium reservoirs with a storage volume of 7.3 km^3, of which 129 are classified as large dams with 7.2 km^3 of storage (ADB, 2014b).

There are about 49,070 irrigation systems with a combined irrigated area of 801,916 ha (Witharana, 2020). The major and medium systems are those defined as (i) irrigated areas of greater than 400 ha and (ii) 80 to 400 ha, respectively, which constitute only 2% of the schemes, but cover 58% of the total irrigated area. The minor schemes are those schemes of less than 80 ha (98% of schemes) and 42% of the total irrigated area. The cascade system created by the interconnection of minor tanks is an important feature in the development pattern of water resources of the dry zone. The network of village tanks played an important role in supporting many critical livelihood functions in the village life, including the supply of water needs of humans and livestock, sustenance of home gardens, food and recreation.

Until recently, hydropower was a major contributor to energy production, producing about 50% of the annual national requirements. There are 16 hydropower stations with a combined average annual power production potential of about 1,207 MW (CEB, 2020). In addition, there are also 85 small hydropower stations operated under Public Private Partnership (PPP) arrangement with an installed capacity of 175 MW. As most of the hydropower potential has been developed, future generation capacity will come from an expansion of other energy sources.

The total annual withdrawals for consumptive use are approximately 13 km^3, of which 88% is for agriculture and 6% each for municipal and industrial use. Demand is predicted to increase further with population growth, change of lifestyles and growth of industry.

Currently, Sri Lanka produces only a limited amount of its food requirement. However, the policy objective of the government is to achieve food security and become self-sufficient as early as possible. To meet this

53 During the northeast monsoon

54 During the southwest monsoon

objective, additional water resources are needed, translating into more reservoir and dam capacity to meet irrigation needs. This requires rehabilitation, including improvements and modernizations, and construction of reservoirs and dams, water diversions (intra and inter-basin transfer) to water scarce areas to meet the water use efficiency targets. Currently, these targets remain very low (ADB, 2014).

The growth in the domestic water supply sector is driven by the policy of the government to provide safe drinking water to all by 2025. This is to be achieved by increasing pipe water coverage from 51% to 79% and the balance 21% by the community water supply schemes (NWSDB, 2020). This is a difficult target to achieve, unless opportunities are provided to the private sector as well. As in the irrigated sector, the wastage of water is fairly high. Currently, the island wide Non-Revenue Water stands at 30%, with 49% in Colombo.

As Sri Lanka continues to record impressive Gross Domestic Product growth, the demand for water by the industrial sector is also set to increase. Consequently, pressure on water is imminent and may place bigger demands on the business sector. In view of higher tariff levied to industrial sector, water conservation and sustainability measures have already been introduced and more decisions are being taken to conserve water by setting up their own treatment and recycling plants. However, industries resort to the abstraction of groundwater without payment, because there are no policy or guidelines for such abstraction.

2.7.2 Current Status

A fragmented approach to water resource management is being quoted as one of the reasons for the issues in the water sector in Sri Lanka because there are more than 50 legislations and 20 institutions in relation to water resource conservation, development and management. Therefore, a need for a mechanism at the national level has been emphasized by many to coordinate activities of this fragmented approach.

Apart from the main problem about the unavailability of an overall institutional arrangement, there have been many other issues which threaten the availability of water resources in the country. Water resources are being polluted from urban, industrial and agricultural wastes. In addition to agricultural pollution, discharge of sewage and domestic waste to water bodies and industrial pollution are increasing. Faecal contamination of water supply systems is evident in water intakes in many parts of the country. Chronic kidney disease reported in the dry zone was attributed to the contamination of water, though a conclusive causative agent has yet to be identified.

Groundwater quality is variable among aquifers and locations. It is estimated that about 40% of tube wells constructed during the 20th century have been abandoned because of high levels of iron and manganese, and on the Jaffna peninsula, because of nitrate levels of more than 200 mg/l. High concentrations (more than 3 ppm) of fluorides are also reported in the eastern and north central dry zone. Overexploitation of aquifers near coastal areas such as Puttalam, Mannar, Paranthan, Kilinochichi and Mullaitivu has resulted in seawater intrusion and salinization of water supplies.

River sand mining is another severe environmental problem, which has a serious impact on river erosion and groundwater availability, because it destroys riverbeds and increases the depth of rivers. Further, it facilitates sea water intrusion and affects water supply intakes.

The ability of the natural environment to provide good quality water with adequate quantities has been further disrupted by removal of natural vegetation in the headwaters and reservations of streams and filling up of wetlands. The impact of soil erosion on water resources as a result of poor land management has been a problem during the last 150 years. However, its intensity has been increased because of encroachments[55] into stream and reservoir reservations and illegal sand and gem mining. Nutrient enriched sediments derived from soil erosion transported with the runoff, leads to eutrophication of water bodies. Worsening the existing problems, climate change has increased extreme weather events leading to more frequent floods and

55 Eutrophication is a process of nutrient over-enrichment of water, where excess nutrients result in rapid growth and increase of phytoplankton and macro-algae in the water.

droughts. Recently, severe floods have been recorded in 2003, 2006, 2008, 2010 and 2012, 2014, 2016 and 2019. Floods have the single greatest impact on people among the natural disasters, accounting for 46% of affected persons from 1974 to 2012 (JICA, 2013). (Notably drought is second most damaging, accounting for 42% of affected persons.)

Another major trend is the projected increasing demand for irrigated agriculture. The area planted with paddy has increased from 800,000 to 900,000 ha during the period 2005-2007, to more than 1 M ha after 2010, and is expected to increase in the future. It was reported that the area under cultivation of other food crops needs to be doubled in 2020 from the 2009 level (from around 110 thousand ha in 2009 to over 200 thousand ha in 2020) and to be increased by more than three-fold by 2030 from the 2009 level (Ministry of Agriculture Development and Agrarian Services, 2011).

As indicated above, the water demand for domestic and industrial sectors is also expected to increase with time. This requires an integrated planning in the water sector, with high investment.

2.7.3 Policy and Legal Framework

The process of Integrated Water Resources Management (IWRM) is identified and accepted globally as the way forward to address complex issues associated with water resources development and management (Gunawadena, 2012). IWRM is defined as a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems. Realizing the importance of water for people and the environment, the United Nations (UN) has identified Goal 6 - “Clean Water and Sanitation” - as one of 17 Sustainable Development Goals (SDGs) for 2030. Sri Lanka, as a signatory to the SDGs, has to comply with SDG goal 6 to:

6.1 achieve universal and equitable access to safe and affordable drinking water for all;

6.2 achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations;

6.3 improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally;

6.4 substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity;

6.5 implement integrated water resources management at all levels;

6.6 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes;

6.6.a. expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies; and

6.6.b. support and strengthen the participation of local communities in improving water and sanitation management.

The government policy on water, as stated in the “Vistas of Prosperity and Splendour” aligns very closely with the SDG Goal 6. It has given the priority to provide all citizens of the country with access to clean drinking water within the next three years, by expanding and improving the efficiency of the current projects carried out by Sri Lanka Water Board and community water projects. Necessary actions to create an environment where rivers, lakes, and reservoirs/tanks are free from chemicals, pesticides, and other harmful chemicals are also identified. To achieve this, it is expected that there will be a campaign to educate people on the importance of keeping rivers, lakes and reservoir/tanks free from contamination and pollution.

"Vistas of Prosperity and Splendour", which outlines the current government policy, envisages minimizing of inequality and eliminating poverty, and improving people's health and lifestyle by several means, including addressing issues of climate change with due regard to safeguarding the environment. Considering the important role played by water resources to achieve these goals, and its limitations, there is a need for a Strategic Plan for Water Resources Development and Management, which will address current and future water demands, in an equitable and sustainable manner. Therefore, the Irrigation Department plays the major role in setting up the background to develop a Strategic Plan for Water Resources Development and Management in the country.

Because large sums of money are being spent annually on disaster relief such as flood and droughts, it is expected that a proactive approach is taken to manage these situations by developing a flood control mechanism, with prevention and forewarning systems, as well as water storage and pumping methods to dry areas through drainage and canals systems.

Therefore, it is logical to develop the water sector programme for the National Environmental Action Plan (NEAP) based on the directions given by the overall policy framework of the country (Vistas of Prosperity and Splendour) and the international obligations (SDGs), using the principles of IWRM.

The Roman-Dutch law, on which Sri Lankan law is based, considers that water resources belong to the nation as a whole and are available for common use by all citizens, but, in the public's interest, is controlled by the state. Accordingly, the Government is committed to carry out its obligations by means which: a) guarantees access to sufficient water for basic domestic needs; b) ensures that the requirements of the environment are met; c) accounts for the interconnected nature of the water cycle - a process on which the sustainability and renewability of the resource depends; d) makes provision for the transfer of water between catchments; and e) fulfils its commitment as custodian of the nation's water.

After the enactment of 13th amendment to the Constitution in 1987, the Provincial Councils were also vested with powers to manage water. In allocating water in the public interest, the national Government and Provincial Councils must consider the planning and development of water resources in a manner which ensures efficient, equitable and sustainable use of the resources.

In order to discharge the responsibilities of the state, several ordinances and legislations have been enacted since 1856 to establish various government institutions to develop and manage the water resources in the country in partnership of the public. Brief descriptions of relevant legislations are presented below from the oldest to the newest.

The Irrigation Ordinance (No: 32) of 1856 legalizes traditional irrigation practices and prescribes the condition for water extraction, especially for paddy cultivation by the Department of Irrigation and Agrarian Development Department. The State Lands Ordinance (No: 08, Part IX) in 1947 defines public and private water and specifies water uses where no permits are required. This Ordinance provides the legislation on regulation and control of public water and, streams through a system of permits. The Electricity Act No. 19 of 1950 empowers the Ceylon Electricity Board to install and use water for the electricity generation. The National Water Supply and Drainage Board (NWSDB) Act of 1974 established NWSDB to provide water supply for public, domestic and industrial purposes. According to the Article 21 of this Act, local authorities are identified as legitimate institutions which could provide water supply and sanitation services to the people. The Mahaweli Authority of Sri Lanka (MASL) Act No. 23 of 1979 empowered the MASL to use and develop the Mahaweli river or any river found in the areas where MASL exercises its authority. The National Environmental Act (NEA) No. 47 of 1980, specifically Article 23H of the National Environmental (Amendment) Act, No. 56 of 1988, provides details for the regulation and control of pollution of the inland waters. The Water Resources Board (WRB) Act No. 29 of 1964 and its amendment of 1999, mandated the WRB as the institution responsible to develop, control and manage the groundwater resources in the country. The Extraordinary Gazette No. 2010/23 of 2017/03/16 by the WRB is the regulation by which this is effected.

The National Watershed Management Policy of 2004 was formulated to conserve, protect, rehabilitate, sustainably use and manage the watersheds while maintaining their environmental characteristics with the involvement of people. The Disaster Management Act No. 13 of 2005 Provides the basis for the current disaster management approach, which covers floods and droughts. Flood control and protection is mandated to Irrigation Department through the Flood Protection Ordinance No. 4 of 1924.

Caring for Environment (2008 – 2012) by the MoE identified the vision for the water sector to have "access to clean and safe drinking water for all, and adequate water supply for agriculture, industry, wildlife and other livelihoods while maintaining the minimum environmental flow". The programme proposed actions to deal with issues faced by the water sector under 11 strategies.

The National Action Plan for Haritha Lanka Programme (HLP) 2009 to 2016 by the MoE, specifically mission 7, named "Water for All and Always" had eight strategies to address in the water sector, to be implemented from 2009 to 2016. Subsequent work carried out by the MoE on updating the HLP up to 2022 had four additional strategies covering minimizing saltwater intrusion, creation of awareness and capacity building, encouraging research and developing the water sector and enhancing the water availability by increasing storage capacity. Related to the policy on conservation of Water Sources and Water Spouts of 2014, the Government Extraordinary Gazette number 1894/3 of 2014/12/22 protects and conserves all the water sources, their reservations, the conservation areas and immediate catchment areas to ensure the existence of the water sources.

The National Water Use Master Plan of 2014 is a detailed proposal for water resources improvement, especially in the Mahaweli areas. The Proposed Water Resources Development Projects 2020 provides ongoing, as well as future, water resources development projects, including new reservoirs and diversions to assure water security of the nation.

The national programme "Surakimu Ganga" is the most recent programme launched by the Ministry of Environment to address the water pollution issues in all the rivers in the country. Detailed activities and institutional arrangements for implementation from national to local level have been identified.

Finally, the Nationally Determined Contributions (NDCs,) 2021 to 2030 by the MoE identifies ten (10) NDCs for the water sector. These NDCs are categorized under three themes, namely, integrated river basin management (1), domestic water supply sub sector (5) and irrigation management sub-sector (4).

2.7.4 Introduction to the Action Plan

This proposed action plan is formulated based on relevant reviews and the close interaction with stakeholders. There are two sets of activities identified in the action plan. As indicated in the plan, MoE or institutions coming under the MoE – such as the CEA and the Geological Survey and Mines Bureau (GSMB) – as lead agencies, can directly implement some activities with other collaborative agencies. The lead agencies for the rest of the actions in the plan are expected to be undertaken by other ministries or line agencies.

This categorization is considered to be very important in formulating detailed actions plans for the MoE/CEA/GSMB including costing, targets, timelines and responsible institutions/persons. The MoE has the overall control of the programme and hence, has the responsibility to secure required funds, implement activities and carry out regular monitoring to assess the progress.

The second set of activities could be included in the institutional activity plan of other institutions, where preparation of activities, fund allocation, implementation and monitoring are expected to be undertaken by each one of them. For example, the Ministry of Water Supply has already prepared a detailed corporate plan for 2021-2025. They will work towards achieving the 1st and 2nd strategies of the proposed action plan.

Therefore, it is proposed that a coordinating arrangement with the lead agencies is established as identified in the action plan, so that the progress could be reviewed at regular intervals. This helps the MoE to update the status of the environment in relation to the water sector, identify challenges and move forward with corrective actions.

2.7.5 Strategies for Management

Strategy 1. Ensure environmental safeguards in providing access to safe drinking water for a healthy nation.

Strategy 2. Provide safe sanitation and prevent contamination of surface and ground water bodies with sewage.

Strategy 3. Improve the water quality of rivers, lakes, reservoirs/tanks, ground water by reducing pollution.

Strategy 4. Promote watershed management for the sustainability of water resources.

Strategy 5. Increase water conservation and water use efficiency in all sectors.

Strategy 6. Improve irrigation system management for the conservation of water.

Strategy 7. Improve groundwater management.

Strategy 8. Minimize saltwater intrusion.

Strategy 9. Reduce water-induced disasters, such as floods and droughts.

Strategy 10. Assure water security of the nation.

Strategy 11. Implement IWRM at all levels.

Strategy 12. Introduce new policy and institutions for improved water resources planning and management.

Strategy 13. Promote awareness, capacity building and community mobilization.

Strategy 14. Strengthen water related research.

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2.7.6 Action Plan for Integrated Water Resources Management

Actions	Key Performance Indicators (KPIs)	Baseline	Target		Timeframe (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 1: Ensure environmental safeguards in providing access to safe drinking water for a healthy nation.											
1.1 Establish new water supply schemes to provide drinking water to households and industries, while considering environmental concerns	Coverage of population with pipe water connections	51%	79%		Continue to provide new connections	Complete the target by end of year 2025		6.1	990,000	NWSDB	SMoPC& LG
1.2 Expand new community water supply schemes while protecting the surrounding environment at water sources/intakes	Coverage of rural water supply schemes established/upgraded	10%	21%		Continue to provide new connections	Complete the target by end of year 2025		6.1		DCWS	NWSDB, SMoPC&LG, LUPPD
1.3 Establish an independent regulatory mechanism for drinking water quality assessment	Regulatory mechanism for drinking water quality assessment established	None	Regulatory mechanism established		Initiate discussion with NWSDB and relevant agencies	Establish the mechanism			15	MoH	CEA, SLSI, ITI, research institutes, NBRO
Strategy 2: Provide safe sanitation and prevent contamination of surface and ground water bodies with sewage.											
2.1 Improve off-site sanitation facilities to prevent contamination of water bodies	Coverage of populations served with improved off-site sanitation	1.5%	4.4%		Continue implementation	Continue implementation	Reach the assigned target	6.2	360,000	NWSDB	SMoPC&LG
2.2 Improve on-site sanitation facilities to prevent contamination of water bodies	Coverage of populations served with improved on-site sanitation	40%	95.6%		Continue implementation	Continue implementation	Reach the assigned target	6.2		NWSDB	SMoPC&LG
2.3 Carry out surveillance and take action against untreated sewage discharged into waterways and water bodies	No. of new interventions to prevent the discharge of sewage to water bodies	0	5000		No. of punitive actions, awareness programmes	No. of punitive actions, awareness programmes	No. of punitive actions, awareness programmes	6.2	200	MoH	SMoPC&LG, CEA, NWSDB, DCWS
Strategy 3: Improve the water quality of rivers, lakes, reservoirs/tanks and ground water by reducing pollution.											
3.1 Prepare an island wide surface water quality database by using available data and prepare a surface water pollution vulnerability zonation map	Surface water quality vulnerability map	None	Water quality vulnerability map developed		Compile available data and complete the map			6.3	10	CEA	NWSDB, MASL, DAD, ID
3.2 Prepare an island wide ground water quality data base by using available data and prepare a groundwater pollution vulnerability zonation map	Groundwater quality vulnerability map	None	Water quality vulnerability map developed		Compile available data and complete the map			6.3	10	WRB	NWSDB, DAD, CEA
3.3 Initiate action to coordinate with line agencies and local authorities to prevent the deterioration of water quality of streams rivers/reservoirs (Surakimu Ganga Programme)	No. of new activities conducted under the programme, progress reports	0	1,000		Entertain proposals from local authorities and initiate actions	Expand activities to cover the entire country	Continue activities	6.3	2,000	CEA	SMoPC&LG
3.4 Establish a water quality surveillance and monitoring programme of rivers, reservoirs etc. to assess the impact of water quality improvement programmes with required capacity development	No. of new water quality monitoring locations and laboratory facilities established	0	1,030		Expand the monitoring network of CEA and improve the laboratory facilities	Coordinate with other agencies to expand the coverage		6.3	500	CEA	NWSDB, ID, MASL

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Timeframe (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
3.5 Reduce household and industrial pollution through dumping waste to water bodies	% reduction of dumping sewerage/waste	10%	90%		Strict monitoring and punitive actions	Strict monitoring and punitive actions	Strict monitoring and punitive actions	6.3	100	SMoPC& LG	CEA
3.6 Promote central wastewater treatment plants for industrial zones and other agencies/ establishments	No. of new central wastewater treatment plants introduced	0	20		Identify and initiate actions	Monitor implementation	Monitor implementation	6.3	200	BoI, CEA	IDB, SMoPC&LG
3.7 Promote Good Agricultural Practices (GAP) certification programme and expand the marketing facilities for GAP products	No. of GAP sales outlets	25	5,000		Facilitate the establishment of more GAP sales centres	Continue facilitation	Continue facilitation	6.3	100	DoA	Private sector, PDoA
Strategy 4: Promote watershed management for the sustainability of water resources.											
4.1 Initiate watershed management programmes as given in the national watershed management policy	A mechanism for watershed management established	None	Mechanism established		Initiate discussion to determine the key institution to implement the policy	Strengthen the institution	Continue	6.6	10	MoE	MoIrri, ID, MASL, LUPPD, NRMC, CEA
4.2 Prepare a national database covering all watersheds and identify priority watersheds	National database	None	Database developed		Initiate database development process	Complete the database and identify priority watersheds		6.6	50	MoE	MoIrri, ID, MASL, LUPPD, NRMC
4.3 Prepare watershed plans for priority watersheds, with the participation of communities	No. of watershed management plans prepared	0	30		-	10	20	6.6	150	MoE	LUPPD, PDoA, MASL
4.4 Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, waterfalls, aquifers and lakes	Identify them in the plan and initiate programmes to protect them	0	80%		-	Include relevant activities in the watershed management plans	Continue	6.6	50	CEA	FD, DWC, WRB, ID, MASL, LUPPD
4.5 Establish and maintain stream/river/reservoir reservations with the coordination of relevant authorities	Maps of demarcated streams/ rivers reservoirs developed	0	30%		Initiate a programme to demarcate reservations	Continue	Continue	6.6	200	ID	SD, CEA, MASL, SMoPC&LG
4.6 Demarcate and protect headwaters of water supply schemes and water sprouts, especially with the participation of local communities	Maps of protected headwaters of water schemes developed	0	60%		Initiate actions to protect head waters with communities	Continue	Continue	6.6	50	LUPPD	MoPla, SMoPC&LG
Strategy 5: Increase water conservation and water use efficiency in all sectors.											
5.1 Facilitate the adoption of modern water application techniques for agriculture, such as drip and sprinkler irrigation etc., by introducing low-cost interest rate loans and tax relief	Low-cost interest rate loans and tax relief programmes developed No. of farmers who adopt new technology	None	10% of the OFC farmers to use improved application systems		Declare tax incentives. Promote use of micro-irrigation systems	Promote use of micro-irrigation systems	Continue	6.4	100	MoF	DoA, ID, MASL, DAD, PDoA
5.2 Introduce water saving/re-using, recycling technologies for water conservation	No. of new water saving/ recycling techniques used	0	250		10	70	170	6.4	50	ID	CEA, MoIrri, DAD, MASL
5.3 Promote harvesting of rain water and proper storage systems for households/rainfed farming	No. of new rainwater harvesting systems established	N/A	500		100	150	250	6.4	10	SMoPC& LG	LRWHF, PID, UDA

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Timeframe (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
5.4 Employ principles of demand management, such as tariff revision, to help increase treated water conservation in the drinking and industrial sectors	New programmes adopted for demand management Assessment of feasibility of introducing dual water supply schemes with drinking and non-drinking water supply	5%	30%		Use demand management instrument for water conservation Initiate a feasibility study to develop dual water supply scheme	Continue	Continue	6.4	20	NWSDB	WRB, ID, MASL
5.5 Introduce a permit system for bulk users (e.g., industries and commercial farms) to control water abstractions from both ground and surface water sources	Permit system is introduced	0	System is fully functional		Develop the permit system	Develop and use the permit system	Continue	6.4	20	MoIrri	WRB, ID, MASL
5.6 Carry out water usage audits for all large users such as industries, commercial farms etc	No. of new audits carried out	0	60% of large users covered		10%	20%	30%	6.4	20	NWSDB	ID, MASL, WRB
Strategy 6: Improve irrigation system management for the conservation of water.											
6.1 Rehabilitate irrigation infrastructure and introduce bulk water allocation	No. of irrigation systems practising bulk water allocation and use	N/A	75		5	20	50	6.4	10,000	MoIrri	ID, MASL, DAD, PID
6.2 Introduce new technological approaches such as laser levelling, land consolidation, wet and dry irrigation etc. to reduce water use	No. of new initiatives adopted.	0	10		2	3	5	6.4	10	ID	MASL, DoA, IMD, DAD
6.3 Introduce benchmarking of major and medium irrigation systems with the intention of improving the water efficiency	No. of irrigation schemes where benchmarking is introduced and practised	None	75		5	20	50	6.4	10	MoIrri	ID, MASL
Strategy 7: Improve groundwater management.											
7.1 Prepare guidelines for well construction and groundwater abstractions for industrial and commercial users	Guidelines developed	None	100%		Complete the preparation of guidelines			6.6	10	WRB	CEA
7.2 Monitor and control the abstraction of ground water use, especially by the industrial and commercial sector	Information of groundwater abstraction from industrial and commercial sector available	None	80%		10% of the industries covered	20%	50%	6.6	10	WRB	CEA
7.3 Assess the available groundwater resources, especially in groundwater dependent areas (north and north-western districts) and monitor abstractions	Information of safe yield; abstraction of monitoring system established	N/A	80%		Initiate assessment	Continue	Continue	6.6	100	WRB	CEA
7.4 Enhance groundwater recharge	No. of artificial recharge programmes introduced	N/A	50		5	15	30	6.6	100	WRB,	MoIrri, DoA, NWSDB
7.5 Develop regulatory measures to prevent groundwater contamination	Regulatory measures in place	20%	100%		Improve the existing regulations	Continue		6.6	50	CEA	WRB
7.6. Introduce groundwater remediation activities in highly polluted areas	No. of areas where successful remediation action taken place	0	50						50	WRB	CEA
7.7 Establish an island wide groundwater monitoring network, especially in coastal districts to monitor and prevent saltwater intrusion	No. of new monitoring networks established	0	600		100	200	300	6.6	100	WRB	

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Timeframe (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 8: Minimize saltwater intrusion.											
8.1 Identify vulnerable areas for saltwater intrusion	Vulnerable area of Saltwater intrusion developed	10%	100%		Identify vulnerable areas	Continue	Continue	6.3	10	WRB	NWSDB, CC&CRMD
8.2 Identify suitable sites for salinity barriers	No. of barriers identified	3	10		3	7			10	NWSDB	WRB, CC&CRMD
8.3 Establish salinity barriers	No. of barriers established	0	10		1	3	6		80	NWSDB	CC&CRMD
8.4 Rehabilitate/construct new saltwater extrusion structures for irrigation	No. of new structures rehabilitated and constructed	0	100%		Undertake feasibility studies	Implement rehabilitation activities	Continue		500	ID	CC&CRMD, PDoI
8.5 Identify priority sand dunes for conservation	Priority sand dunes identified	N/A	100%		Identify all the important sand dunes			6.6	10	CC&CRMD	MoE
8.6 Introduce programmes to conserve sand dunes	Initiate programmes to conserve sand dunes	0	100%		Initiate activities to conserve sand dunes	Continue	Continue		10	CC&CRMD	MoE
8.7 Reduce sand and gem mining to prevent sea water intrusion	No of new programmes initiated to take legal actions against sand and gem mining	None	Cover all critical districts		Initiate new programmes on priority basis	Continue	Continue		10	GSMB	MoE, CEA, ID, WRB, NGJA, DAD
Strategy 9: Reduce water-induced disasters, such as floods and droughts.											
9.1 Establish a national coordinating body to manage water induced disasters	National coordination body established	None	100%		Coordination body in place			6.5	10	DMC	MoIrri, MoWS
9.2 Approve Flood Risk Management Act along with proposed institutions	Flood Risk Management Act is gazetted	None	Flood Risk Management Act is available		Flood Risk Management Act is available				Internal funds	MoIrri	
9.3 Prepare flood zoning maps	No. of flood zone maps prepared	10%	100%		Continue to prepare flood zone maps for major rivers	Complete the preparation of flood zone maps		6.5	10	ID	SMoPC&LG
9.4 Discourage settlements within the vulnerable zones	No. of programmes developed and implemented	None	50		10	15	25	6.5	50	SMoPC&LG	DMC, UDA, CEA
9.5 Improve flood and drought warning systems	Improved flood and drought warning system established	10%	100%		Implement already developed proposal	Fully functional and updated warning system in place		6.5	100	DMC	MoE, MD, ID
9.6 Prepare flood and drought management programmes at the local level according to the Flood Risk Management Act and the National Drought Management Plan	Flood and drought management programmes developed	None	200		25	50	125	6.5	100	DMC	MoE

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Timeframe (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
Strategy 10: Assure water security of the nation.											
10.1 Establish a comprehensive surface water resources database	Database developed	None	100%		Compile the existing data and develop the database	Identify gaps and take action to fill them		6.5	10	MoIrri	LUPPD, DAD, MASL
10.2 Prepare a water resources master plan for the country with the participation of relevant agencies, while taking the environmental concerns into account	Water Resources Master plan developed	20%	100%		Develop the master plan based on existing information	Update the master plan by taking climate change, land use etc	Continue to update the plan	6.5	10	MoIrri	ID, MoE
10.3 Prepare an investment plan for the implementation of the master plan and ensure follow-up action	Investment plan developed and funds identified for implementation of master plan	20%	100%		Investment plan and funding available	Continue	Continue	6.5	100	MoIrri	
10.4 Integrate a System of Environmental Economic Accounting (SEEA) of water into the System of National Accounting (SNA) in Sri Lanka	Improved procedure of SEEA of water into SNA established	5%	100%		Commence applied research in improving SEEA	Continue	Continue	6.5	10	MoE	MoF
10.5 Construct new water storage/diversion infrastructures	No. of new reservoirs constructed	4	15		2	3	10	6.5	185,000.0	ID	MASL
10.6 Rehabilitate village tanks along with ecosystem-based cascade improvement programmes	No. of new minor tanks rehabilitated	0	10,000		2000	3000	5000	6.5	10,000	DAD	PID, ID
10.7 Rehabilitate and improve the management of the existing major and medium reservoirs/ anicut schemes along with canal network	No. of new reservoirs, and anicuts rehabilitated	0	150		25	50	75	6.5	15,000	ID	MASL
10.8 Provide infrastructure facilities to supply water to water deficit areas through trans-basin diversion	No. of new trans basin diversions completed	0	10		2	3	5	6.5	138,000	ID	MASL
Strategy 11: Implement IWRM at all levels.											
11.1 Use the river basin as a planning unit for water resources management	No. of water resource plans developed for river basins	None	50%		Use river basin/cluster of river basins for planning	Continue	Continue	6.5	50	ID	MASL, MoWS, MoE, CEA
11.2 Incorporate basic principles of IWRM in allocating water to all users, so that ecosystems (fauna and flora) and disadvantaged/marginal groups are also considered	Water allocation for various water use sectors available	None	60%		Establish priorities and guidelines for water allocation	Allocate water according to identified guidelines	Continue and monitor water allocation	6.5	10	MoIrri	MASL, MoWS, CEA, MoE
11.3 Adopt a participatory approach, wherever possible, for planning, construction, maintaining and monitoring	Mechanism for the participation of stakeholders established	10%	75%		Improve the mechanism to get stakeholders involved	Continue	Continue	6.5	25	ID	MASL, DAD, PID MoWS, MoE, CEA
Strategy 12: Introduce new policy and institutions for improved water resources planning and management.											
12.1 Introduce a new water resources management policy for Sri Lanka	New Water Resources Management policy available	None	New Policy is available		New policy is gazetted			6.5	10	MoIrri	NWSDB, WRB, CEA, MASL, DAD, MoE
12.2 Establish the governance mechanism so that water resources can be allocated rationally among different sectors, regulated and managed	New Governance Mechanism for water resources management established	None	New Governance Mechanism established		Approve Water Act. Initiate interim institutions on place	Proposed governance mechanism is fully functional		6.5	100	MoIrri	NWSDB, WRB, CEA, MASL, DAD, MoE

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Actions	Key Performance Indicators (KPIs)	Baseline	Target		Timeframe (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5–10			Lead Agency	Other Key Agencies
12.3 Prepare strategic plans based on the thrust areas with the participation of relevant line agencies for implementation	No. of new strategic plans developed	None	18		Commence preparation of plans	Plans for thrust areas completed		6.5	10	MoIrri	NWSDB, WRB, CEA, MASL, DAD, MoE
12.4 Strengthen water sector institutions to implement the strategic plans	Programmes identified and implemented for institutional strengthening	N/A	10		Identify areas to be strengthened	Carry out programmes to strengthen institutions	Continue programmes	6.5	50	MoIrri	NWSDB, WRB, CEA, MASL, DAD, MoE
Strategy 13: Promote awareness, capacity building and community mobilization.											
13.1 Embark on a campaign to educate people of the importance of keeping rivers, lakes and reservoir/ tanks free from contamination and pollution with the participation of local police and the communities of the respective areas	No. of new awareness programmes conducted	0	250		50	75	125	6.6b	10	MoE	CEA, SMoPC& LG, MASL
13.2 Undertake capacity building of communities to manage community water supply schemes and sanitation	No. of new training programmes conducted for CBOs	0	4500		500	1500	2500	6.6b	45	NWSDB	DCWS
13.3 Continue and improve training programmes for water users' associations (WUA) of irrigation systems	No. of new training programmes conducted for WUAs	0	200		40	60	100	6.6b	15	ID	MASL, DAD, IMD
Undertake island wide education campaign to make people aware of the current issues facing the water sector and the importance of protecting it for the present, as well as for future generations	No. of new activities conducted for the public	0	200		40	60	100	6.6b	50	CEA	NWSDB
Strategy 14: Strengthen water related research.											
14.1 Compile and disseminate already conducted research in the water sector, as a prerequire for need assessment	Compendium of the summary of water research conducted	N/A	Compilation of research conducted		Compiled and disseminate findings			6.5	10	NSF	MoIrri, Uni, WRB, NWSDB, CEA
14.2 Identify priority areas for research related to water sector	Priority areas for water research is identified	20%	100%		Need assessment completed			6.5	10	NSF	MoIrri, Uni, WRB, NWSDB, CEA
14.3 Establish a mechanism to coordinate water sector research institutions	Coordinating mechanism available	None	100%		Initiate discussion	Mechanism in place		6.5	20	NSF	MoIrri, Uni
14.4 Increase funds allocated for water sector research	Amount allocated	20 mil	LKR 1000 M		LKR 200 M	LKR 300 M	LKR 500 M	6.5	1,000	NSF	NRC, Uni, NWSDB, MoI, WRB, CEA
14.5 Provide facilities for research, especially by the water sector institutions	No. of internships/research fellowships provided	10	200		30	60	100	6.5	50	NWSDB	ID, MASL, WRB, Uni
14.6 Disseminate important research findings for application	No. of new conferences/ workshops held	0	50		10	15	25	6.5	10	Univ	NSF, NWSDB, ID, MASL, WRB, CEA

Baseline1 = Indicate the present status; 0 implies no activity is in place

Target2 = Indicate the target to be achieved; 100% indicate that expected target is fully achieved

N/A = Not available

THEME 8
ENVIRONMENT MANAGEMENT IN CITIES AND HUMAN SETTLEMENTS

Urbanization has become a rapidly growing force, as an increasing number of people have begun to move to towns and cities.Cities provide opportunities, economies of scale and a future with more choices (Cities Alliance, 2017). In 2018, about 55% of the world's population lived in cities, but this percentage is projected to reach 68% by 2050. Cities occupy just 3% of the Earth's land but account for 78% of the world's primary energy consumption and create more than 70% of carbon emissions.

2.8.1 Overview

Historically, economic development of human societies and countries has been characterized by human settlements and urbanization. A human settlement can be viewed as an organized grouping of human habitation, which can involve many people in cities/urban areas or just a few in rural areas. Urbanization has become a rapidly growing force, as an increasing number of people have begun to move to towns and cities. Cities provide opportunities, economies of scale and a future with more choices (Cities Alliance, 2017). In 2018, about 55% of the world's population lived in cities, but this percentage is projected to reach 68% by 2050. Cities occupy just 3% of the Earth's land but account for 78% of the world's primary energy consumption and create more than 70% of carbon emissions. They generate about 80% of the global GDP. The number of mega-cities[56] has increased from ten in 1990, to 34 in 2020. In the future, it is predicted that nine out of ten mega-cities will be in the developing world. About 96% of urban growth will occur in the less developed regions of East Asia, South Asia and Africa (UN Habitat, 2020).

There are numerous challenges and threats as a consequence of urbanization and poor urban planning. A major challenge is the growth of slums, which frequently form because of rapid urbanization, as well as a lack of affordable housing and are more vulnerable to natural disasters and crime. Another challenge is the high rate of discrimination and segregation, as the urban poor are usually left out of the decision-making process, despite their high stakes in urban planning and policy-making. In addition, activities in urban areas can affect the local, regional and global environments, as cities need inputs of large quantities of resources in order to provide their populations with the myriad of demanded services. In particular, growing cities and human settlements (C&HSs) have adverse impacts on surrounding ecosystems - such as wetlands, forests, mountains - and also overexploit resources from these ecosystems. Local environmental concerns include inefficient water management and sanitation, air quality degradation, solid waste and health impacts (UNEP, 2020). Another issue is the urban heat-island effect, where structures such as roads, buildings and other man-made infrastructure absorb and re-emit more solar heat compared to natural landscapes, resulting higher ambient temperature in urban areas, and the need for more cooling, resulting in economic and environment issues. Other concerns associated with C&HSs include, among others, visual and light pollution, noise and vibration, and health, safety and security.

Meanwhile, as today's cities are part of the global environment, their policies, development activities and people have impacts far beyond city borders, for example, implications for environmental conditions elsewhere in the world (Cities Alliance, 2017). Towns and cities rely on a wide range of resources (including water, energy, food, and raw materials for manufacturing) from outside their geographical boundaries, demands of which can have significant environmental effects on distant locations. Urban areas also use large amounts of energy and contribute significantly to global greenhouse gas (GHG) emissions and climate change. In turn, climate change has adversely affected C&HSs, leading to the need of significant attention on topics such as climate-resilience and disaster risk management.

Because of these issues, several important international programmes and conventions have been implemented in the last two decades. In the wake of the United Nations (UN) Conference on Environment and Development (the 1992 Rio Earth Summit), many international programmes were initiated to help cities to incorporate environmental issues into their planning processes. For example, the need for the development of sustainable human settlements was discussed at the 2nd and 3rd sessions of the Commission on Sustainable Development, which is the subject of Chapter 7 of Agenda 21, that calls eight priority interventions. The New Urban Agenda, adopted at the UN Conference on Housing and Sustainable Urban Development (Habitat III) in 2016, sets the pathway for Sustainable C&HSs and is targeted at key stakeholders involved in urban governance and planning. Other international programmes initiated include the Sustainable Cities Programme (UNEP and UN-Habitat), Localizing Agenda 21 (UN-Habitat), as well as several bilaterally funded programmes. As well

56 a very large city, typically one with a population of over ten million people.

as these international programmes, there have been many cities and city networks that have also developed innovative environmental and planning programmes, for example, Green City Accord of European cities (UNEP, 2020). The importance given to this topic in global development efforts is signified by the inclusion of a stand-alone goal on cities and urban development in the 2030 Agenda for Sustainable Development, the Sustainable Development Goal (SDG) 11 – 'Sustainable Cities & Communities: Make cities and human settlements inclusive, safe, resilient and sustainable'. C&HSs also have an impact on several other SDGs, including SDG 1, SDG 6, SDG 7, SDG 8, SDG 9, SDG 12, SDG 15, and SDG 17, among others, thus indicating the complexity of managing their environmental issues, while addressing other aspects of sustainability.

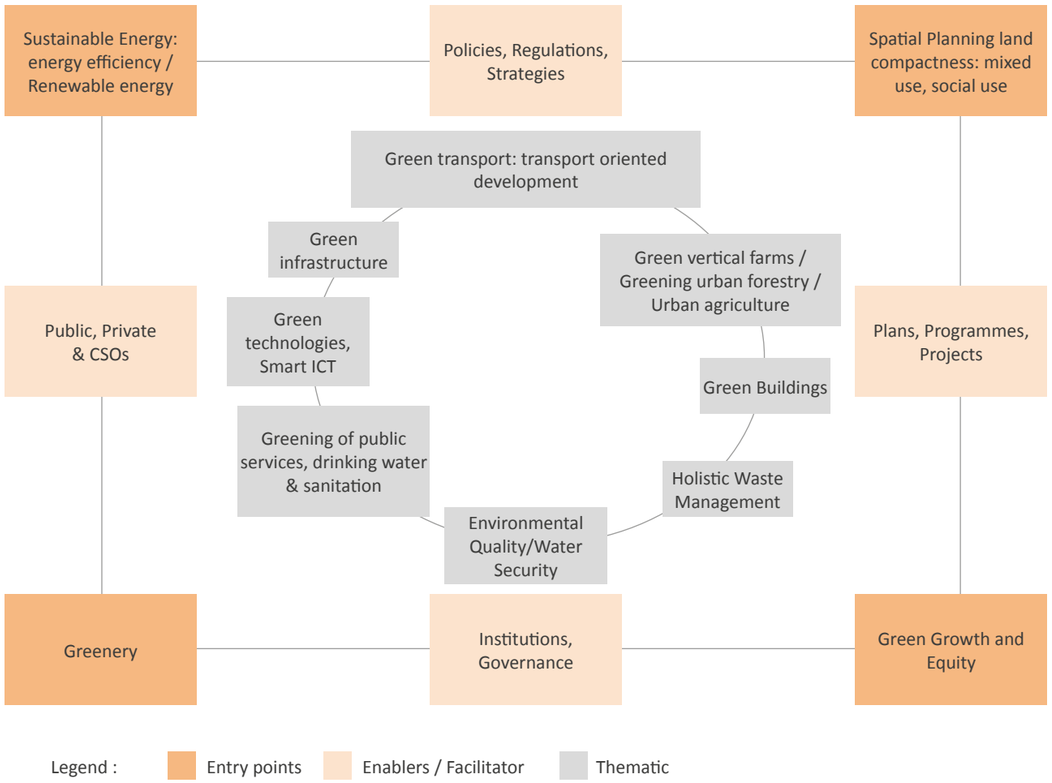

Figure 2.8.1. Framework for environment management in C&HSs

The complex nature of the urbanization demands a holistic framework approach as a solution methodology, enabling city planners to rethink the delivery of urban infrastructure and ensure that it is greener, smarter, resilient, more equitable and efficient. In fact, the New Urban Agenda lays out standards and principles for the planning, construction, development, management and improvement of urban areas in its five main pillars of implementation. These are 1) national urban policies; 2) urban legislation and regulations; 3) urban planning and design; 4) local economy and municipal finance; and 5) local implementation (UN Habitat, 2020b). Some common concepts, themes and elements from these pillars that could be used in developing strategies and actions for sustainable environment management of C&HSs, are presented in Figure 3.8.1.

Fundamentally, this framework accepts the holistic interconnectedness among different components; includes a set of entry points; enablers/facilitators and a series of thematic areas such as clean energy, sustainable transport, air quality smart digital technology, efficient technologies, green buildings/ infrastructure; along with a circular economy approach to management of water, waste and materials (UN Habitat, 2020).

2.8.2 Current Status

The total population in the country was 21.8 million in 2019, with an average population density of 348 persons/km^2. The population distribution by sector is 18.2% in urban, 77.4% in rural and 4.4% in estate areas, respectively (CBSL, 2020). Urban residents live in 64 municipal areas in nine provinces. The relatively low proportion of urban population shows that Sri Lanka as among least urbanized country with a rank of 11 among 195 countries and 38 dependencies (UNDESA, 2018). However, the country's socio-economic indicators signify a much higher level of urbanization. In fact, for the above figures, the term 'urban', is defined as those who live in the areas under the jurisdictions of Municipal Councils and Urban Councils. Yet, there is a mismatch between the figures and the ground realities, as more areas than those under Municipal or Urban councils are already urban in their functions and outlook. The National Physical Planning Policy & The Plan: 2017 - 2050 indicates, in a broader definition, that 50% of the population is urbanized. If the agglomeration index - an alternative measure of urbanization that employs multiple indicators - is used, the urban population in the country is between 35 - 45% (Government of Sri Lanka, 2018b).

In fact, urbanization in Sri Lanka is unique compared to many other countries and different from the conventional understanding of the process of urbanization. Instead of populations moving into urban areas, urban facilities are fast reaching out into populations and urban lifestyles and aspirations are fast embraced by the people, even though they live away from designated urban areas. However, the social, economic and environment impacts of urbanization are clearly evident, particularly with rapid spatial growth over past decade, emphasising Sri Lanka's urban paradox (NPPD, 2019). Sri Lanka fits into an emerging pattern of global urbanization, which is characterized by rapid growth in the cities of developing countries. Some of the common indicators are growth of private vehicles, traffic congestion, air quality degradation, and accumulation of municipal solid waste. However, human settlements even in rural areas have evidenced a variety of critical environment-related issues, for example, indoor air pollution because of biomass cooking in the estate sector and human-elephant conflict in rural farming areas.

The importance given by policymakers for the C&HSs is evident in many related national level policies, strategies and plans. An important guide to sustainable cities in Sri Lanka is provided by the 2030 Agenda for Sustainable Development and SDGs, particularly SDG 11 – Sustainable Cities & Communities. The country's standing in relation to the SDG 11 is given in Sri Lanka Voluntary National Review on the Status of Implementing SDGs (Ministry of Sustainable Development, Wildlife and Regional Development, 2018). Shown below are a few highlights of this review:

- Nearly 80% of the population is expected to be more than 60% urbanized by 2030;
- Public investment programme for SDG 11 is 63% aligned;
- Unplanned urban development has caused an array of issues/challenges, mainly related to housing, transport and environmental management; and
- Disaster management and climate change impacts must be mainstreamed into urban planning policy.

In addition, a comprehensive study on urbanization in Sri Lanka has been conducted by the Ministry of Provincial Councils and Local Governments, with the support of UN-Habitat, covering major cities (one each in nine provinces) (NPPD, 2019). The performance of each city is presented through two main indices, namely City Governance Index (CGI) and City Performance Index (CPI), in addition to several other parameters. The results indicate the challenges for cities in contributing to achieving SDGs. The study recommends a roadmap for Sri Lankan cities, proposing five principles (competitive, inclusive, resilient, safe and sustainable) and five related integrated policy and programmatic responses (redefining urban areas; sustainable development of cities; urban research and information systems; urban governance reforms and city connectedness).

Another important aspect is the Nationally Determined Contributions (NDCs) under the Paris Agreement of 2015. The country's NDCs identify C&HSs as a key area for interventions, under the section of adaptation. Further, the NDCs in other adaptation sectors, as well as those in the mitigation sectors - such as energy, transport and waste - have strong connectivity to the C&HSs. The ongoing updates of NDCs in Sri Lanka

relevant to C&HSs are:

- Enhance the resilience of human settlements and infrastructure through mainstreaming climate change adaptation into national, regional and local level physical planning;
- Incorporate disaster risk reduction (DRR) mechanisms into urban, city and human settlement planning/ implementation in areas of high vulnerability to climate change risks;
- Establish climate resilient built environment; and
- Minimize the impact of slow onset events/sea level rise on coastal settlements and infrastructure.

Therefore, the NDCs should be considered in identifying strategies and activities for the environment management in C&HSs.

2.8.3 Policy and Legal Framework

There is no separate policy on urbanization/cities in Sri Lanka but the topic is covered by key sections in many national policies in related areas. The National Policy Framework – Vistas of Prosperity and Splendour emphasises urban development under 'Chapter 7: New Approach in National Spatial System'. In this section, several policy elements are proposed in an integrated physical spatial system to address disparities in urbanization, including integration of urban centres, transport hubs, an efficient and environmentally sound transport network, affordable energy, clean water, and disaster management. Further, in 'Chapter 8: Sustainable Environmental Policy', one sub-sector on Settlements and Cities highlights a policy on 'Green, Smart, Resilient cities and settlements'. The draft National Policy and Strategy on Sustainable Development for a Sustainably Developed Sri Lanka, as the global agenda, comprehensively covers C&HSs under SDG 11, and is also interconnected with several other SDGs and targets. There are nine policy targets and 15 indicators under SDG 11. The other policies that have reference to C&HSs include the draft National Transport Policy, National Policy on Waste Management, National Climate Change Policy, National Policy on Sustainable Consumption and Production, and National Policy for Disaster Management. The draft National Environment Policy, which has just been updated, includes a set of policy statements under Built Environment & Green Development, while the policy statements in Pollution Control & Waste Management and Land & Water Resources cover a few key aspects of environment management in C&HSs.

The legal and institutional framework for development of C&HSs, and their environment management too are provided by several legislations (and their subsequent amendments), including the Town and Country Planning Ordinance, No. 13 of 1946; Urban Development Authority Law No. 37 of 1978; Urban Development Projects (Special Provisions) Act, No. 2 of 1980; Urban Settlement Development Authority Act No. 36 of 2008; Sri Lanka Land Reclamation and Development Corporation Act, No. 15 of 1961; National Environmental Act No. 47 of 1980; Disaster Management Act No.13 of 2005; Coast Conservation Act, No. 57 of 1981; National Water Supply and Drainage Board Law, No. 2 of 1974; Water Resources Board Act, No. 29 of 1964 and the Sustainable Development Act No.19 of 2017.

As the subject topics related to the urban sector are vast, there are several ministries and agencies (national, provincial and local) who are responsible for the development of policies, regulations, action plans and implementation therein. Some ministries relevant to urban development are under the following topics: urban development; housing; coast conservation, waste disposal, community cleanliness; environment; health; education; power; energy; transport; water supply, lands; highways; road; vehicle regulation; and bus transport services. The implementation aspects of these subject areas are carried out through agencies in these ministries. Each of these ministries (and agencies) have action plans related to C&HSs, aligned with their subject policies and other overarching policies related to national development. For example, the National Physical Planning Policy and the Plan 2017- 2050 of the NPPD provides all development agencies in Sri Lanka with a broad national level guiding framework for the planning and execution of development activities, which will directly impact upon the physical environment of the country and its territorial waters. It also provides for the establishment facilities, amenities and service-related infrastructure incidental to the

development of the physical environment. It presents the Urban Development Strategy covering following key objectives:

- Attractive and Liveable Conditions;
- Safe and Secured Localities;
- Smart and Convenient Facilities; and
- Green and Sustainable Environments.

2.8.4 Introduction to the Action Plan

The action plan of the Thematic Area 8: Environment Management in C&HSs is formulated with a set of guiding principles, in line with those of the 2030 Agenda for Sustainable Development and SDGs, and drawing on several frameworks and methodologies developed in other countries and regions in localizing the global agendas to circumstances in C&HSs. Further, the policies, strategies and national development priorities, and the policy principles and strategic directions given in the National Environment Policy (draft) have considered in developing the action plan.

Further, the policy objectives and key thematic areas of the National Physical Planning Policy and the Plan 2017- 2050, the principles and integrated policy responses proposed in the study on State of Sri Lankan Cities 2018 by UN-Habitat and several other frameworks, methodologies and criteria/indicators developed globally have been considered to derive the strategies for environment management in C&HSs.

2.8.5 Strategies for Management

Shown below are the nine main strategies of the Thematic Area 8: Environment Management in C&HSs.

Strategy 1. Ensure spatial sustainability through integrated planning and rational zoning, with optimum land compactness, mixed-use and social-use.

Strategy 2. Secure urban governance and resilience.

Strategy 3. Develop sustainable energy by enhancing energy efficiency, harnessing renewable energy and fostering rational use of energy.

Strategy 4. Establish energy efficient and environmentally sustainable transport systems.

Strategy 5. Promote and facilitate green and high-performance building and infrastructure, as well as smart ICT.

Strategy 6. Foster urban biodiversity and ecosystem services.

Strategy 7. Promote circularity and sustainability for green growth.

Strategy 8. Further social mobilization to ensure inclusion, empowerment and equity.

Strategy 9. Enhance global participation and collaboration for liveable cities and human settlements.

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2.8.6 Action Plan for Environmental Management in Cities and Human Settlements

Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
Strategy 1: Ensure spatial sustainability through integrated planning and rational zoning, with optimum land compactness, mixed-use and social-use.											
1.1 Appoint, empower and operationalize a Sector Expert Committee (SEC), together with technical expert committees (TECs), for specific sectors/areas, for assisting with science/ fact-based decision-making, strategic planning and monitoring of environment management in C&HSs	SEC meetings conducted/yr	-		3	✓	✓	✓	11.3	1.4	MoUDH	MoE
1.2 Establish rational methodology to demarcate 'urban/peri-urban/rural sectors in Sri Lanka and update the information continually	No. of TEC meetings held/yr	-		2	✓	✓	✓	11.3; 11.a	15.5	DCS	MoUDH, UDA, USDA, CEA
	Total no. of updates performed	-		3	-	1 in 3 yr	2 in 5 yr				
	Revised framework for demarcation (with specific parameters and thresholds)	-		Endorsed framework for demarcation							
1.3 Appraise environment management aspects of present regulations, standards, guidelines and procedures for land use planning/zoning for the development of C&HSs and identify gaps therein	Appraisals conducted	-		Appraisal report endorsed				11.a	0.8	NPPD	MoUDH, UDA, USDA, CEA
1.4 Establish new procedures and guidelines for integrated planning and rational zoning with optimum mixed- and social-use, for both new and rehabilitation/alteration to existing C&HSs for better management of the environment	Development of integrated planning procedures	-		Integrated planning procedures endorsed				11.a	2.4	NPPD	MoUDH, UDA, USDA, CEA
1.5 Promote and facilitate the new integrated land use planning procedure/guidelines at all levels of governance and use a performance index for 'Spatial Sustainability' for tracking the progression and performance	No. of updates of Spatial Sustainability Index performed	-		4	1	1	2	11.3	17.5	NPPD	MoUDH, UDA, USDA, CEA
	No. of training programmes conducted/yr	-		4	✓	✓	✓				
1.6 Establish and maintain an information platform/ repository to record the relevant environment management programmes and projects implemented in the country, with the supervision of SEC (link to Activity 9.5)	No. of updates performed/yr	-		4	✓	✓	✓	11.3	5	MoE	NPD, SMoUD, MoPP&L
Strategy 2: Secure urban governance and resilience.											
2.1 As appropriate, facilitate good urban governance through the introduction of policy reforms for inclusive, implementable and participatory features, to mainstream sustainable development of C&HSs	TEC meetings conducted/yr	-		4	✓	✓	✓	11.3	1.4	MoUDH	NPD, SMoUD, UDA, MoE
2.2 Develop, regularize and operationalize programmes to ensure urban governance as defined by Urban Governance Index (UDI)	No. of training programmes conducted/yr	-		4	✓	✓	✓	11.3; 11. a	20	MoUDH	NPD, SMoUD, UDA, MoE
	Data collection survey for UDI carried out/yr	-		1	✓	✓	✓				
2.3 Facilitate urban resilience by addressing health and well-being of individuals, Urban Systems and Services; Economy and Society; and Leadership and Strategy, as defined by the Urban Resilience Index (URI)	No. of training programmes conducted/yr	-		4	✓	✓	✓	11.3: 11.b	25	DMC	MoUDH, NPD, SMoUD, UDA. MoE, MoH, NBRO
	Data collection survey for URI carried out/yr	-		1							

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
2.4 Promote and facilitate measures to mitigate disaster and hazard risks (both natural and man-made) at national and local government levels to prevent the creation of new risks, reduce existing risks and increase resilience	National DRR strategies	DRR strategies developed		DRR strategies implemented	✓			11.3: 11.b	80	DMC	MoUDH; NPD, SMoUD, UDA. MoE, MoH, NBRO
	Local DRR strategies	-		Local DRR strategies endorsed		✓					
	No. of training packages implemented/yr	-		4	✓	✓	✓				
2.5 Promote urban governance and resilience through comprehensive awareness and capacity building programmes to effectuate social mobilization (see Strategy 8)	No. of awareness and capacity building programmes conducted/yr	-		4	✓	✓	✓	11.3	39.2	MoPP&L	NPPD, NPD, MoUDH, UDA, DMC
Strategy 3. Develop sustainable energy by enhancing energy efficiency, harnessing renewable energy and fostering rational use of energy.											
3.1 Encourage rational use of energy among all the sections of the community through development and implementation of a communication strategy and education plan	No. of national level communication strategies and media campaigns conducted/yr	-		1	✓	✓	✓	7.1; 7.3; 12.8	150	SLSEA	MoEd, MoE, Uni
3.2 Extend the energy efficiency (EE) labelling scheme for all the main appliances and equipment	Total no. of EE labels introduced	1		10	5	10 (cumulative)	10 (cumulative)	7.3	690 (implementation) + 94,000. (investment)	SLSEA	SLSI, CEB
	% reduction of energy consumption	0%		15%	3.0%	6.5%	15%				
3.3 Enable energy management in institutions and other entities, through an Energy Manager/Energy Auditor Programme, including energy benchmarking in priority energy end-use sectors	Total no. of energy managers / energy officers appointed	200		1,000	360	500 (cumulative)	1,000 (cumulative)	7.3	137.5	SLSEA	SLEMA, NCPC, CEB
	No. of sectors having energy benchmarking	2		10	4	6	10				
3.4 Promote ISO50001 – Energy Management System	No. of establishments awarded with the ISO certification	15		150	40	80 (cumulative)	150 (cumulative)	7.3	18	SLSI	SLSEA, CEB
3.5 Promote and facilitate establishment of solar photovoltaic (PV) systems (rooftop and ground installations) in C&HSs, with and without battery storage (covering both grid connected and off-grid)	No. of awareness programmes conducted/yr	-		8	✓	✓	✓	7.2	120 (programme cost) + 192,500 (private investments)	SLSEA	MoP, SMoSWHPD, CEB
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
	No. of media campaigns conducted/yr	-		1	✓	✓	✓				
	No. of Solar PV systems installed on rooftops	26,800		75,000	36,500	51,000	75,000				
	Total power added in MW	190		550	270	375	550				
	Total power added in MW in ground mounted plants	-		550	220	550	550				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
3.6 Foster the use of solar energy for thermal applications in households, and commercial establishments	No. of awareness programmes conducted yr	-		4	✓	✓	✓	7.2	18	SLSEA	SMoSWHPD, MoInd, NERD
	No. of media campaigns conducted/ yr	-		1	✓	✓	✓				
3.7 Encourage the use of passive techniques and designs for energy services such as natural lighting, ventilation, cooling, heating in built environment	No. of awareness programmes conducted/yr	-		4	✓	✓	✓	7.2; 7.3; 7.b	18	SLSEA	SMoSWHPD, MoInd, NERD
	No. of media campaigns conducted/ yr	-		1	✓	✓	✓				
3.8 Encourage the use of other renewable sources and technologies, such as biogas, biomass, wind, and geothermal for energy applications in C&HSs (at domestic, commercial and local authority levels)	No. of awareness programmes conducted/yr	-		4	✓	✓	✓	7.3	26	SLSEA	SMoSWHPD, MoInd, NERD
	No. of media campaigns conducted/ yr	-		1	✓	✓	✓				
Strategy 4: Establish energy efficient and environmentally sustainable transport systems.											
4.1 Promote the improvement of system efficiency in transport systems in C&HSs through concepts of 'avoid/reduce' (link, and further, to Theme 1 – Activity 2.1)	No. of media campaigns conducted/ yr	-		1	✓	✓	✓	9.1; 11.2	50	MoT	SLSEA, NTC
4.2 Encourage the improvement of trip efficiency in the transport sector through campaigning for a shift to more efficient and/ or environmentally friendly transport modes – including public transport systems, cycling and walking (link, and further, to Theme 1 – Activity 2.2)	No. of national level media campaigns conducted/yr	-		1	✓	✓	✓	3.6; 9.1; 11.2	50	MoT	SLSEA, NTC, SLR, SLTB, UDA
4.3 Facilitate the improvement of vehicle efficiency in the transport sector through supporting the use of more efficient technologies for travel, including electric vehicles (EVs), hybrids, efficient internal combustion engine vehicles (ICEs) and other emerging technologies such as hydrogen fuel cell	No. of national level media campaigns conducted/yr	-		1	✓	✓	✓	11.2	50	MoT	SLSEA, NTC, DMT, MoE, CEB
4.4 Implement fuel economy standards for both light-duty vehicle and heavy-duty vehicle categories (link, and further, to Theme 1 – Activity 6.4)	Total no. of fuel economy labels introduced	-		6	2	6	6	11.2	33	SLSI	MoT, SLSEA, PUCSL, SLAB, Uni/technical colleges
	Total no. of TEC meetings conducted (10 per Label)	-		60	20 in 2 yr	40 in 3 yr	-				
4.5 Provide guidance to improve the operational performance of vehicles through traffic management, road infrastructure, vehicle maintenance, and driver skills/habits (link, and further, to Theme 1 – Activities 2.3, 2.6, and 2.7)	No. of training programmes conducted/yr	-		4	✓	✓	✓	11.2	54	MoT	SLSEA, DMT, RDA, MoE, SLP, Uni
	No. of national level media campaigns conducted/yr	-		1	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
Strategy 5: Promote and facilitate green and high-performance building and infrastructure, as well as smart ICT.											
5.1 Regularize and enforce the Energy Efficient Buildings Code (EEBC) 2020 of Sri Lanka	Enforcement of EEBC	-		Updated EEBC				7.3; 11.c	No additional cost	SLSEA	UDA, LAs, NHDA
5.2 Popularize the 'Guideline for Sustainable Energy Residences' in Sri Lanka and develop regulations for enforcement	No. of awareness programmes conducted/yr	-		4	✓	✓	✓	7.3; SDG11.c	8	SLSEA	UDA, LAs, NHDA
	No. of media campaigns conducted/ yr	-		1	✓	✓	✓				
5.3 Disseminate the 'Green Building Guide for Sri Lanka' in both government and private sectors	No. of awareness programmes conducted/yr	-		4	✓	✓	✓	7.3; 11.c; 11.6	12	MoE	SLSEA, UDA, NHDA, USDA
	No. of media campaigns conducted/ yr	-		1	✓	✓	✓				
5.4 Formulate and introduce energy efficiency rating scheme (EERS) for commercial and residential building in Sri Lanka	Development of EERS	-		Approved EERS				7.3; 11.c	10	SLSEA	UDA, LAs, NHDA, USDA
	No. of awareness programmes conducted	-		8	-	✓	-				
	No. of training programmes conducted	-		8	-	✓	-				
5.5 Promote and facilitate information and communications technology (ICT) as an energy efficiency solution driver for smart cities and built environment	No. of promotional programmes conducted/yr	-		1	✓	✓	✓	7.3; 11.c	125	USDA	LECO, SLSEA, ICTA, UDA, CEB
	Total no. of pilot projects implemented	-		5	1	3 (cumulative)	5 (cumulative)				
5.6 Promote green building concepts and technologies, particularly in condominiums, apartments, vertical housings, housing schemes, urban housing and re-housing	Total no. of promotional programmes conducted/yr	-		1	✓	✓	✓	7.3; 11.c	25	USDA	MoE, UDA, MoUDH, NHDA
	Total no. of pilot projects implemented	-		1	-	-	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
5.7 Promote and facilitate high-performance building concepts that integrate and optimize all performance attributes on a life cycle basis, including consideration for related codes and guidelines	Total no. of promotional programmes conducted	-		1	✓	✓	✓	7.3; 11.c	25	SLSEA	UDA, CEB, ICTA, MoUDH, USDA, NHDA
	Total no. of pilot projects implemented	-		1	-	-	✓				
5.8 Provide guidance to establish green infrastructure concepts such as rainwater harvesting, rain gardens, planter boxes, bioswales, permeable pavements, green streets and alleys, green parking, green roofs, urban tree canopies, and green spaces	No. of promotional programmes conducted/yr	-		4	✓	✓	✓	7.3; 11.	25	UDA	USDA, MoUDH SLSEA
	No. of green infrastructure concepts promoted	-		10	2	5 (cumulative)	10 (cumulative)				
Strategy 6: Foster urban biodiversity and ecosystem services.											
6.1 Assess the biodiversity in prioritized zones within C&HSs to establish maps and profiles, including wetland areas and environmentally sensitive ecosystems (link to Theme 2, Activities 1.1 to 1.10)	No. of TEC meetings conducted	-		6	✓	-	-	15.1 to 15.5	10.1	MoE	SEC, CEA, MoUDH, UDA, LAs, Uni,
	No. of stakeholder consultation meetings conducted	-		6	✓	-	-				
	No. of field visits conducted/province	-		4	✓	-	-				
	No. of provinces covered	-		9	✓	-	-				
6.2 Propose conducive policy and regulatory revisions for protection of urban biodiversity and ecosystems (link to Theme 2, Activities 15.1 to 15.3)	Total no. of TEC meetings conducted	-		6	✓	-	-	15.1 to 15.5	1.2	MoE	SEC, CEA, MoUDH, UDA, LAs, Uni
6.3 Facilitate addressing the causes of biodiversity loss through mainstreaming biodiversity restoration, conservation and enhancements with the engagement of all the stakeholders (link to Theme 2, Activities 3.1 and 3.2)	Stakeholder consultation meetings conducted/yr	-		10	✓	✓	✓	15.1 to 15.5	15	SMoWFRD	MoE, CEA, MoUDH, UDA, SLLDC, PCs. LAs, DoA, USDA, DoF, DAD, DWC
6.4 Encourage the enhancement urban biodiversity through the introduction of the green concepts such as urban forestry, green vertical gardens, living roofs, particularly within smart cities and built environments (link to Theme 2, Activity 5.2 and Theme 3, Activity 1.7)	No. of awareness and promotional programmes conducted/yr	-		4	✓	✓	✓	15.1 to 15.5	15	UDA	MoE, CEA, MoUDH, SLLDC, PCs, LAs, USDA, DoA, DoF, DAD
6.5 Promote concepts such as urban/smart agriculture, vertical farming, organic farming, own composting and home gardening to improve food security (link to circular economy)	No. of awareness and promotional programmes conducted/yr	-		4	✓	✓	✓	15.1 to 15.5	15	UDA	MoE, CEA, MoUDH, SLLDC, PCs, LAs, USDA, DoA, DoF, DAD
6.6 Provide guidance to deliver benefits from biodiversity and ecosystem services (BES), including the introduction of Payments for environmental services (PES) and other economic benefits to the society (link to Theme 2, Activities 9.1 to 9.3)	No. of TEC meetings conducted	-		6	✓	-	-	15.1 to 15.5	50.4	MoE	CEA, MoUDH, SLLDC, PCs, LAs, USDA, DoA, DoF, DAD
	No. of stakeholder consultation meetings conducted	-		4	✓	-	-				
	Fund allocated for BES/yr (M LKR)	-		5	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
Strategy 7: Promote circularity and sustainability for green growth.											
7.1 Support the establishment of knowledge ecosystem with effective date/information management systems (IMS) and communication of best practices and knowledge products	Development of IMS	-		Operational IMS				11.6; 12.8; 17.8	5	MoE	CEA, MoUDH, Uni
	No. of communications performed/yr	-		1	✓	✓	✓				
7.2 Foster innovation and research ecosystem for circularity and sustainability, through the operationalization of a strategic research agenda and effective multi-stakeholder partnerships and sustainable financing	Development of a research road map	-		Adopted roadmap				11.6; 17.16	10	MoE	CEA, MoUDH, Uni
	No. of awareness campaigns conducted/yr	-		1	✓	✓	✓				
7.3. Promote holistic waste management (HWM) within C&HSs, closing the loop (circularity), with special emphasis on ensuring that local governance effects waste management, including the sustainable disposal of residues in waste treatment facilities (link with Theme 6, Activities 1.1, 1.2 and 1.7)	Development of HWM plan	-		Adopted plan				3.9; 6.2; 12.3 to 12.5	100	MoPP&L	MoE, SMoUD, CEA, WMAWP, NSWMSC
	No. of education-training campaigns conducted/yr	-		4	✓	✓	✓				
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓				
7.4 Provide guidance to establish a resource exchange platform to operationalize the concept of industrial symbiosis in mainstreaming circular economy within C&HSs	No. of consultative meetings conducted/yr	-		4	✓	✓	✓	3.9; 6.2; 12.3 to 12.5	5	MoE	MoInd, SMoUD, CEA, WMAWP, NSWMSC
	Development of an operational guideline	-		Completed guideline							
7.5 Facilitate the mitigation of air pollution issues in C&HSs to improve and maintain the indoor and outdoor air quality at safe levels, through awareness, education, capacity development and regulatory interventions (link to several activities in Theme 1)	No. of education campaigns conducted/yr	-		4	✓	✓	✓	11.6	45	CEA	MoE, MoUDH, MoH, NBRO, ITI
	No. of awareness campaigns conducted/yr	-		6	✓	✓	✓				
7.6 Promote integrated water resource management (IWRM) concepts in C&HSs, with particular emphasis on efficient water management and sanitation, groundwater recharging and prevention from pollution to ensure water security (link to Theme 3, Activity 1.6 and several activities in Theme 7)	No. of TEC meetings held/yr	-		4	✓	✓	✓	3.9; 6.1; 6.3 to 6.6; 11.1	31.8	NWSDB	WRB, MoE, MoUDH, SMoUD
	No. of awareness campaigns conducted/yr	-		4	✓	✓	✓				
	No. of training programmes conducted/yr	-		4	✓	✓	✓				
7.7 Promote and facilitate the introduction of efficient management schemes for liquid waste, sewage, and night soil in C&HSs (link to Theme 6, Activity 3.6)	No. of TEC meetings held/yr	-		3	✓	✓	✓	6.3; 6.a	4.9	NWSDB	WRB, MoE, CEA, MoInd, BoI
	No. of awareness campaigns conducted/yr	-		3	✓	✓	✓				
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
7.8 Provide guidance to control land/soil pollution in C&HSs through awareness, education, capacity development and regulatory interventions (link to several activities in Theme 5)	No. of TEC meetings conducted/yr	-		4	✓	✓	✓	3.9; 12.4	27.8	MoE	CEA, SLLDC, UDA
	No. of awareness campaigns conducted/yr	-		4	✓	✓	✓				
	No. of training programmes conducted/yr	-		4	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
7.9 Facilitate the mitigation of other environmental pollution in C&HSs – such as noise and vibration, heat, visual, and light –through awareness, education, capacity development and regulatory interventions, to further the quality of life (link to Theme 9, Activity 2.8)	No. of TEC meetings held/yr	-		2	✓	✓	✓	11.6; 11.c	15.4	MoE	CEA, MoUDH, MoH, UDA, NBRO, ITI, PCs, LAs
	No. of awareness campaigns conducted/yr	-		4	✓	✓	✓				
	No. of training programmes conducted/yr	-		4	✓	✓	✓				
7.10 Develop guidelines to promote modular and flexible designs within C&HSs for enhanced resource efficiency and construction efficacy/ electiveness	No. of TEC meetings held/yr	-		4	✓	✓	✓	11.1; 11.7	23.8	UDA	MoE, MoUDH, USDA, Uni, NBRO, DMC, NERD
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓				
	No. of training programmes conducted/yr	-		8	✓	✓	✓				
7.11 Introduce and maintain minimum quality standards for environment, health, safety and security conditions to ensure liveable C&HSs, with particular emphasis on built environments (link to Theme 9, Activity 2.7)	No. of TEC meetings held/yr	-		4	✓	✓	✓	11.1; 11.7	21.8	NIOSH	MoE, MoUDH, USDA, MoH, UDA
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓				
	No. of training programmes conducted/yr	-		8	✓	✓	✓				
7.12 Promote green businesses, green logistics systems and greening of public services to improve system performances towards sustainable development of C&HSs	No. of TEC meetings held/yr	-		2	✓	✓	✓	5.4; 16.6	12.4	MoInd	MoE, NIBM, MoUDH
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓				
	No. of training programmes conducted/yr	-		4	✓	✓	✓				
Strategy 8: Further social mobilization to ensure inclusion, empowerment and equity.											
8.1. Formulate policy guidelines and metrics to introduce and/ or strengthen social mobilization in decision-making and implementation processes at all levels of governance	No. of TEC meetings held/yr	-		4	✓	✓	✓	11.3; 11.a; 11.b	22.6	UDA	MoUDH; USDA, NHDA, MoPP&L, CEA
	No. of awareness campaigns conducted/yr	-		2	✓	✓	✓				
	No. of training programmes conducted/yr	-		8	✓	✓	✓				
8.2 Adopt and establish social indicators (in accordance with UGI and URI) to measure and monitor social inclusion, empowerment, equity and cultural diversity	No. of awareness programmes conducted/yr	-		3	✓	✓	✓	11.3; 11.4; 11.a; 11.b	72.5	UDA	MoUDH; USDA, NHDA, MoPP&L, CEA
	No. of training programmes conducted/yr	-		6	✓	✓	✓				
	No. of field surveys/yr	-		10	✓	✓	✓				
8.3 Introduce and/or strengthen statutory and legal provisions - including Strategic Environment Assessments (SEA) - to enable socially inclusive and culturally vibrant C&HSs	No. of TEC meetings conducted/yr	-		4	✓	✓	✓	11.3; 11.a; 11.b	11	CEA	MoUDH; USDA, NHDA, MoPP&L, UDA, NPPD, LUPPD, NPD
	No. of training programmes conducted/yr	-		2	✓	✓	✓				
	Regularize SEA	Amendment to NEA covering SEA (draft)		Regularity framework for SEA	x						
	No. of SEC meetings conducted/yr	-		4	✓	✓	✓				

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Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2–5	L 5-10			Lead Agency	Other Key Agencies
8.4 Promote the concepts such as citizen science, behaviour change communication, social norms and innovations, for efficient and productive engagement of the society in the development process	No. of training programmes conducted/yr	-		4	✓	✓	✓	11.3; 11.a; 11.b	12	MoE	MoUDH; USDA, NHDA, MoPP&L, CEA
	No. of general awareness programmes conducted/yr	-		4	✓	✓	✓				
8.5 Promote multidisciplinary and multi-sectoral approaches in planning and development of programmes in C&HSs through enhanced mobilization of all stakeholders (government, private sector, development partners/donors, academics, professional organizations, CSOs)	No. of training programmes conducted/yr	-		4	✓	✓	✓	11.3	20	NPPD	MoUDH, MoPP&L, MoE, MoH
	No. of awareness programmes conducted/yr	-		4	✓	✓	✓				
Strategy 9: Enhance global participation and collaboration for liveable cities and human settlements.											
9.1. Strengthen existing partnerships and collaborations. e.g. UN Habitat and Climate Technology Centre and Network (CTCN)	Total no. of partnerships strengthened	2		2	✓	✓	✓	11.c; 17.16	No additional cost	MoE	Uni, CEA, NBRO
9.2 Explore opportunities to form formal partnerships, obtain membership of global institutes and partnerships (e.g. Global Platform for Sustainable Cities)	Total no. of partnerships initiated	-		2	-	1	2	11.c; 17.16	No additional cost	MoE	Uni, CEA, NBRO
9.3 Participate in regional and international initiatives/projects (e.g. CTCN, UN Habitat, Partnerships for Sustainable Cities)	Total no. of projects / programmes conducted	-		4	1	2	4	11.c; 17.16	No additional cost	MoE	Uni, CEA, NBRO
9.4 Continue engagement with regional and international projects/programmes (e.g. CTCN, UN Habitat, Partnerships for Sustainable Cities)	Total no. of projects / programmes conducted	-		4	1	2	4	11.c; 17.16	No additional cost	MoE	Uni, CEA, NBRO
9.5 Record and update environment management programmes and projects that are implemented, with the participation of international donors and organizations (link to Activity 1.6)	No. of updated performed/yr	-		4	✓	✓	✓	11.c; 17.16	No additional cost	MoE	Uni, CEA, NBRO

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THEME 9
GREENING INDUSTRIES

Industries play a pivotal role in economic growth, export drive, income generation, job creation and poverty reduction. While having increased the welfare of millions, global economy growth has spurred resource-intensive lifestyles - a trend further exacerbated by population growth and a rising middle class. Between 1950 and 2010, the global population almost trebled in size, and real-World GDP increased sevenfold (Raworth, 2017). This has accelerated the build-up of greenhouse gases in the atmosphere, ocean acidification, pollution and biodiversity loss, the effects of which are increasingly being felt across the world, with the most vulnerable being disproportionately affected.

2.9.1 Overview

Industries play a pivotal role in economic growth, export drive, income generation, job creation and poverty reduction. While having increased the welfare of millions, global economy growth has spurred resource-intensive lifestyles – a trend further exacerbated by population growth and a rising middle class. Between 1950 and 2010, the global population almost trebled in size, and real-World GDP increased sevenfold (Raworth, 2017). This has accelerated the build-up of greenhouse gases in the atmosphere, ocean acidification, pollution and biodiversity loss, the effects of which are increasingly being felt across the world, with the most vulnerable being disproportionately affected.

Rising income inequality and less inclusive societies, both within and among countries, is drawing more attention. The situation has been aggravated by the COVID-19 pandemic, and a growing number of governments are looking to ways of rectifying unsustainable social and economic trends.

As a result, there is a growing global consensus that growth must be sustainable – commonly understood to encompass the pursuit of economic growth while seeking to preserve the environment and reducing social inequalities. This is captured in the Sustainable Development Goals (SDGs).

Other international initiatives, like the Paris Agreement which was concluded at the COP21 in 2015, speak to the importance of ensuring that any growth objectives do not aggravate climate change. Under the Paris Agreement, countries made commitments to combat climate change and limit global warming to less than 2°C.

A number of authors have contributed ideas recently for repositioning industrial policy in our changing world. For instance, the OECD (2019) has argued for a new conception of economic progress – one that links together growth, well-being, greater equality and environmental sustainability.

As serious initiatives are underway by major economies to green the economy, integrating climate change and environmental considerations will be critical for Sri Lanka's industrial development strategy to be relevant and competitive in a rapidly changing global economy.

2.9.2 Current Status

The annual survey of industries by the Department of Census and Statistics recorded 21,295 industrial establishments in 2016. The manufacturing sector represents the largest industrial segment, with over 18,210 units. Industrial production, according to Central Bank Annual Report 2018, is the second largest contributor to GDP (15.5%), after services (26.1%), and employs 30% of the country's workforce. Textile, apparel and tea manufacturing are the most significant export-oriented sub-sectors.

According to the Energy Balance 2018 of Sri Lanka's Sustainable Energy Authority, the energy required for industrial needs came from several sources such as biomass (33%), petroleum oil (34%), and electricity (33%). Biomass is used in tea and rubber factories, bakeries, tile and brick industries and other small-scale industries. Fossil fuel is used for operating boilers, ovens and furnaces in other industries. The key industries contributing to GHG emissions are cement manufacture, lime production for construction industry, and industries using limestone and soda ash. However, the emissions from the industrial process is relatively low compared to the emissions from industrial energy consumption.

Some manufacturing industries have the potential for causing environmental damage by discharging waste products, which may be toxic and hazardous. Among industries of particular concern are textile dyeing and bleaching; paper; paints; cement; asbestos; leather tanning; rubber processing; food processing; distilleries;

manufacturing of agricultural and mineral products; and metal works. Industrial effluents are sources of toxic inorganic compounds containing heavy metals, as well as organic compounds.

Many industries operate with outdated technologies, equipment, poor infrastructure, low access to finance, knowledge and capacity gaps, and therefore, with negative impacts on the environment.

Micro-, small- and medium-scale enterprises (MSMEs) lack adequate knowledge and skills on practices of sustainable consumption and production (SCP). In addition, MSMEs show meagre economic surplus, cause high negative environmental impacts, generate excessive greenhouse gases and waste, including hazardous waste and show inefficient resource consumption and overall poor environmental performance. These concerns will be addressed under this theme of the NEAP.

Currently, the regulation of industries comes under the mandates and competence of multiple government institutions and agencies, including the Ministry of Industries, Board of Investment of Sri Lanka (BoI), the Ministry of Plantations, Sri Lanka Tea Board, Coconut Development Authority.

Hitherto, much effort has expended to resolve the problem of industrial waste management. The National Environmental Act (NEA) is the main legislative enactment under which several regulations pertaining to the discharge of pollutants have been gazetted. The main regulatory body is the Central Environmental Authority (CEA). Under the law, it is mandatory that an initial environmental examination (IEE) report or an environmental impact assessment (EIA) be prepared and approval obtained before certain prescribed industries are established. Under the NEA, the environmental protection licensing scheme requires existing industries - which produce considerable quantities of liquid waste - to have in-house waste water treatment plants.

Despite the range of legislative, administrative and regulatory actions established to improve the performance of industries in safeguarding the environment, pollution from industrial sources is still a common occurrence.

Given below are the industry-related main agencies categorized into three main groups according to the role of each organization. Ministries, line agencies and other organizations and chambers and industry associations and also under four main broad groups according to their principal roles and functions.

Table 2.9.1 Ministries, line agencies according to the principal roles and functions.

Facilitation Functions	**Ministries**	MoInd, MoP, MoPla, SMoSVR&I and Subject Specific Various State Ministries
	Line Agencies and other Organizations	BoI, CEB, CRI, DAP&H, EDB, IDB, ISB, ITI, LINDEL, NCPC, NEDA, NERD, RISC, RRI, SLEMA, SLSEA, SLSI, SLTDA, TRI and UDA
Regulatory Functions	**Ministries**	MoE and MoL
	Line Agencies and other Organizations	CDA, CEA, NWPEA and SLTB
Provision of Other Services		Academics, services providers in EE and environmental management, financiers, productivity, RECP, SCP, SLEMA and technology and equipment suppliers

Chambers and Industry Associations

The Ceylon Chamber of Commerce (CCC), Federation of Chambers of Commerce and Industry in Sri Lanka (FCCISL) and other national and regional chambers are industry stakeholders with the principal role of lobbying.

This multiplicity of organizations can be viewed with different perspectives. Positively, it can be treated as a strength, if it is possible to establish an institutional coordination mechanism with clearly identified

responsibilities and targets to bring together all these organizations with different competencies and the industry in a unified direction. In contrast, negatively, this multiplicity can be very complex fragmentation of industry sector, which is a challenge and a hindrance for collective actions towards sustainable development. Therefore, this multiplicity must be considered and appropriate remedial measures proposed when strategies and actions are developed for greening the industries and subsequent implementation.

2.9.3 Policy Legal and Legal Framework

As listed below, there had been many policy instruments such as policies, acts, regulations, strategies, etc. since 1955 related to industrial development:

1. Government sponsored Corporation Act No. 19 of 1955 and amended Act No. 55 of 1957;
2. State Industrial Corporation Act No. 49 of 1957;
3. Industrial Development Act No. 36 of 1969;
4. Industrial Promotion Act No 46 of 1990;
5. New Industrialization Strategy for Sri Lanka in 1995;
6. National Strategy for Small and Medium Enterprise Development in Sri Lanka (SME White Paper in 2002);
7. National Policy on Mineral Resources - 2017;
8. National Policy Framework for Small and Medium Enterprise (SME) Development – 2018; and
9. Labour regulations applied for manufacturing industry.

Even though majority of the above were conceptually good initiatives and developed with the involvement of either local or international scholars, there were many implementation issues because of poor governance and institutional arrangements. Most of the structural changes suggested to enhance the decision-making process on many occasions under different government regimes, either remained as proposals or abandoned prematurely. Therefore, only a few of the arrangement positively contributed to improving the industrialization process in Sri Lanka.

In addition, after 13th amendment to the constitution in 1987, industrial development became devolved subject, and respective Provincial Councils were empowered to establish their own agencies. This has led to the development of several important regional industrial initiatives lacking coordination and guidance from the national level, and therefore, without a focus on the overall economic development framework of the country. Similarly, as stated before, fragmented organization structures, cumbersome procedures and complicated regulatory frameworks were under various Ministries, Departments and Provincial Councils, resulting in not only poor coordination and collaboration, but also the duplication of services.

Like in many other countries, in Sri Lanka too, the linear economic model of “take-make-throw” has been the standard practice, along with a resource intensive and fossil fuel-based development approach. Therefore, none of the policies mentioned above had a focus of sustainability, green growth or low carbon development except some environmental management attempts though the focus was only on an ‘end-of-pipe’ treatment approach, rather than resource efficiency.

With the gradual shift of focus from linear to circular economic development around the world, Sri Lanka too started introducing sustainability focused policy instruments. One of the early attempts in this direction, was the introduction of the National Cleaner Production Policy and various other sectoral policies on cleaner production, promulgated by the Ministry of Environment, in collaboration with the Ministry of Industries. This effort was culminated with the introduction of national policies such as on sustainable consumption and production and waste management.

The current policy framework of the government provides broad guidelines and directions for a sustainable industrial development and promotion of all levels of local industries. In particular, on greening of industries,

it emphasizes increasing efficient resource use, creation of employment and safety of workplace, ensuring environment safety and complying with international standards.

Aligned with the government's policy framework, the Ministry of Industry now adopts several approaches to promote sustainable industrial development in the country – that is, environment-friendly industrialization and productivity improvement in the industry sector. Switching to greener and more efficient technologies will not only reduce emissions but will also generate energy savings for industries, while supporting low-carbon economic development and green jobs. In addition, the co-benefits of reduced air pollution, water pollution, and solid waste can be realized through improved energy and resource efficiency.

The Government is now focusing on creating a globally competitive, highly value-added, innovative, technology and knowledge-based industrial base, with a minimal adverse impact on the environment, which could boost the investor confidence, ensure a higher export income and promote sustainable development. To reflect this new direction, the Ministry of Industries is now in the process of formulating a National Policy for Industrial Development (NaPID) and a five-year Strategic Implementation Plan to operationalize the NaPID.

The Ministry of Industries is also exploring the possibility of implementing industry sector-based Nationally Determined Contributions (NDCs) through the design and implementation of technical, policy, regulatory and financial tools and mechanisms to accelerate the deployment of renewable energy, energy and resource efficiency technologies and best practices. These NDCs will enhance mitigation ambitions while embracing and incorporating resource efficiency, circular economy and other internationally acclaimed concepts.

2.9.4 Introduction to the Action Plan

Strategies and actions are proposed for greening the industries and eliminating sources of environmental degradation are aligned with the national policy framework - "Vistas of Prosperity and Splendour" and the national policy on sustainable consumption and production.

Several measures for consolidating resource efficient cleaner production in industries are detailed. These include reducing emission of pollutants and wastage of resources, targeting small and medium industries to exercise environmental care and social responsibility, promoting energy use efficiency, and where possible, switching to renewable energy use.

The establishment of eco-friendly industrial parks is proposed, while improving the environmental infrastructure in existing industrial estates. A scheme for establishing environmental performance criteria for the individual industries in the industrial estates is also proposed. Industries will be encouraged to obtain various ISO certifications. The promotion of the use of environmentally- friendly raw materials, encouraging industries to recover resources from selected wastes, and encouraging industries to green funding available for their renewable energy projects are also recommended.

2.9.5 Strategies for Management

Strategy 1. Enhance the application of Resource Efficient Cleaner Production (RECP) practices.

Strategy 2. Introduce the concept of Circular Economy.

Strategy 3. Promote the use of sustainable biomass energy and improve user efficiency.

Strategy 4. Promote eco-industrial parks.

Strategy 5. Introduce a special greening programme targeting SMIs and micro industries.

Strategy 6. Introduce Tri-generation facilities.

Strategy 7. Reduce emissions from industrial processes.

Strategy 8. Create an enabling environment through relevant policy instruments, institutional arrangements and legal framework.

Strategy 9. Introduce a monitoring system.

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2.9.6 Action Plan for Greening Industries

Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Strategy: 1 Enhance the application of Resource Efficient Cleaner Production (RECP) practices.											
1.1 Promote energy efficient appliances and technologies for relevant industries	Energy saving from:				✓	✓	✓	7.3			MoInd, MoP, SLTB, TRI, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, NERD, GBCSL, CEA, CIAs
	Efficient lighting	65 GWh		20 GWh per year (2.5% reduction)					2,000 (private) + 100.0 (facilitation)	SLSEA	
	High-Efficient Motors (HEM)	775 GWh		18 GWh per year (2.25% reduction)					1,500 (private)	NWS&DB	
	Variable Frequency Drives (VFD)	590 (Facilitated by the Energy NAMA Project)		2,900 GWh					725.0 (private)	SLSEA	
	Efficient chillers and refrigeration technologies (replacement with)	1,300 GWh		170 GWh					4,250 (private) + 125 (facilitation)	SLSEA	
	Absorption chillers	30 GWh		100 GWh					4,180 (100 X 41.8) (private)	MoInd	
1.2 Improve water use efficiency in relevant industries	% of relevant industries engaged	Baseline to be established		50% relevant industries	✓	✓	✓	6.4	60 (facilitation) + To be estimated (private)	MoInd	MoPP&L, NCPC, SLSEA, IDB, CDA, RRI, CEA, CIAs
1.3 Promote rainwater harvesting concepts and methodologies in relevant industries	% of relevant industries engaged	Baseline to be established		50% relevant industries	✓	✓	✓	6.4	30 (facilitation) + To be estimated (private)	MoInd	MoPP&L, NCPC, SLSEA, IDB, CDA, RRI, CEA, CIAs
1.4 Enhance resource efficiency in relevant industries through waste minimization, waste management, resource recovery and residual (sludge and sewage) processing	% of relevant industries engaged	Baseline to be established		50% relevant industries	✓	✓	✓	6.3 & 12.4	240 (facilitation) + To be estimated (private)	MoInd	MoPP&L, NCPC, IDB, CDA, RRI, ITI, service providers of WM, CEA, CIAs
1.5 Promote the use of renewable energy	No. of installations and MW installed	Baseline to be established		Target to be set	✓	✓	✓	7.2	70 (facilitation) + To be estimated (private)	SLSEA	MoP, CEB, MoInd, service providers of renewable energy, CIAs
1.6 Conduct comprehensive “Cleaner Production” (CP) audits / “Resource Tracking” (covering energy, water, materials and waste) and develop baselines (based on industry classifications and importance)	% and no. of industries CP and energy audits conducted	Baseline to be established		70% relevant industries	✓	✓	✓	9.4	200 (facilitation) + 400.0 (private)	MoInd	NCPC, SLSEA, SLEMA, CEA, service providers of SCP
1.7 Make waste load assessment mandatory for environmentally sensitive or polluting industrial sectors before issuing EPL	Legislation for Resource Efficient Cleaner Production	Voluntary system		RECP legislation introduced	✓			6.3, 6.4, 7.1, 9.4, 12.2, 12.4 & 12.5	10	CEA	MoE, MoInd, NCPC, SLSEA, SLEMA, service providers of SCP

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
Strategy: 2. Introduce the concept of Circular Economy.											
2.1 Conduct a survey to identify and determine the relevant industries and subsectors to implement circular economy concept	No. of industries and subsectors identified for circular economy	Baseline to be established		All relevant industries	✓			9.4, 12.4 & 12.5	25	MoInd	BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, Service providers of SCP and WM, CEA, CIAs
2.2 Introduce the life cycle approach for relevant industries and subsectors for greening the supply chain followed by a pilot demonstrational project	% of subsectors and industries engaged in greening the supply chain Pilot demonstration project	Baseline to be established		50% relevant industries Pilot demonstration project established	✓	✓	✓	12.4	30 (facilitation) + To be estimated (private)	MoInd	NCPC, service providers of SCP, CEA, CIAs
2.3 Practice industrial symbiosis concept in selected industrial parks or industrial subsectors	No. of subsectors and new IPs adopted industrial symbiosis	Baseline to be established		All subsectors and new IPs	✓	✓	✓	9.4	30	MoInd	BoI, RISC, IDB, NCPC, NEDA, ISB, UDA, LINDEL, CEA, service provider of SCP & WM, academics
2.4 Establish pilot projects on the zero-waste concept	No. of zero waste pilots in subsectors	Baseline to be established		10 industrial subsectors		✓		9.4, 12.4 & 12.5	30 (facilitation) + To be estimated (private)	MoInd	BoI, RISC, IDB, NCPC, NEDA, ISB, LINDEL, UDA, SCP & WM service providers, academics
2.5 Adopt the proposed ISO standards for circular economy concept (ISO/ITC 323) after the adoption by SLSI	% of industries adopted ISO/ITC 323	Baseline to be established		70% relevant industries		✓	✓	9.4, 12.4 & 12.5	100 (facilitation) + To be estimated (private)	MoInd	SLSI, BoI, RISC, IDB, NCPC, NEDA, ISB, LINDEL, UDA, service providers of SCP & WM, CIAs
2.6 Build industry capacity (awareness and training) to adopt circular economy concept	% of industries adopted circular economy concept	Baseline to be established		70% relevant industries	✓	✓	✓	9.4, 12.4 & 12.5	Included in 2.5	MoLands	NCPC, SCP & service providers of WM, CIAs, academics
2.7 Promote occupational health and safety measures	No. of industries engaged	Baseline to be established		All industries	✓	✓	✓	8.8	30 (facilitation) + To be estimated (private)	MoL, MoH	MoInd, RISC, BOI, IDB, NCPC, NEDA, ISB, UDA, service providers of EE, SCP and WM, CIAs, associations
2.8 Assist to reduce thermal, light, noise, visual, and radiation	% of industries assisted	Baseline to be established		80% relevant industries	✓	✓	✓	8.8, 9.4, 12.4 & 12.5	20	MoE	MoInd, CEA, ITI, NCPC, BoI, RISC, IDB, NEDA, ISB, UDA, SLAERC, SLAEB, service providers of EE, SCP and WM, CIAs
Strategy: 3. Promote the use of sustainable biomass energy and improve user efficiency.											
3.1 Enhance the availability of sustainable biomass for industry use	% of industries having access to sustainable biomass	Baseline to be established		100%	✓	✓	✓	7.2	To be estimated	SLSEA	MoInd, MoE, MoP, SLTB, TRI, SLTDA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, CIAs

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
3.2 Convert fossil fuel fired industrial boilers to sustainable biomass	No. of industrial boiler conversions	500		90	✓	✓	✓	7.2	2,250 (private)	SLSEA	MoInd, MoP, SLTB, TRI, SLTDA, CIAs
3.3 Introduce steam/hot water generators and advance controlling system with VFDs for tea drying process	No. of systems installed	10		90	✓	✓	✓	7.2 and 7.3	1,080 (private)	SLSEA	MoInd, MoP, SLTB, TRI, SLTDA, CIAs
3.4 Improve sustainable biomass user efficiency in industry	No. of improvements	500		300	✓	✓	✓	7.2 and 7.3	150 (private)	SLSEA	MoInd, MoP, SLTB, TRI, SLTDA, CIAs
3.5 Introduce sustainable biomass co-generation (electricity generation and thermal energy) in relevant industries	No. of systems installed	4		25	✓	✓	✓	7.2 and 7.3	2,500 (private)	SLSEA	MoInd, SLTDA, CIAs
3.6 Switch fossil fuel fired thermal energy generators to sustainable biomass energy in government institutions for thermal energy requirements - biomass fired hot water heaters in hospitals, prisons, armed forces, hostels, universities, etc.	No. of hot water systems installed	25		192	✓	✓	✓	7.2	115	SLSEA	MoH, MoD, MoEd
Strategy: 4. Promote eco-industrial parks.											
4.1 Transform existing industrial parks (IPs), incorporating maximum possible green industrial concepts (based on viability of redesigning and rebuilding existing infrastructure) to support environmentally-sound industries	No. of existing BOI EPZs transformed to eco IPs % of existing non-BOI IPs transformed to eco IPs	0		04 (BOI to upgrade existing infrastructure of wastewater treatment plants in Seethawaka, Horana, Koggala and Mawathagama EPZs) 50% Non-BOI IPs	✓	✓	✓	9.4	4,000	BoI, MoInd	RISC, IDB, ISB, LINDEL, UDA, CEA
4.2 Introduce policy and regulatory regime, including guidelines to ensure all new IPs will be set up as Eco IPs with special emphasis to high polluting industries, where SMEs adhere to green standards through incentives (such as credit/taxes) and regulations (such as EPLs)	Policy Package for Eco IPs	0		1		✓		9.4	No additional cost	MoInd	MoE, CEA, BoI, RISC, IDB, ISB, UDA, LINDEL, CIAs
Strategy: 5. Introduce a special greening programme targeting SMIs and micro industries.											
5.1 Promote "Resource Efficient Cleaner Production" (RECP) in SMIs by covering all possible areas: material, energy, water, waste, air, etc. (included in Action 1.6)	% of SMIs adopting RECP	Baseline to be established		50% relevant SMIs	✓	✓	✓	6.2, 6.3, 6.4, 7.2, 7.3, 8.4, 8.8, 9.4, 12.2, 12.4 and 12.5	Included in Action 1.6	MoInd	MoE, NCPC, SLSEA, RISC, IDB, NEDA, ISB, UDA, service providers of EE, SCP and WM, CEA, CIAs

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
5.2 Improve productivity through capacity building, value addition and process improvement and modernization	% of SMIs adopting productivity improvements	Baseline to be established		50% relevant SMIs	✓	✓	✓	6.2, 6.3, 6.4, 7.2, 7.3, 8.4, 8.8, 9.4, 12.2, 12.4 and 12.5	50 (facilitation) + To be estimated (private investment)	MoInd	NCPC, SLSEA, RISC, IDB, NEDA, ISB, UDA, service providers of EE, SCP and WM, CEA, CIAs
5.3 Facilitate to acquire energy efficient and environmentally sound technologies (E3STs)	% of SMIs acquiring E3STs	Baseline to be established		Target to be set	✓	✓	✓	6.2, 6.3, 6.4, 7.2, 7.3, 8.4, 8.8, 9.4, 12.2, 12.4 and 12.5	To be estimated	SLSEA	MoI, NCPC, RISC, IDB, NEDA, ISB, UDA, service providers of EE, SCP and WM, CEA, CIAs
5.4 Prepare SMIs for digital economy and industry 4th revolution	% of SMIs prepared for digital economy and industry 4th revolution	Baseline to be established		70% relevant SMIs	✓	✓	✓	9.c	50 (facilitation) + To be estimated (private investment)	MoInd	ICTA, RISC, IDB, NEDA, ISB, UDA, service providers of EE, SCP and WM, CIAs
5.5 Promote occupational health and safety measures (included in Action 2.7)	No. of relevant SMIs engaged	Baseline to be established		All relevant SMIs	✓	✓	✓	8.8	Included in Action 2.7	MoInd	MoL, RISC, IDB, NEDA, ISB, UDA, service providers of EE, SCP and WM, CEA, CIAs
5.6 Facilitate SMIs for EPL compliance	% of relevant SMIs facilitated	Baseline to be established		70% relevant SMIs	✓	✓	✓	6.2, 6.3, 6.4, 7.2, 7.3, 8.4, 8.8, 9.4, 12.2, 12.4 and 12.5	20 (facilitation) + To be estimated (private investment)	MoInd	CEA, NWPEA, NCPC, RISC, IDB, NEDA, ISB, UDA, service providers of EE, SCP and WM, CIAs
5.7 Formalize informal micro industries such as e-waste recyclers	No. of micro industries formalized	Baseline to be established		Target to be set	✓	✓	✓	8.3, 9.3, 9.4, 12.4 and 12.5	To be estimated	CEA	MoInd, CEA, LAs, IDB, NEDA, ISB
Strategy: 6. Introduce Tri-generation facilities.											
6.1 Carry out a rapid assessment of tri- generation[57] potential in prospective industrial parks	No. of rapid assessments completed	1		9	✓			7.2 and 7.3	0.5 x 9 = 4.5	SLSEA	BoI, MoI, academics
6.2 Carry out a detailed assessment in one of the industrial parks for piloting	Detailed assessment completed	None		1	✓			7.2 and 7.3	2.5	SLSEA	BoI
6.3 Develop business models and funding options	Business models and funding options completed	None		3	✓			7.2 and 7.3	1	BoI	MoI, SLSEA
6.4 Implement one tri-generation facility as a pilot project	Pilot tri-generation facility established	None		1		✓		7.2 and 7.3	6,500 (private investment)	BoI	SLSEA
6.5 Depending on the success of the pilot project, expand it into other prospective industrial parks and applications	No. of tri-generation facilities established	None		5			✓	7.2 and 7.3	32,500.0 (6,500 x 5) (private investment)	BoI	MoInd, SLSEA, CIAs

57 combined cooling, heat and power (CCHP)

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
6.6 Make provisions through policy instruments to have tri-generation for new industrial zones	Policy package	None		Policy package introduced			✓	7.2 and 7.3	No cost	MoInd	MoI, SLSEA, CIAs
Strategy: 7. Reduce emissions from industrial processes.											
7.1 Develop a road map for the enforcement of the Environmental (Stationary Sources Emission Control) Regulations, No. 01 of 2019 in the industrial sector, with particular emphasis on high polluting industries	Road map and code of practices	None		Road map and code of practices developed	✓			3.9, 6.3, 7.3, 9.4, 12.2, 12.4 and 12.5	To be estimated	CEA	MoE, MoInd, ITI, NBRO
7.2 Develop guidelines for (I) the medium and large industries and (ii) micro and small industries, for the effective adoption and compliance of the Environmental Regulations No. 01 of 2019	Guidelines	None		Guidelines established	✓			3.9, 6.3, 7.3, 9.4, 12.2, 12.4 and 12.5	To be estimated	CEA	MoE, MoInd
7.3 Establish an inventory of industries, their emission characteristics and compliance, covered in Schedule II - Instrument/Equipment Based Standards of the Environmental Regulations No. 01 of 2019 (i.e. thermal power plants, standby generators, boilers, thermic fluid heaters, incinerators, cupolas, ovens, furnaces and kilns)	Emission inventory	None		Emission inventory established	✓	✓		3.9, 6.3, 7.3, 9.4, 12.2, 12.4 and 12.5	10	CEA	MoE, MoInd, MoEn, CEB. SLSEA
7.4 Characterize industries for the operationalization of Schedule III – Pollutant-based Standards of the Environmental Regulations No. 01 of 2019, with particular emphasis on the two categories of (I) the medium and large industries and (ii) micro and small industries	Industries characterized	None		Industry characterization established	✓			3.9, 6.3, 7.3, 9.4, 12.2, 12.4 and 12.5	Included in Action 7.1	CEA	MoE, MoInd
7.5 Develop more specific standards and guideline for the control of emissions in industrial processes, in complementing Schedule III – Pollutant-based Standards and Schedule IV to VII on Fugitive Emission Standards of the Environmental Regulations No. 01 of 2019	Standard and guidelines	None		Standard and guidelines established	✓			3.9, 6.3, 7.3, 9.4, 12.2, 12.4 and 12.5	To be estimated	CEA	MoE, MoInd
7.6 Reduce GHG emissions of industrial processes in relevant industries	GHG reduction	-		Percentage and absolute amount of GHG reduction	✓	✓	✓	9.4, 12.2, 12.4 and 12.5	To be estimated	MoInd	MoE, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics
Strategy: 8. Create an enabling environment through relevant policy instruments, institutional arrangements and legal framework.											
8.1 Facilitate industries to adopt relevant ISO systems such as ISO 14001, ISO 14064-1 (updated), ISO 22000, ISO 50001 and OSHAS 18000/ ISO 45000, etc.	% of industries adopting various ISO systems	Baseline to be established		25% of relevant industries	✓	✓	✓	7.3, 8.8, 9.4, 12.2, 12.4 and 12.5	To be estimated	MoInd	SLSI, BoI, RISC, IDB, NEDA, ISB, UDA, LINDEL, NCPC, service providers of EE, SCP and WM, CEA, CIAs

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Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
8.2 Introduce and promote suitable financial and non-financial incentives to promote the acquiring of sustainable technologies (e.g. soft loans)	Financial and non-financial incentives	Baseline to be established		50% of relevant industries	✓	✓	✓	8.3 and 9.3	1,000 (coupled with an ongoing programme)	MoInd	MoF, CEA
8.3 Facilitating the entry of environment related ISO certified companies to enter the Sustainable (Green) Public Procurement system of Sri Lanka	No. and % of environment related ISO certified industries entering into Sustainable (Green) Public Procurement system	None		Target to be set	✓	✓	✓	12.7	To be estimated	MoE	MoInd, MoF
8.4 Facilitate transformational investment, favourable loans through financing institutions linking with green financing in line with "Sustainable Financing Roadmap" developed by the Central Bank (combined with 8.2)	No. and % of industries benefitting from green financing	Baseline to be established		Target to be set	✓	✓		9.3	250	MoInd	MoE, MoF
8.5 Strengthen national policies to address industrial zoning issues, siting of industrial parks and stand-alone industries, to introduce new concepts such as circular economy, industry ecology, RECPs, digitalization	Policy package	None		Policy package strengthened	✓			8.3 and 9.4	10	MoInd	MoE, CEA, SDC, relevant CIAs, academics
8.6 Ensure the availability of sustainable biomass for industry use, through necessary facilitation and coordination, with relevant policy making and regulatory authorities, by adopting policy tools such as SLSI 1551	% of industries with access to sustainable biomass	Baseline to be established		100% of relevant industries	✓	✓	✓	7.2	50	SLSEA	DoF, MoP, MASL
8.7 Strengthen national policies, legal and institutional frameworks for greening industries	Policy package	None		Policy package strengthened	✓			9.4, 12.2, 12.4 and 12.5	10	MoE	MoI, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics
8.8 Introduce to the industrial sector sustainable chemical management systems	National Chemical Policy	Draft policy		National Chemical policy introduced	✓				10	CEA, RoP	MoE, MoH, MoD, MoInd, ITI, SLSI, NDDCB, Excise Dept, Import and Export control, SLC, BoI, MoEn, DMC, MEPA, MoA, MoF, academics
	Chemical management strategy and action plan	None		Chemical management strategy and action plan developed	✓						
	Chemical management regulations	None		Chemical management regulations introduced	✓						
	Implementation of the strategy and action plan	None		Strategy and action plan implemented	✓						
	Regular update of national chemical profile (once in every 3 yr)	Existing profile		Updated chemical profile	✓	✓					
8.9 Introduce "SCP Education Package" developed by MoE for industry training and awareness programmes, with required amendments	SCP Education Package for industry	SCP Education Package for university education		SCP Education Package for industry developed and introduced	✓			3.9, 7.2, 7.3, 8.4, 9.4, 12.2, 12.4 and 12.5, 12.7, 13.3	10	MoE	MoI, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics

NATIONAL ENVIRONMENTAL ACTION PLAN 2022-2030: Pathway to sustainable development

Actions	Key Performance Indicators (KPIs)	Baseline		Target	Time Frame (in yr)			Relevant SDG Target/s	Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
8.10 Introduce Sustainable Public Procurement (SPP) system of Sri Lanka	SPP	Draft available		SPP introduced	✓			12.7	No additional cost	MoE	MoInd, MoF, CEA, SLSI, SLAB, MoPP&L, SLIDA, DCS, CIAs
8.11 Operationalize the Sustainable Public Procurement (SPP) system of Sri Lanka	No. of products and services included in SPP	Not formally practised		Target to be set		✓	✓	12.7	30	MoE, MoF	MoInd, CEA, SLSI, SLAB, NPS, MoPP&L, SLIDA, DCS, CIAs
8.12 Introduce a national framework for eco-labelling followed by a national generic eco-label	Eco-labelling Framework	Draft eco- labelling Framework		Eco- labelling Framework established	✓			9.4, 12.2, 12.4 and 12.5, 12.7	To be estimated	MoE	MoInd, SMoSVR&I, SLSI, SLAB, CEA, SDC, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics, EDB, CAA
	No. of schemes registered	None		Target to be set	✓	✓	✓				
	National generic eco-label	None		National generic eco-label introduced	✓	✓					
	No. of products and services specific eco-labels introduced	None		Target to be set	✓	✓	✓				
8.13 Promote the adoption of green building concepts to industries	No. of industries green building concept adopted	Baseline to be established		Target to be set	✓	✓	✓	6.4, 7.2 and 7.3, 8.4, 9.4, 12.2, 12.4, 12.5	25	SLSEA	MoInd, MoE, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, ICTAD, NERD, GBCSL, SLIA, IESL, CIAs, CEA, academics
8.14 Facilitate the appointment of sustainability managers or sustainable officers depending on the scale of industries	% of relevant industries appointing / designating sustainability managers / sustainability officers	Baseline to be established		40% of relevant industries	✓			3.9, 6.3, 6.4, 7.2, 7.3, 8.4, 9.4, 12.2, 12.4, 12.5, 12.6, 12.7	20	MoInd	MoE, UGC, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs
8.15 Promote green jobs	% of relevant industries creating green jobs	Baseline to be established		40% of relevant industries	✓	✓	✓	8.3, 8.9, 12.6	20	MoInd	MoE, MoEn, SMoSVRI, VTA, NAITA, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs
8.16 Facilitate the development of emergency preparedness and business continuity plans for industries	No. of industries with emergency preparedness and business continuity plans	Baseline to be established		Target to be set	✓	✓		11.c	30	MoInd,	DMC, MoE, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, CEA, Labour Dept., academics
8.17 Conduct a national level public awareness campaign on greening industries through print and electronic media	Public awareness on greening industries	Present level of public awareness on greening industries		Public awareness on greening industries increased	✓	✓	✓	4.7, 12.8	50	MoInd	MoMM, MoE, CAA, media, CBOs, CEA, consumer societies
8.18 Motivate and reinforce community/individuals to consume green products and services through behavioural and attitude changes	No. of green products and services promoted	Baseline to be established		Target to be set	✓	✓	✓	12.8	40	CAA	MoMM, MoInd, MoE, media, CBOs, consumer societies
8.19 Promote ethical behaviour of industrialists	No. of programmes promoting ethical behaviour of industrialists	Baseline to be established		Target to be set	✓	✓	✓	12.8	40	CPA	MoMM, MoInd, MoE, CEA, media, CBOs, consumer societies

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
8.20 Addressing public issues related to operation of industries	Mechanism for addressing public grievances	Existing mechanism on attending public complaints.		Updated mechanism					10	CEA	MoE, MoInd, IP operators, LAs, SLP, UDA, MoH, DMC, SMoPC&LG
8.21 Promote ethical and responsible advertising to promote green products and services while discouraging the consumption of potentially harmful products and services	No. of ethical and responsible advertisements	Baseline to be established		Target to be set	✓	✓	✓	12.8	30	CAA	MoMM, MoInd, MoE, media, CBOs, consumer societies
8.22 Promote National Green Reporting System (NGRS) as an encouragement for industries to embrace low carbon initiatives	No. of green reporters registered and reported	10		Target of 20% annual increase of registrations and 50% annual report submissions	✓	✓	✓	12.6	20	MoE	MoInd, CEA, SDC, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CCC, ITI, CIAs
8.23 Promote the adaptation of green initiatives through the National Environmental Awarding scheme	No. of applicants	100 applicants		Target to be set	✓	✓	✓	9.4, 12.2, 12.4 and 12.5, 12.7, 12.b	120 (12.0 per year)	CEA	MoE, MoInd, MoST, SLSI, SLAB, SDC, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs
Strategy: 9. Introduce a monitoring system.											
9.1 Introduce / adopt International Standard Industrial Classification (ISIC) for relevant industry categories	% of industry categories ISIC classification adopted	Different organizations follow different classifications		100%	✓			-	20	MoInd	MoE, DCS, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics
9.2 Establish a fully-fledged database covering all categories of industries	Industry database	Stand-alone databases of different organizations		Fully fledged industry database established	✓	✓		17.18	200	MoInd	MoE, DCS, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs, academics
9.3 Introduce a monitoring system for industries for the purpose of progress tracking of various sustainability initiatives / EPL and SWML compliance and for international communications (NDCs, SDGs, etc.)	Proper monitoring system	No proper monitoring system		Proper monitoring system established	✓	✓		3.9, 6.3, 6.4, 7.2, 7.3, 8.4, 9.4, 12.2, 12.4, 12.5	Included in 9.2	MoInd	MoE, DCS, CEA, SDC, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, CIAs
9.4 Upgrade the existing EPL and SWML system from an “end of pipe treatment” approach to a “resource efficiency” approach, focusing on waste minimization and incorporating the polluter pay principle	EPL and SWML with necessary regulations	Present EPL and SWML systems		EPL and SWML updated with necessary regulations	✓	✓		6.3, 6.4, 7.2, 7.3, 8.4, 9.4, 12.2, 12.4, 12.5, 12.6	20	CEA	MoE, MoInd, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, NWPEA, CIAs, academics

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					S 1-2	M 2-5	L 5-10			Lead Agency	Other Key Agencies
9.5 Ensure industry compliance of EPL and SWML	% EPL and SWML compliance from eligible industries	EPL – high polluting 60-70%, medium polluting 50%, low polluting 25% SWML –around 80% applied industries (about 800 industries)		EPL – high polluting 100%, medium polluting 90%, low polluting 70%	✓	✓	✓	6.3, 6.4, 7.2, 7.3, 8.4, 9.4, 12.2, 12.4, 12.5, 12.6	No additional cost	CEA	MoE, MoInd, DCS, BoI, RISC, ITI, IDB, NEDA, ISB, LINDEL, UDA, NCPC, NWPEA, CIAs, academics
9.6 Introduce ICT based remote monitoring systems to track the environmental performance of selected high polluting industries	Remote monitoring system	0		Remote monitoring system established	✓	✓		6.3, 12.4, 12.5	To be estimated	CEA	MoE, MoI, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NWPEA, CIAs, academics
9.7 Facilitate the establishment of industry “sectoral benchmarks” for “green indicators”	No. of sectoral benchmarks for green indicators	0		5 sectors (tea, textiles, garments, hotels, cement)	✓	✓		6.3, 6.4, 7.2, 7.3, 8.4, 9.4, 12.2, 12.4, 12.5	75	MoInd	MoE, CEA, SLSEA, BoI, RISC, IDB, NEDA, ISB, LINDEL, UDA, NCPC, NWPEA, CIAs, academics

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CHAPTER 3

RESOURCE MOBILIZATION

3.1 INTRODUCTION

The purpose of this chapter is to address the economics and financial dimensions of the NEAP. Firstly, it provides the conceptual framework, which depicts the complementary nature of environmental planning and economic development in reinforcing each other's dimensions, rather than its traditionally assumed contradictions. Secondly, it provides a framework for costing and valuation of the proposed environment actions for each theme. Finally, the potential sources of traditional and alternative financial solutions are explored, to support the implementation of the NEAP.

Sri Lanka's population, which was seven million at the time of its independence, has more than trebled since then, exerting increased pressure on the country's stock of natural resources. In addition, the island and its people have become increasingly vulnerable to global environmental challenges such as impacts of climate change, loss of biodiversity and over-use of natural resources. While the country's stock of natural resources is a valuable input to its economic development, in contrast, its depletion because of developmental pressure and human activity threatens the very survival of humans. Thus, the economic focus in environmental planning should be to manage economic development and human activity with the sustainable and efficient use of environmental resources and integrate these elements into sectoral and cross-sectoral plans, programmes and policies.

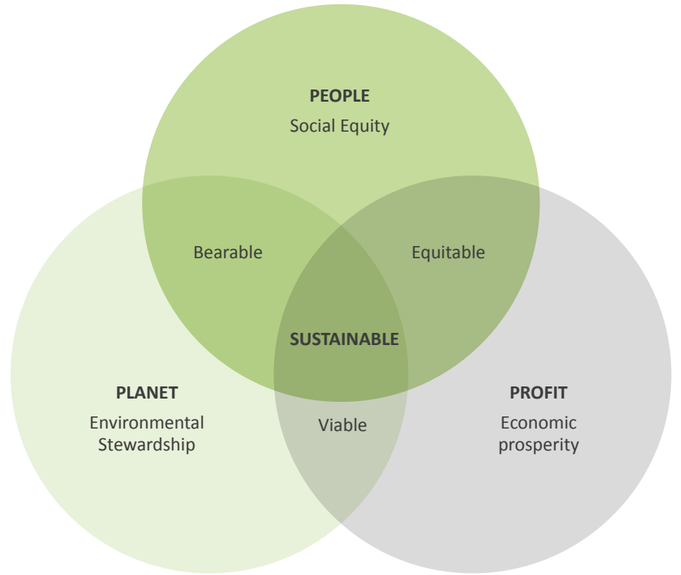

Figure 3.1. The Triple Bottom Line

Sustainability is defined by three core elements, each of which must be considered carefully in relation to the others: environmental sustainability (environmental protection), economic sustainability (economic viability) and social sustainability (social equity) (Figure 3.1). Thus, environmental sustainability is one of the three elements which play a vital role in achieving sustainable development. From a business perspective, the Triple Bottom Line of sustainable development is constituted by three pillars as people, planet and, profit (3Ps). Currently, businesses tend to follow the concept of the triple bottom line, recognizing the need to strike a balance among the three elements, in order to succeed in a dynamic, competitive and challenging business environment. Apart from the long-term benefits associated with conservation and sustainable use of natural resources, the triple bottom line improves the international competitiveness of production in global markets, where there is an increasing demand for sustainable production and consumption.

3.1.1 Financing Environmental Conservation and Management

Because of the need to safeguard the nation's stock of natural resources, it is important that there should be a sustainable mobilization of public and private finances to achieve sustainability. Conservation finance is one of the available mechanisms, which includes investment strategies that sustainably manage the environment. Public or government funding has been the conventional source of funding for investments in environmental conservation and management. Traditionally, the financial costs of environmental conservation and sustainable use of natural resources were considered to be additional costs to the government, business and household sectors. The governments of developing countries often face difficult trade-offs when allocating public funds for environment management because of budgetary constraints and competing priorities. As a result, it is not unusual that there is insufficient financing for environmental conservation and management. In addition, the combination of technical, financial and institutional issues has resulted in poor and unreliable services, subsidies and taxes, which are difficult to be justified on both economic and social grounds and negative environmental externalities. For instance, in many developing countries popular policies applied on transport, fuel, electricity, and agriculture appear to have not been guided by the justifiable economic and social conditions, and have resulted in adverse environmental outcomes.

There is a wide gap between available finance and the expenditure needed to achieve SDGs at global, as well as local levels. Therefore, exploring innovative financing mechanisms to achieve the SDGs is essential to meet the financing gap, as well as for stimulating the businesses and individuals to internalize the externalities. This will need greater commitments from different sectors to generate required finance beyond traditional public finance and international loans. Therefore, the collective efforts from governments, the private sector and CSO/NGOs will be key drivers to reshape markets to be more inclusive, equitable and sustainable.

For long-term stability of the environmental sector, it must be financially sustainable. The best way is to generate finance from resource users and those who are creating environmental externalities, rather than relying solely on public financing. Therefore, investments in the environmental sector could be financed from user payment schemes such as payments for ecosystem services or with economic and market-based instruments like green taxes (levies), tradable permits based on the polluter pays principle. However, reducing the need of financing for environmental conservation and enhancing the efficiency of existing financing is also equally important to ensure the financial sustainability of investments in the environmental sector.

3.2 APPROACH TO COSTING, VALUATION AND FINANCING

The framework used for resource mobilization chapter is presented in Figure 3.2.

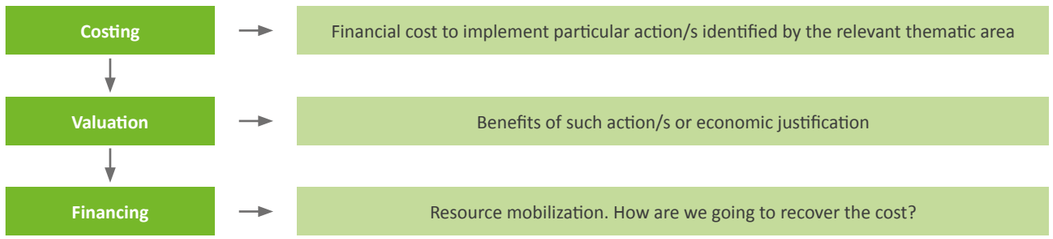

Figure 3.2. Framework for Costing, Valuation and Financing

3.2.1 Costing

Budget estimates are an integral component of the NEAP. Any actions identified by the thematic areas, carry both financial costs and benefits. While the costing process consists of a step-by-step approach (Figure 3.3), the cost estimates are based on three alternative sources. According to the step-by-step approach, the prioritized actions under each thematic area are costed using available cost data. However, given the limitations of the availability of data, the costing exercise is based on the following three alternative sources. It is important to note that all cost estimates are indicative and are not exact.

Fully-costed initiatives: Some of the prioritized actions of the NEAP have been already costed fully in the relevant sectoral programmes and projects prepared in the country. The recent documents of this type include the Biodiversity Financial Needs Assessments in Sri Lanka (BIOFIN); the National REDD+ Investment Framework and Action Plan (NRIFAP); the National Action Programme for Combating Land Degradation 2015-2024 (NAP-CLD); the National Adaptation Plan for Climate Change Impact in Sri Lanka 2016-2025(NAP-CC); the National Biodiversity Strategic Action Plan 2016-2022 (NBSAP); the National Action Plan for Haritha Lanka Programme, 2009-2016 and 2015-2022; the National Water Supply and Drainage Board (NWSDB) Corporate Plan; the Clean Air 2025 Action Plan - Plan for Air Quality Management; the National Environmental Action Plans (NEAP) 1998-2001, 2003-2007, 2007-2012; the National Water Use Master Plan of 2014, National Aquaculture Development Authority (NAQDA) Annual Report 2018; the Coastal Zone and Coastal Resource Management Plan, 2018; and the draft Sri Lanka Tourism Action Plan 2020-2023. In addition, for some proposed actions, cost estimates were also gathered from the key informants and stakeholder consultations.

Partially-costed activities: when the fully-costed actions were unavailable, the second approach to costing was based on partially-costed activities. Under this approach, costing information available from relevant documents, institutions, and key informants were taken as baseline data. Then, these data, representing cost norms were transformed into cost approximates of the prioritized actions of the NEAP.

No-cost activities: once the above two approaches were completed, what was remaining were the activities which did not reveal any documentary evidence on costing. The approach used for these actions was the expert judgments and approximations based on available values elsewhere. All the available cost estimates taken from the above sources are included in the specific action plans of nine thematic areas. Further, there are instances where some actions require preliminary work, and such actions are expected to be costed when such information is available while the NEAP is implemented.

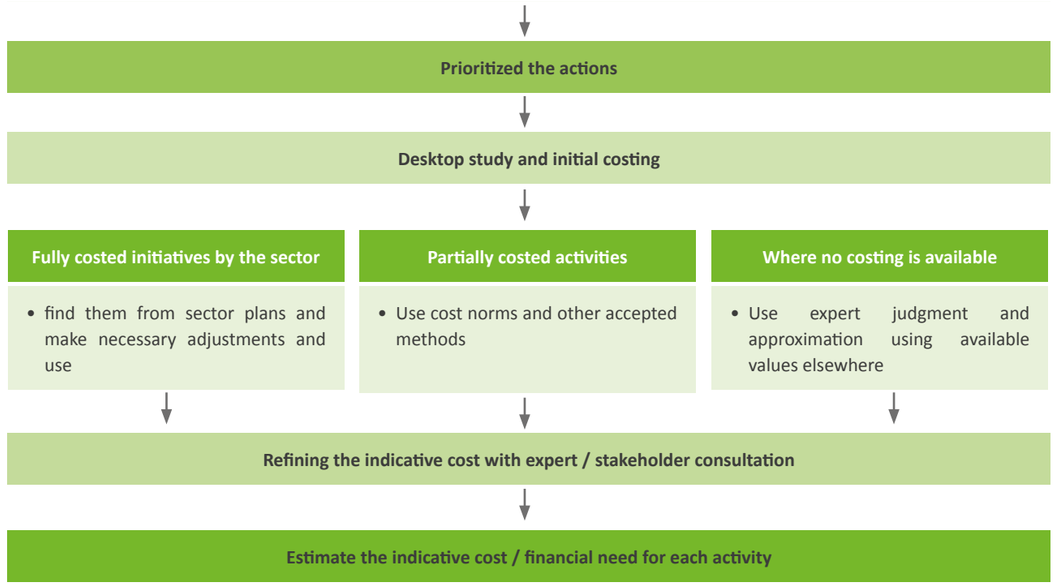

Figure 3.3. Indicative Cost Estimation Process

Table 3.1. Summary of Indicative Budgets[61]

No.	Strategy	Indicative budget (LKR M)
Theme 1: Action Plan for Air Quality Management		
Strategy 1	Effectuate a sound institutional framework for integrated AQM, while fostering advocacy, governance and stakeholder participation	18
Strategy 2	Manage air pollution from mobile sources	1,342
Strategy 3	Manage air pollution from stationary sources	297
Strategy 4	Manage indoor air pollution issues	151
Strategy 5	Prevent air pollution due to unethical, unintentional and harmful actions	185
Strategy 6	Reduce air pollution by deploying environmentally sound technologies, processes and cleaner fuels	2,030
Strategy 7	Establish comprehensive and integrated air quality monitoring network and modelling facilities, with a centralized data sharing platform	1,475
Strategy 8	Encourage information and knowledge management, including citizen science, for better air quality	50
Strategy 9	Foster innovation, research and development for effective AQM	163
Strategy 10	Enhance global participation and collaboration for furthering AQM	No additional cost
Total indicative budget for Theme 1		*5,711*
Theme 2: Action Plan for Biodiversity Conservation and Sustainable Use		
Strategy 1	Optimize the conservation of ecosystems, their services and integral biodiversity, through a well-connected and effective protected area system and other area-based conservation measures.	7,647
Strategy 2	Ensure viable populations of native species in all terrestrial and aquatic systems	349
Strategy 3	Mainstream the wise use, fair and equitable sharing of benefits arising from fauna, flora and the genetic resources	16
Strategy 4	Safeguard and promote traditional knowledge and practices in biodiversity conservation and sustainable use	9
Strategy 5	Assess and apply economic values of biodiversity and ecosystem services in decision making	30
Strategy 6	Promote research, ensure data governance and sharing for evidence-based decision making and communication	55
Strategy 7	Apply necessary policy frameworks, legal and organizational arrangements for biodiversity conservation and sustainable use	45
Total indicative budget for Theme 2		*8,151*
Theme 3: Action Plan for Climate Actions for Sustainability[58]		
Strategy 1	Strengthen enabling environment through policy support, legal and institutional framework related to climate change	24
Strategy 2	Assess vulnerability and build resilience to address adverse impacts of climate change	625
Strategy 3	Reduce greenhouse gas emissions through low carbon development pathways	43,520
Strategy 4	Manage losses and damages due to climate-induced disasters	to be estimated
Strategy 5	Enhance national capacity through the creation of awareness, education, research and development, technology transfers and information dissemination for climate change mitigation and adaptation	to be estimated
Strategy 6	Strengthen partnerships and resource mobilization for adapting to climate change impacts and mitigating greenhouse gas emissions	15
Total indicative budget for Theme 3		*44,184*
Theme 4: Action Plan for Conservation and Sustainable Use of Marine and Coastal Resources		
Strategy 1	Conserve, manage and sustainable use coastal and marine ecosystems	515
Strategy 2	Conserve marine mammals and other threatened species	80
Strategy 3	Conserve, sustainably develop and manage coastal and marine resources	1,199
Strategy 4	Administer and manage affected areas along the coast	6,058
Strategy 5	Control coastal and marine pollution	645
Strategy 6	Control sand mining and mange extraction of other mineral resources to enhance beach stability, habitat and biodiversity conservation	210
Strategy 7	Adapt to climate change and natural hazards impacts on coastal features, infrastructure, coastal communities and livelihoods	240
Strategy 8	Carry out research and development to support the conservation and sustainable use of marine and coastal resources	168
Strategy 9	Strengthen policy, legal and institutional framework for coastal and marine conservation and sustainable use	2,891
Total indicative budget for Theme 4		*12,006*
Theme 5: Sustainable Land Resources Management		
Strategy 1	Align policy and legislative support for sustainable land management	93
Strategy 2	Practise sustainable management of lands in critical natural ecosystems and environmentally sensitive areas	300
Strategy 3	Ensure sustainable land use in agriculture	4,250
Strategy 4	Conserve and practise sustainable management of grasslands (pathana, savanah, damana, villu and production grasslands)	130
Strategy 5	Minimize disaster impacts on land resources	3,295
Strategy 6	Facilitate sustainable land management through Information and Communication Technology (ICT) options.	105
Strategy 7	Mobilize resources for SLRM (institutional strengthening, governance, capacity building, and awareness creation)	1,493
Strategy 8	Promote sustainable management of mineral resources	2,170
Strategy 9	Strengthen international cooperation for SLRM	1,130
Total indicative budget for Theme 5		*12,966*

58 Most costs are to be estimated with additional information to be generated during NEAP implementation

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No.	Strategy	Indicative budget (LKR M)
Theme 6: Holistic Waste Management		
Strategy 1	Ensure a sound waste administration and operation for Integrated Sustainable Waste Management, while fostering governance, information, advocacy, compliance and stakeholder engagement	663
Strategy 2	Effect maximum conversation of resources in waste management through prevention and reduction	1,690
Strategy 3	Ensure sustainable management of plastics and other recyclables	28,210
Strategy 4	Manage the biodegradable waste component through biological treatments	9,479
Strategy 5	Exploit treatment with an energy recovery option for management of non-recyclable and non-usable waste	204
Strategy 6	Manage final disposal sites	2,114
Strategy 7	Manage hazardous waste	460
Strategy 8	Foster innovation, research and development to support holistic waste management	215
Strategy 9	Enhance global participation and collaboration for furthering holistic waste management	5
Total indicative budget for Theme 6		*43,040*
Theme 7: Integrated Water Resources Management		
Strategy 1	Ensure environmental safeguards in providing access to safe drinking water for a healthy nation	990,015
Strategy 2	Provide safe sanitation and prevent contamination of surface and ground water bodies with sewage	360,200
Strategy 3	Improve water quality of rivers, lakes, reservoirs/tanks and ground water by reducing pollution	2,940
Strategy 4	Promote watershed management for the sustainability of water resources	510
Strategy 5	Increase water conservation and water use efficiency in all sectors	220
Strategy 6	Improve irrigation system management for conservation of water	10,020
Strategy 7	Improve ground water management	420
Strategy 8	Minimize salt water intrusions	630
Strategy 9	Reduce water-induced disasters, such as floods and droughts.	270
Strategy 10	Assure water security of the nation	348,130
Strategy 11	Implement IWRM at all levels	85
Strategy 12	Introduce new policy and institutions for improved water resources planning and management	170
Strategy 13	Promote awareness, capacity building and community mobilization	120
Strategy 14	Strengthen water related research	1,100
Total indicative budget for Theme 7		*1,714,830*

No.	Strategy	Indicative budget (LKR M)
Theme 8: Environment Management in Cities and Human Settlements		
Strategy 1	Ensure spatial sustainability through integrated planning and rational zoning with land compactness, optimum mix-use and social-use	43
Strategy 2	Secure urban governance and resilience	166
Strategy 3	Develop sustainable energy with enhancing energy efficiency, harnessing renewable energy and rational use of energy	287,678
Strategy 4	Establish energy efficient and environmentally sustainable transport systems	237
Strategy 5	Promote and facilitate green and high-performance building and infrastructure as well as smart ICT	230
Strategy 6	Foster urban biodiversity and ecosystem services	107
Strategy 7	Promote circularity and sustainability for green growth	303
Strategy 8	Further social mobilization to ensure inclusion, empowerment and equity	138
Strategy 9	Enhance global participation and collaboration for liveable cities and human settlements	No additional cost
Total indicative budget for Theme 8		*288,902*
Theme 9: Action Plan for Greening Industries		
Strategy 1	Enhance the application of Resource Efficient Cleaner Production (RECP) practices	13,890
Strategy 2	Introduce the concept of Circular Economy	265
Strategy 3	Promote the use of sustainable biomass energy and improve user efficiency	6,095
Strategy 4	Promote eco-industrial parks	4,000
Strategy 5	Introduce a special greening programme targeting SMIs and micro industries	120
Strategy 6	Introduce Tri-generation facilities	39,008
Strategy 7	Reduce emissions from industrial processes	10
Strategy 8	Create enabling environment through relevant policy instruments, institutional arrangements and legal framework	1,825
Strategy 9	Introduce a monitoring system	315
Total indicative budget for Theme 9		*65,528*
Total indicative budget for all thematic areas		**2,195,318**

No.	Strategy	Indicative budget (LKR M)
Resource Mobilization Action Plan		
Strategy 1	Create enabling conditions for effective resource mobilization for NEAP	25
Strategy 2	Streamlining resource mobilization and fund utilization by the government for NEAP	48
Strategy 3	Enhance resource mobilization through multilateral donor agencies and trust funds	11
Strategy 4	Enhanceresource mobilization with alternative financing tools	585
Strategy 5	Enhance environmental outcome and reducing environment pressure through Reciprocity, Suasive Tools and Community Empowerment	57
Strategy 6	Commencing Green Accounting practice in Sri Lanka	25
Total indicative budget for action plan for resource mobilization		**751**
Implementation and Monitoring Action Plan		
Strategy 1	Ensure enabling conditions for successful implementation of the NEAP	148
Strategy 2	Effective tracking of the implementation of the NEAP	101
Total indicative budget for action plan for implementation and monitoring		**249**
Action Plan for Information and Knowledge Management for Green Growth		
Strategy 1	Coordinate and incentivise knowledge generation for environmental management	182
Strategy 2	Guide and empower decision - makers, with timely access to quality data and information	173
Strategy 3	Influence behaviour and attitudinal change through awareness and advocacy	254
Strategy 4	Promote quality and lifelong environmental and sustainability-oriented education	852
Strategy 5	Build capacities and access financing for research, innovation and monitoring change	267
Total indicative budget for action plan for Information and Knowledge Management for Green Growth		**1,728**
Total indicative budget to implement NEAP		**2,198,046**

3.2.2 Valuation

"The basic aim of ecosystem valuation to facilitate more equitable, sustainable, inclusive and informed decision-making, by articulating in monetary terms the economic importance of ecosystem services for human well-being" (BOBLME, 2014).

Environmental valuation is important in the context of public policy-making, in relation to the environment, and it is also important as a measure of the cost of damages to the environment (or in contrast, of the benefits of improvement to environmental quality), as it allows for the costing of the degree/value of the damage, as well as provision of the economic justification for the investment. The low priority and the insufficient investments in environmental infrastructure, particularly in developing countries, are partly due to insufficient documentation of the benefits of such improvements. Therefore, it is important to demonstrate and value such benefits/demands through valuation, to document evidence for the benefits of investments in environmental conservation and management.

Environmental valuation is also needed to assess the potential for cost recovery (through, for example, restoration), leveraging private financing because attracting private investors for investing in environment is

a critical strategy to achieve the aims of the SDGs. For this purpose, it is important to describe to them the economic benefits of such an investment by assessing the benefits of avoiding the environmental damages (as avoided cost is a benefit).

Environmental valuation will also increase awareness and inform policy decisions on resource allocation and efficient management and provides the required inputs for the cost-benefit performance on management policies/programmes.

In a wider social context, valuing environmental benefit is essential to evaluate environmental policy changes. Economic analyses can measure how beneficial environmental improvements would be for resource users and more importantly, how to design the management policies in a more efficient, equitable and sustainable manner. Unfortunately, such changes related to environmental quality are not reflected in daily market transactions as they are not captured because of market imperfections.

Table 3.2. provides annotated examples of valuation estimates for each thematic area and brief explanations of how such estimates provided the justification for financing to implement proposed strategies in the NEAP.

Table 3.2: Selected valuation studies applicable to NEAP

(Note that values given have not been converted to current values.)

Article	Key Findings	Linkage with NEAP action plan
Theme 1: Air Quality Management		
Air Quality and Cement Production: Examining the Implications of Point Source Pollution in Sri Lanka Source: Bogahawatte & Herath, 2008	1. The study estimates that the expected annual welfare gains by reducing the Suspended Particulates Matter (SPM) level by 50% is LKR 699 per representative individual, while the annual welfare gain to all people living in the vicinity of the factory is LKR 2.96 M. 2. A 100% reduction in SPM levels will meet WHO standards. This will result in an annual gain per individual of LKR 1,398 with the annual gain to the community being about LKR 6 M.	This study shows that investing in air quality improvements will produce vast welfare gain, avoid future health expenditures on airborne health impacts and enhance the productivity of the people. True benefits may be higher than what is shown because the amount shown may reflect only part of the total benefits/willingness to pay (WTP) of air quality improvements. This study therefore, strongly justifies the financing of the series of air quality improvements proposed under different strategies of Theme 1 of the NEAP.
Health cost of urban air pollution in Sri Lanka: an empirical analysis in Kandy city Source: Karunarathna, et al., 2019	1. The study investigates the health cost attributable to air pollution in Kandy city area in Sri Lanka. They calculated the burden of diseases attributable to air pollution which is approximately 2.7% of their monthly income. Accordingly, the average medical expenditure was LKR 1,214 per month per person and the average exposure to the polluted environment was 170 hours per person per month. 2. Monthly mean willingness to pay for avoiding pollution induced health risk as LKR 1,314 per person per month.	This reflects that pollution control is an essential task in the city area and air quality improvements will certainly produce huge welfare gain and avoid the future health expenditures on airborne health impacts and enhance the productivity of the people. True benefits may be higher than that because it may reflect part of the total benefits/WTP of air quality improvements. Therefore, this study strongly justifies improving quality by controlling air pollution is more important as proposed in different strategies under the Theme 1 of NEAP.

Article	Key Findings	Linkage with NEAP action plan
Theme 2: Biodiversity Conservation and Sustainable Use		
Assessment of the Economic Value of Muthurajawela Wetland Source: Emerton & Kekulandala, 2003	1. According to this study, the direct and indirect economic value of wetland has been assessed. The results shown that, Muthurajawela has a high direct and indirect economic value of LKR 726.5 M a year, or LKR 0.24 M/ha. 2. The study shown that, Muthurajawela is worth an average of almost LKR 23,000 a year to each of more than 30,000 beneficiaries. Wetland agriculture (more than LKR.150,000 per beneficiary per year), waste and sewage treatment (more than LKR 180,000 and flood control services contribute by far the highest economic value on a per capita basis.	The action plan of Theme 2 highlighted the importance of enhancing the biodiversity conservation, while providing the better service to species and the assessment shows the magnitude of the economic benefits that wetlands provide. This study found that substantial funds are required to manage the wetland sanctuary, to address threats and pressures, and to enforce controls on land and resource uses. Accordingly, this study can be used to justify the value and importance of wetland conservation and the benefits that can be derived from it.
Theme 3: Climate Actions for Sustainability		
The Economic Cost of Climate Change and the Benefits from Investments in Adaptation Options for Sri Lankan Coconut Value Chains Source: Pathiraja, et al., 2017	The analysis reported here shows that estimated future climate change scenarios have a large potential negative economic impact on the Sri Lankan coconut value chain. The mean value of this loss is LKR 4,781 M/yr which is nearly 5% of the total value of the industry at equilibrium.	The negative impact of climate change has the potential to be reduced with the implementation of appropriate adaptation measures to reduce the estimated loss due to climate change as proposed in Theme 3 of NEAP.
Theme 4: Conservation and Sustainable use of Coastal and Marine Resources		
Valuation, rehabilitation and conservation of mangroves in tsunami affected areas of Hambantota, Sri Lanka Source: Ranasinghe & Kallesøe, 2006	This study estimates the total value of mangroves in four villages in the coast of Hambantota District. The indirect values of mangroves in supporting near-shore fisheries was calculated as being between 1,276-20,564 USD $^{-1}$yr $^{-1}$ha.	These results assist to identify pragmatic evaluation of ecological value of mangroves and justify their conservation and management for the extremely important fisheries sector in the coast, as well as other strategies proposed under Theme 4 of NEAP.

Article	Key Findings	Linkage with NEAP action plan
Theme 5: Sustainable Land Resources Management		
On-site and off-site cost of soil erosion in the Upper Mahaweli Watershed (UMW) of Sri Lanka Source: Gunathilaka & Gunawardena, 2000	This study provides a comprehensive account of both on-site and off-site costs of soil erosion in the UMW. The on-site costs were estimated using the replacement cost method[59]. The on-site cost was estimated to be LKR 721.12 million, of which 69.5% is contributed by tobacco and shifting cultivation and poorly managed seedling tea. The total off-site costs of soil erosion was LKR 22.33 million as of 1993 and it rises to LKR 134.82 million over 50 years. The social cost benefit analysis results found that welfare generally will be increased if soil conservation measures are implemented on all lands within the UMW.	The financial and social feasibility of soil conservation indicated importance of soil conservation. Financing for soil conservation will generate enormous environmental and socio-economic benefits. This study supports the need for soil conservation measures as proposed in Theme 5.
Theme 6: Holistic Waste Management		
Circular economy of composting in Sri Lanka: Opportunities and challenges for reducing waste related pollution and improving soil health Source: Bekchanov & Mirzabaev, 2018	The results indicate that establishing compost facilities to recycle organic waste in Sri Lanka will decrease total waste management and chemical fertilizer use costs by USD 191 M. Facilitating inter-provincial trade in compost will further expand the composting potential in the country, reducing waste management and chemical fertilizer use costs by USD 357 M.	This provides the financial and economic justification for investing in composting which provides environmental and economic benefits to the nation. This is also one of the strategies proposed under the NEAP and supports the government's commitment to promote composting.
Theme 7: Integrated Water Resources Management		
Economic analysis of residential, commercial and industrial uses of water in Sri Lanka. Source: Hussain, et al., 2002	Estimated price elasticities are -0.18, -0.17, and -1.34 for residential, commercial, and industrial water demands, respectively. In addition, real income, number of connections (population), and weather variables are found to be important determinants of urban water demand.	These findings may be useful to NWSDB to review the existing pricing policies and may provide the guidelines to re-design the current pricing policies and to introduce the cost recovery pricing policy in order to enhance the water use efficiency, as proposed under Strategy 5 of Theme 7.

59 The replacement cost refers to the amount of money that must be spent currently to replace an essential asset with one of the same or higher value (Investopedia, 2021).

Article	Key Findings	Linkage with NEAP action plan
Evaluation of Performance of Existing RO Drinking Water Stations in the North Central Province, Sri Lanka Source: Suresh Indika, et al., 2021	This study investigated the performance of existing RO drinking water stations. Community-based organizations (CBOs) provide the RO drinking water at a reasonably low rate to develop health conditions and lifestyle. Most of the CBO operated RO stations (84% of RO stations) supply product drinking water at the standard price of LKR 1 (Sri Lankan rupee) per one litre. It ranges from 50 cents per litre to LKR 1.5 per litre. Usually, the average monthly income of the CBO-operated RO stations was around LKR 54,062.00, with the range from LKR 2250.00 to LKR 210,000.00.	These findings may be useful to ensure environmental safeguards in providing access to safe drinking water for a healthy nation and may provide the guidelines and awareness to maintain the drinking water quality in order to enhance the water use efficiency as proposed under the strategy 5 of theme 7.
Theme 8: Environment Management in Cities and Human Settlements		
Sustainable Development Through Green Building Concept in Sri Lanka. Source: Bombugala & Atputharajah, 2010	Although the construction cost of green buildings is 20-25% higher than for traditional buildings, the benefits are ten times as much over the entire life of the building. Implementing the green building concept can result in reduction of carbon emissions by 35%, water usage by 40%, energy usage by 50% and solid waste by 70%.	Promoting green and high-performance buildings and infrastructure is one of the key strategies in the NEAP. The findings of this study further confirm the importance of promoting green building concept, as it generates the series of benefits.
Theme 9: Greening Industries		
Taxing the Pollution: A Case for Reducing the Environmental Impacts of Rubber Production in Sri Lanka Source: Edirisinghe et al., 2008	This study used data from 62 rubber-producing firms in Sri Lanka and estimated the marginal cost function[60] for pollution abatement. The results show that taxes will bring firms into compliance and found the tax rate necessary for environmental compliance is LKR 26 per 100 g (in 2005 values) of COD/yr.	The results can be used by the CEA as a baseline to monitor effluents carefully and introduce the market-based instruments such effluent charge (where tax should be equal to the marginal abatement cost). Findings of this study justify the implementation of several strategies proposed under Theme 9 of NEAP.

60 Cost of reduction of additional unit of pollution

Article	Key Findings	Linkage with NEAP action plan
Life cycle cost analysis: green vs. conventional buildings in Sri Lanka Source: Weerasinghe et al., (2017)	This study provides a comparison about the cost of conventional and green buildings. According to the results, it indicates that operation, maintenance and end of life cycle cost of the green building are comparably less than the conventional building, respectively by 35 to 41%, 26 to 30% and 6 to 18% due to energy cost reduction by 40 to 50%, water consumption reduction by 50 to 60%, 95% waste recycling, reduced absenteeism by 2%.	This provides the justification for investing on green buildings which provide the huge environmental and economic benefits for the industries. Findings of this study justify the implementation of several strategies proposed under Theme 9 of NEAP.

The economic rationale for environmental actions can be established through simple cost benefits analysis when the cost of action and benefits of the actions are available. However, often, they are not always readily available. Therefore, it is suggested that NEAP should facilitate systematic undertaking of high-quality environmental valuation studies for environmental decision-making.

3.3 FINANCING SOLUTIONS

The objective of this section is to present a broad-based resource mobilization plan for meeting the financial needs for investing in management, conservation and sustainable use of natural resources.

3.3.1 Guiding principles

The resource mobilization plan unveils a newer perspective on broad-based innovative financing mechanisms for investing in environmental matters, guided by the following principles:

1. Spending on the environment is an investment rather than a cost, although traditionally, it was treated as an additional cost arising from negative externalities of human activity.
2. When spending on the environment is considered an investment, it is easier to recognize that there are “returns to investment” in the form of short-term and long-term benefits, as well as private and social benefits.
3. Potential returns to investment in the form of private and social benefits provides a rationale for both private and public sector investment on the environment, taken from a broad-based resource mobilization plan.
4. A broad-based resource mobilization initiative is a business case that would attract potential investors to finance the resource mobilization plan by undertaking investment in environment.

A broad-based resource mobilization initiative will open the way for going beyond the traditional perspectives on spending on environment as an additional cost, particularly in attracting private and community investment.

The resource mobilization plan makes use of conceptualization in the Biodiversity Financing Initiative (BIOFIN) of Sri Lanka and the other international sources, which provide information on gradually transforming world economic affairs in favour of conservation and sustainable use of environment.

The following sections emphasize the importance of participation by different stakeholders for investing in the environment.

The government

Traditionally, it has been the government which has had to endure the burden of spending on the environment, but such spending has often been far from being sufficient to achieve the desired environmental outcome. Often faced with a narrow fiscal space, governments in developing countries usually cut down spending on environment, assuming that its negative outcome is covered by the considerations on other short-term issues.

For the government, investment in environment means bridging the gap between desirability and feasibility. Apart from the international commitments made by the successive governments of Sri Lanka, there has been unilateral policy initiatives on environment, as emphasized in the national and sectoral policy documents. If the government is to ease its capacity constraint, there must be innovative and alternative mechanisms of financing.

The corporate sector

For private sector businesses, spending on the conservation of environment and sustainable use of natural resources has been weak, because it was considered to be an additional cost which would erode their cost competitiveness. In cases where the environment has been considered, it has often been the large-scale corporate sector, which allocates expenses on the environment from their corporate social responsibility (CSR) budget.

Spending on environmental aspects has increasingly become a part of the corporate sector’s core business activity. This has become vital today in order to meet the sustainable consumption and production standards demanded by the markets, the competitive edge enjoyed by the corporates who have moved into “green production” procedures and, the triple bottom line of sustainable development. Investment in the environment has therefore become an integral part of core business of the corporate sector by i) adding value to their products, enhancing product quality, market value, social appreciation and, their global reputation; ii) enabling the business sector to comply with international environmental standards and to improve the competitive market access; and iii) expanding and strengthening the long-term cost advantage and business sustainability.

Communities

For communities, investing on environment means enhancing people’s access to pleasant living and healthy lives for themselves, as well as for their children and grandchildren. The natural environment provides communities with clean air to breathe, fresh water to drink, healthy food to eat and an unspoiled environment in which to live. Investing in the environment allows people to enjoy their pleasant living and healthy life by conserving and sharing nature. However, this is conditional because the active participation of communities is guided by the awareness and mechanisms in place but constrained by poverty related issues.

The question is that unlike other organizations with common objectives such as the government or the corporate sector, how do communities become involved in investing in environment? Based on the innovative resource mobilization plans that are being presented here, communities are expected to contribute directly in various ways to expand the resource base for investment, but simultaneously contribute in various ways to avoid potential future spending on environmental conservation.

The nation

For the nation as a whole, investing in environment means the conservation of the stock of natural capital. The biodiversity of a country is part of its capital assets (natural capital) along with financial capital, physical capital, and human capital. The overall stock of capital assets contributes to people’s living, as well as to the creation of their wealth. Investing in the environment is the nation’s effort to conserve its natural capital and to compensate for its depreciation, so that the nation’s prosperity can be enhanced for the present and sustained for the future.

3.3.2 Financing approaches

Existing financing approaches are dominated by the government's budgetary allocations and contributions by international donor agencies. In addition, government agencies generate revenue from environmental related fees and penalties. However, a large part of this revenue is credited to the government's consolidated fund, so that it could be considered more of a revenue for the government, rather than finance mobilization for spending on the environment.

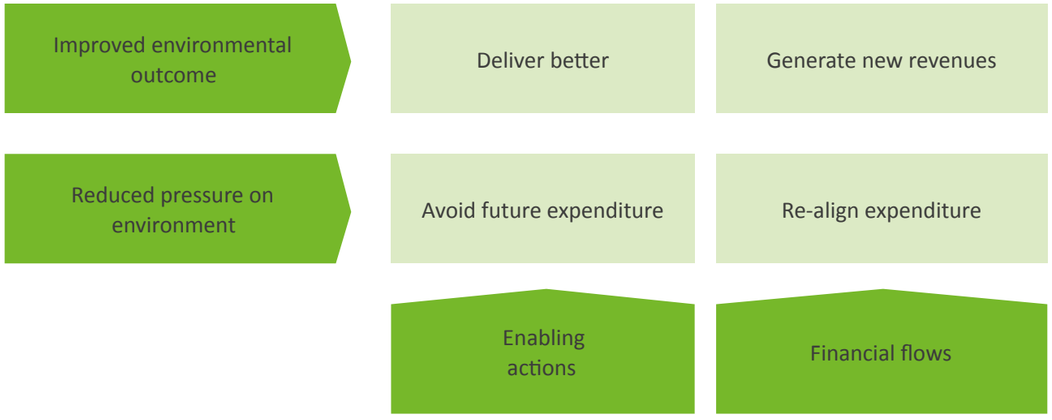

Figure 3.4. Financial sources, environmental outcomes, and actions

(Adopted from BIOFIN Workbook, 2016)

Other spending on the environment includes Sri Lanka's corporate sector allocations for environment conservation and protection their CSR initiatives with large-scale corporates moving into sustainable production for export markets. Private commercial banks have begun to promote "green lending" initiatives to those businesses that meet given environmental standards. In addition, there are community-based local organizations concerned with spending on specific areas of environment.

Under the BIOFIN project in Sri Lanka, there are two recent initiatives that could be considered as important milestones for financing sustainable business practices. The first is the launch of the Roadmap for Sustainable Finance in Sri Lanka by the Central Bank in 2019, in collaboration with the Sustainable Banking Network (SBN). The Roadmap provides guidelines for the commercial banks to divert and promote their business lending to those businesses which meet the sustainable criteria. The second is the initiative by the Sri Lanka Tourism Development Authority (SLTDA), in collaboration with the Global Sustainable Tourism Council (GSTC), to award the National Sustainable Tourism Certification (NSTC) to the tourist hotels and guest houses which adopt the sustainable practices.

The above initiatives provide evidence of various financing approaches that could be adopted for resource mobilization.

3.3.2.1 Outcome-based financing instruments

Four types of financing approaches are planned to provide finance solutions for investing in the environment, as proposed in the Biodiversity Financing Initiative Workbook (UNDP 2016: 35-39) and also guided by the country's own experience:

1. *Generation of new revenues*: This finance instrument is based on the use of both traditional and innovative sources of financing instruments to increase financial flows. The challenge is not about generating financial flows, but maintaining the fund/s by the government or the private sector or both in partnerships, and the use and implementation of that fund in environmental programmes.

2. *Realigning of expenditures*: This financing instrument is concerned with the re-orientation of existing expenditure to obtain a more sustainable outcome with environmental considerations such as replacing subsidies on carbon intensive energy sources with investing in renewable energy sources, which results in the same outcome, but does so sustainably.
3. *Avoiding future expenditures*: This instrument uses current expenditure with an environmentally consistent outcome resulting in an avoiding future expenditure or reducing financial needs. Investing in sustainable business practices may avoid future expenditure on environment conservation, while investing on air quality improvement may reduce the future expenditures on related health issues of the population.
4. *Delivering better output/resources*: This instrument is concerned with the more efficient and effective use of existing resources, as well as influencing a better output. The efficiency and cost-effectiveness of managing resources for investing in the environment is a better delivery of sustainable business practices are aimed at producing an improved output, which can claim higher market premium.

Green accounting: The efficacy of these outcome-based financing instruments needs to be evaluated in terms of their environmental outcome. Green accounting allows for frequent stock-taking of the natural capital and its flow changes, showing either an increase or decrease over time. Green accounting has received global attention, with increased awareness over the depleting stock of natural capital and increased concern over its sustainable use and conservation.

In the past, there were preliminary discussions and workshops related to the above, but actual implementation of the estimates of green accounting has not occurred. It is important that under the NEAP, Sri Lanka initiates the practice of green accounting. This requires the establishment of an implementation mechanism and adoption of approaches to account for the valuation of the stock of natural capital and annual net inflows to it, by accounting for the differences between the outcome of investment in environment and its depreciation.

3.3.2.2 Financing tools

Alternative financing sources must be secured because i) they are expected to reduce the fiscal burden of the government; ii) they will provide an opportunity for different stakeholders to participate more in investing in the environment; and iii) they will provide alternative sources of financing which can significantly raise funding for investing in the environment, above its current minimum levels. See Table 3.3 for more details.

Whichever the source of funding, in terms of their environmental outcome, they will align with one or more of the four scenarios depicted in Figure 3.4 delivering better, generating new revenues, avoiding future expenditure and, re-aligning current expenditure.

Table 3.3. Financial tools

Government funding	
	Typical government expenditure for the environment is from the government's annual budget, these funds are disbursed largely through relevant governmental departments and statutory bodies with a mandate to managing the environment. One of the main issues of depending on the government's budgetary allocations for investment in environment, is its great degree of vulnerability to the gradually narrowed down fiscal space in Sri Lanka. Environment related fees are another source of financing for investing in environment. Fees have been often been charged as entry fees of the specific sites such as the botanic gardens and national parks and as license fees charged for permitting economic activities in environmentally sensitive areas. In most of the cases, the funds collected from entry fees and license fees have been part of the government's consolidated fund. This means that such funds cannot be used directly for investing in environment in the related sectors. In other words, income and expenditure are unrelated matters in most government agencies. Environmental fines and penalties are imposed by the government for violating environmental laws by individuals or organizations. While there are a wide range of activities, which would infringe these environmental laws in any geographical location of the country, the penalties that generate these funds are also considered to be part of the government's consolidated fund. However, the main issue is that such fines and penalties are too small to be effective and at the same time enforcement of the law is also weak. Environmental taxes on economic activities, which carry environmentally harmful externalities, are widely used policy measures all around the world. Fundamentally, environmental taxes are designed either for discouraging such activities by raising their private cost and price, or for financing the recovery of the harmful effects of such activities. However, these taxes are also credited to the consolidated fund and appear to have become part of the government's general revenue. Government incentives or subsidies on economic activities, which would improve the environmental outcome or reduce pressure on environment can be encouraged. Even though these incentives or subsidies do not generate revenues, they do perform a major role in avoiding future expenditure or re-aligning current expenditure.
Multilateral Funding Agencies	
World Bank	In particular, under the Environmental and Social Framework (ESF), World Bank finance is available during 2018-2025 for development- and social aspects-related environmental projects, including conserving natural ecosystems, reducing agrochemical use and for implementing environmental action plans. In addition, the World Bank has a 10-year multi-phase programme for 2019-2028 for Sri Lanka for climate change, with 774 M USD funding. According to the Country Partnership Framework (2017-2020) of the World Bank, the priority areas for World Bank funding have been identified as (a) management of natural resources and the environmental impacts associated with economic growth, structural transformation, and urbanization; (b) natural disasters and climate change; and (c) green development.
Asian Development Bank (ADB)	According to the ADB's Country Partnership Strategy – Sri Lanka (2018-2022), the priority areas of financing for environment have been identified as environmental sustainability, climate change, and disaster risk management. There are 99 ADB-funded projects in Sri Lanka covering many aspects, including 47 projects under the theme of environmentally sustainability. This provides evidence for the ADB's commitment to funding for sustainable development activities. The current focus of ADB has also been specified as funding for projects on clean energy and environmental safeguards. In addition, the ADB is expecting to support the implementation of programmes designed to achieve environment-related SDGs in Asia and the Pacific in partnership through ESCAP and UNEP.
European Union (EU)	Even though it is not a development agency *per se*, the EU has provided technical and financial assistance to Sri Lanka to implement several environment-related projects among other development activities. Under the SWITCH-Asia Programme of the EU, launched in 2007, many Asian countries including Sri Lanka (2015) have benefitted in initiatives of developing Sustainable Consumption and Production (SCP). The EU-Sri Lanka Joint Commission has agreed upon future cooperation on climate change and the implementation of the Paris Agreement, while the recovery from the global COVID-19 crisis is to be used as an opportunity to sustainably rebuild the economy.
UN assistance	
United Nations Development Program (UNDP)	Technical assistance of the UNDP is available for the environment areas related to SDGs, biodiversity and ecosystems, sustainable agriculture and irrigation and, clean energy. The UNDP's Strategic Plan (2018-2021) has specified its diverse commitment to a broader development agenda in the areas of eradicating poverty, structural transformations and, building resilience. While the core work of the UNDP is defined by a series of signature solutions, one of them is nature-based solutions for development.
United Nations Environment Programme (UNEP)	Under the UN umbrella, UNEP is the leading operational global environmental authority. It sets the UN global environmental agenda, promotes coherent implementation for the dimension of environment for sustainable development and, serves as an authoritative advocate for the global environment. UNEP programmes are categorized under the seven broad thematic areas: climate change, disasters and conflicts, ecosystem management, environmental governance, chemicals and waste, resource efficiency, and environment under review.
Global environmental funding initiatives	
Global Environmental Facility (GEF)	Since the time of its establishment in 1992, to help assist in the most pressing environmental problems in the world, the GEF has provided more than USD 21.1 B in grants and mobilized an additional USD 114 B in co-financing for more than 5,000 projects in 170 countries. Further, through its Small Grants Programme (SGP), the GEF has extended its support for more than 25,000 civil and community initiatives in 133 countries. GEF funds are available to developing countries to meet the objectives of the international environmental conventions and agreements.
Green Climate Fund (GCF)	The GCF was set up in 2010, under the United Nations Framework Convention on Climate Change (UNFCCC). Despite being only a decade-old organization, GCF has already served in more than 100 countries in the world and currently become the world largest climate fund. It supports developing countries that have been affected by the climate change in adaptation and mitigation practices. The adaptation practices are required to cope up with water-related disasters, heat-related disasters and, cyclones and storms. GCF support is available in the following areas: vulnerable people and communities; health, well-being and, security; infrastructure and built environment; ecosystems and ecosystem services. The mitigation practices are applied on reducing greenhouse emissions.

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Global Green Growth Institute (GGGI)	GGGI is an international organization established in 2010, with the aim of promoting a balanced economic growth with environmental sustainability - green growth. As of 2020, GGGI has 38 members and delivers programmes for more than 30 member countries around the world including some of the South Asian countries. The GGGI programmes include technical support, capacity building, policy planning and implementation, and assistance to build green investment projects. The expert knowledge of the GGGI has been available for waste management, solar energy, sustainable transportation, green building, green industry and forest landscape.
International Union for Conservation of Nature (IUCN)	IUCN is a union of governments, organizations and experts, which provide knowledge-based support to conserve nature and accelerate the transition to sustainable development. Its focus is on a wide range of areas under the themes of business and biodiversity, climate change, ecosystems management, environmental law, forests, gender, global policy, governance and rights, protected areas, marine and polar, nature-based solutions, science and economics, species, water and world heritage.
Other international initiatives	There are various international initiatives extending both financial, as well as non-financial assistance for investing in the environment. The Satoyama Development Mechanism (SDM) of Japan, Green for Growth Fund (GGF) which is a public-private partnership initiative is an example China Development Bank (CDB), Kuwait Fund for Arab Economic Development, Norwegian Agency for Development Cooperation (NORAD), Food and Agriculture Organization (FAO) and World Health Organization (WHO).
Alternative sources of funding	
New revenue generating tools	There is a wide range of revenue-generating tools that can be used for mobilizing funds for investing in the environment. Examples include: a) increased revenue from environment-related fines and penalties; b) green lottery, targeting middle-income consumers and using digital technology; c) differentiated green number plates for motor vehicles, perhaps with incentives; d) eco-label for products with certified sustainable standards, which can be adopted under the Sustainable Consumption and Production (SCP) policy; and e) environmental taxes and payments that can be applied to a wide range of environmentally harmful activities, as well as for covering the costs of solid waste collection.

Adoption of sustainable standards	The following can be implemented in partnership with the corporate sector. While these solutions may not generate direct financial flows, they will lead to delivering a better output, avoid future expenditure and, re-align current expenditure.
	• Sustainable Standards and Certification: an introduction of sustainable norms and standards to a wide range of economic activities - a product or a service, which would be certified by a competent and independent third party. Under the BIOFIN Sri Lanka programme, the Sustainable Tourism Certification Scheme has been already implemented for the tourist accommodation sector.
	• Green Financing: is a prioritization of business lending to such business activities with integrated sustainable norms and standards. Many commercial banks have already moved in this direction and the Central Bank of Sri Lanka launched Sustainable Financing Roadmap providing guidance for green lending.
	• Carbon trading mechanism: Because carbon-neutral products claim a high premium in global niche markets, initiatives to facilitate the development of a voluntary carbon trading market in Sri Lanka, with the participation of the private sector, can be commenced. The Colombo Port City can be developed as Asia's primary carbon-neutral Special Economic Zone.
	• Payments for Ecosystem Services (PES): This will be another innovative market-based financing mechanism for different sectors such as biodiversity conservation, watershed management, and energy.
	• Rewards for Ecosystem Services (RES): is another important innovative tool for resource mobilization. The reward scheme does not involve markets or the commodification of ecosystem services, but simply rewards communities for support that they already provide for enhancing ecosystem services.
	• Sustainable Ecosystem Management: This concept recognizes the importance of striking a balance between competing human needs and long-term ecosystem sustainability, through a process of stakeholder negotiation and adaptive management.
Private sector initiatives[61]	
Private investment as core-business	Private sector investment can be encouraged into sustainable production activities of services such as utilities, transport, waste management, lighting, and other logistic supply, provided that the government creates enabling environment for private sector participation and takes the initiative of becoming business partners adopting one of the public-private-partnership models. Today, state-of-the-art technology for sustainable economic activity is available, and there are various international organizations providing technical and knowledge assistance for investment planning. The private sector participation can be built into either build-own-operate (BOO) or build-own-transfer (BOT) arrangements.
Environment as part of the core-business	Large-scale companies have already initiated voluntarily investing part of their profits in environment as part of their business strategy, even though such investments are 'unrelated' to the core-business. This initiative can be encouraged and extended even to medium and small businesses, if the government provides opportunities and guidance for such investment.

61 As several private sector companies have been incorporating environmental aspects as part of their core-business activities and social responsibility initiatives, the government can facilitate such activities. It is necessary to acknowledge the fact that investing in environment *per se* is not a viable commercial activity for the private sector. In cases where investing in environment is expected through private investment, they need to be an integral part of the business strategy adding value to the core-business.

Investing in environment as a 'related' activity:	If investing in environment is a 'related' activity of the business, then it is an incentive for companies at all scales to move into investing in environment, because it enhances their market competitiveness. At international levels, the markets in advanced countries have been imposing sustainable standards of the products, they import so that green standards in exports have become increasingly essential for maintaining market competitiveness. While some of the large-scale companies have already adopted such green standards, even the local SME sector needs to knowledge and the capacity to improve their competitiveness, by improving responsible and sustainable production standards. The government is able to adjust the demand side for sustainable products, provide incentives and disincentives, and facilitate with guidelines, certification and green labels.
Conservation green cards	Government agencies, business firms, banks and other organizations have been increasingly providing plastic cards to the public for different purposes. A differentiated card can be issued by each of these entities to the voluntary customers for a higher premium. This would generate continuous financial flows for investing in environment.
Green bonds	Green bonds can be issued for raising financial resources either from the domestic capital market (like Treasury Bonds) or from the international capital market (like International Sovereign Bonds). Green bonds are different from other bonds because of their restrictive purpose of investing in environment-related activities. In the last decade, worldwide, international green bonds have grown exponentially, to finance environment-related investment projects. As international green bonds are usually for the purpose of raising large funds, it may not be cost-effective to use them for generating smaller funds. Sri Lanka has initiated raising international funds through ISB in 2007, and the amount of international funds raised at a time has been in the range of USD 500–1,500. After raising USD 17,550 B in total by the end of 2019, the government has terminated ISB issuance because of its challenging debt-sustainability problem. It is necessary to address these issues in assessing the option of green bonds as a potential financing instrument during the NEAP implementation period.
Reciprocity, Suasive Tools and Community	It is important conceptually incorporate and apply, where possible, the principle of reciprocity into the NEAP 2022. Reciprocity defines as 'sharing benefits among the people which is much more important for ecological restoration at community level (such as reciprocal agreement for watershed conservation)'. Suasive tools should be adopted in order to change the behaviours of the individuals/firms. Appreciating suasive sentiments of the people non-market values can be mainstreamed effectively. Suasive instruments, trust, and reciprocity operate together. Identifying communities as resources mobilizing agents also important for sustainable resource management. Actions must be stipulated for collective community action for the mobilization of resources and sharing of benefits. As communities do not have easy access to capital/financial resources through positive reciprocity and pooling resources there can be an amplifier effect for the expected outcome for the NEAP.

Table 3.4: Potential Sources of international assistance and NEAP thematic areas

	Multilateral assistance			UN assistance		Global initiatives				
	World Bank	ADB	EU	UNDP	UNEP	GEF	GCF	GGGI	IUCN	Other*
Air Quality Management		✓								✓
Biodiversity Conservation and Sustainable Use	✓			✓		✓			✓	✓
Climate Actions for Sustainability	✓	✓	✓	✓		✓	✓			✓
Conservation and Sustainable Use of Marine and Coastal Resources		✓							✓	✓
Sustainable Land Resources Management				✓	✓	✓				✓
Holistic Waste Management					✓	✓				✓
Integrated Water Resources Management		✓							✓	✓
Environment Management in Cities and Human Settlements	✓		✓							✓
Greening Industries	✓	✓	✓	✓		✓		✓	✓	✓

Note: International agencies are aligned with the NEAP's thematic areas on the basis of their current funding/assistance and future prospects.

*Other includes agencies providing smaller grants, country-initiatives for bilateral finance and, private initiatives for investment in environment; these agencies include Satoyama Development Mechanism (SDM), Global Greengrants Fund (GGF), Global Environment Fund (GEF), Kuwait Fund, China Development Bank (CDB), Food and Agriculture Organization (FAO), Norwegian Agency for Development Cooperation (NORAD), World Health Organization (WHO) and others.

3.4 RESOURCE MOBILIZATION PLAN

3.4.1 Strategies for Management

Strategy 1. Create enabling conditions for effective resource mobilization for the NEAP.

Strategy 2. Streamline resource mobilization and fund utilization by the government for the NEAP.

Strategy 3. Enhance resource mobilization through multilateral donor agencies and Trust Funds.

Strategy 4. Enhance resource mobilization with alternative financing tools.

Strategy 5. Enhance environmental outcome and reducing environment pressure through Reciprocity, Suasive Tools and Community Empowerment.

Strategy 6. Commence Green Accounting practice in Sri Lanka.

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3.4.2 Action Plan for Resource Mobilisation

Actions	Key Performance Indicators (KPIs)		Baseline	Target	Time Frame (in years)			Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10		Lead Agency	Other Key Agencies
Strategy 1. Create enabling conditions for effective resource mobilization for the NEAP.										
1.1 Prepare accurate budgeting for NEAP Actions	% of accurately budgeted actions		Negligible	100%	50%	100%		No additional cost	Every lead agency	MoE
1.2 Develop valuation framework applicable for Sri Lanka	Framework in place		None	Valuation framework adopted	✓			3	MoE	Uni, UN agencies
1.3 Identify of gaps in valuation research/studies for using them in NEAP	Study recommendation on valuation research		No study	Validated study recommendations	✓			2	MoE	Uni, UN agencies, sector experts
1.4 Prioritize allocating funds for undertaking necessary research / primary valuation studies to fill identified gaps	No. of communication rounds on the priorities to funders/year		None	2/yr	4	10	20	10	MoE	NRC, NSF, UN agencies
	No. of periodic review of funding allocated and utilized on those priorities			Every 2 yr	1	2	5	10		
1.5 Prepare thematic area- wise potential sources of funding	No. of thematic areas wise resource mobilization plans prepared		None	10	10			No additional cost	MoE	NPD, ERD
	No. of updates per plan			10/yr	10/yr	10/yr	10/yr			
Strategy 2. Streamline resource mobilization and fund utilization by the government for the NEAP.										
2.1 Estimate government budgetary allocations for NEAP actions	No of thematic area wise budget allocation reports NEAP actions		None	10/yr	10/yr	10/yr	10/yr	No additional cost	MoE	NPD, ERD
2.2 Develop a mechanism to utilize selected environment related fees for NEAP implementation	Report on feasibility of using environmental fees for NEAP actions prepared			Study report	✓			5	MoE	Related ministries, CEA, FD, DWC, DMT, AGD
	Measures to overcome any legal, policy or institutional barriers taken			Barriers removed	✓			5		
	Formulate mechanism for utilization of funds			Operational mechanism		✓		2		
2.3 Develop a mechanism to utilize selected environmental fines and penalties for NEAP implementation	Report on feasibility of using environmental fees for NEAP actions prepared					-		5	MoE	Related ministries, CEA, FD, DWC, DMT, AGD
	Measures to overcome any legal, policy or institutional barriers taken							5		
	Formulate mechanism for utilization of funds							2		
2.4 Develop a mechanism to utilize selected environmental taxes for NEAP implementation	As above					-		5 5 2	MoE	Related ministries, CEA, FD, DWC, DMT, AGD
2.5 Identify incentive / disincentive mechanisms to promote/ discourage activities with serious environmental consequences	As above					-		5 5 2	MoE	Related ministries, CEA, FD, DWC, DMT, AGD

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Actions	Key Performance Indicators (KPIs)		Baseline	Target	Time Frame (in years)			Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10		Lead Agency	Other Key Agencies
Strategy 3. Enhance resource mobilization through multilateral donor agencies and trust funds.										
3.1 Identify a comprehensive list of external funding for NEAP actions under specific thematic areas	No. of thematic area-wise available financing sources database		Non-existent	10 databases	10			3	MoE	Lead agencies
3.1.1 Communicate with financiers with finalized NEAP as the national priority for environmental funding	Annual update of the thematic areas-wise databases		None	1/thematic area		10/yr	10/yr	No additional cost		
3.2 Prioritize designing of projects based on NEAP for global financing mechanisms such as GEF, GCF, Adaptation Fund with specialized agencies	Level of alignment of new projects for GEF, GCF and Adaptation Fund with NEAP			All new project are fully aligned to NEAP	50%	100%	100%	3	MoE	GEF and GCF agencies in SL
3.3 Prepare thematic area-wise financing plans with identified gaps which needs to be sourced outside of the sources considered in the strategies 2 and 3	Thematic area-wise financing plans prepared Annual updates undertaken/thematic area			10 plans 10/yr	✓	10/yr	10/yr	5	MoE	
Strategy 4. Enhance resource mobilization with alternative financing tools.										
4.1 Explore the feasibility of generating finances for NEAP from new sources	No. of feasibility studies undertaken for new sources of financing			5 studies	5			10	MoE	AGD, related ministries, LDD, CEA, SLSI
	No. of pilot studies undertaken			5		5	1			
	No. of new sources selected for upscaling			3		3				
	No. of new sources proven to be appropriate is selected for legalization			2		1				
4.2 Review, revise and upscale Green Financing Initiative (GFI) of the CBSL and selected Commercial Banks	Review results		No.of banks currently engaged	Review report	✓	✓		10	MoE	CBSL, UN agencies, Uni
	No. of new banks engaged in GFI			No. of additional banks engage						
4.3 Promote carbon (emission) trading mechanism	Feasibility study undertaken		-	Study report		✓		10	MoE	SLCF, MoInd, Uni, UN agencies
	Volume of carbon traded in tons/yr		Current volume of C trading							
4.4 Promote Payments for Ecosystem Services (PES)	No. of pilot projects implemented		None	5	2	5		25	MoE	IUCN, UN agencies, Uni, private sector, CBOs, RPCs, MASL
	No. of new projects commissioned		None	50		20	50	500		
4.5 Establish Rewards for Ecosystem Services and Stewardship (RESS)	Feasibility study conducted		None	1	1			10	MoE	
	No. of new projects commissioned		None	10	2	5	10			
4.6 Regularise CSR funding for transparency with an appropriate percentage of funding to be spent on actions relating to NEAP for medium and large corporates	Feasibility study for introducing the concept		None	Study report	✓			20	MoE	CCC, BSL, AGD, private sector
	Gazette notification on CSR contribution to NEAP		None	Publishing of gazette notification	✓					
	Amount of funding mobilize from CSR		Currently not directly relating to NEAP actions	200 million/yr						

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Actions	Key Performance Indicators (KPIs)		Baseline	Target	Time Frame (in years)			Indicative Budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10		Lead Agency	Other Key Agencies
Strategy 5. Enhance environmental outcome and reducing environment pressure through Reciprocity, Suasive Tools and Community Empowerment.										
5.1 Apply community based and suasive tools for Sustainable Ecosystem Management	No. of tools introduced				✓	✓	✓	50	MoE	Other relevant government agencies, CBOs, NGOs and civil society
5.1.1 Identify Community-managed conservation areas possible and execute the projects	Co-management benefits				✓					
5.1.2 Develop Bio-cultural Community Protocols (BCPs)	Extent of BCPs objectives achieved					✓				
5.2 Introduce and operationalize reciprocal complementary economy for Sustainable Ecosystem Management	Cost saved by communities by reciprocal sharing of ecosystem goods and services							5	MoE	Other relevant government agencies, CBOs, NGOs and civil society
	No. of Benefit Sharing Agreements and Volume of BES exchanged				✓	✓				
5.3 Develop sustainable standards and criteria for identified sectors	No. of standards and criteria developed				✓	✓	✓	2	MoE	Sectoral line agencies
Strategy 6. Commence Green Accounting practice in Sri Lanka.										
6.1 Prepare a manual for initiating Green Accounting practice	Study is completed		None (other than discussions)	Complete	✓			25	MoE	CBSL, DCS, other statistical agencies
6.2 Establish implementation mechanism with human resources	Statistical unit established				✓					
6.3 Conduct valuation of the stock of natural capital	First green accounts available					✓	✓			
6.4 Establish accounting methods for annual estimates of new additions to natural capital and its depreciations	Annual changes in the stock and flows of natural capital available						✓			

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CHAPTER 4

INFORMATION AND KNOWLEDGE MANAGEMENT FOR GREEN GROWTH

4.1 INTRODUCTION

Environmental knowledge goes beyond the traditional confines of awareness, advocacy and education. In today's information-saturated, digitally inter-connected world, environmental knowledge is about information that promotes a different value system and leads the next generation away from a high-consumption, high-pollution lifestyle to one more harmonious with nature. In 2015, countries of the world signed the Sustainable Development Goals - agreeing to balance economic development needs with social and environmental safeguards, over the next 15 years. The sustainable development agenda for 2030 has roots in the global environmental conservation efforts of over three decades. The concepts of sustainable development and inter-generational equity were introduced as far back as 1980 by the World Conservation Strategy, jointly promulgated by IUCN/UNEP/WWF, and later reinforced by the Brundtland Commission Report (Brutland, 1987). This landmark report refers to: (a) the need for reconciliation between economic development and environmental conservation; (b) the need to place any understanding of environmental concerns within a socio-economic and political context; and (c) the need to combine environment and development concerns. The term 'sustainable development' presented the theoretical basis to balance the three pillars (environment, economic and social) of development and to re-orient the large economic aspects of development towards a more holistic approach.

In the current age of sustainable development, there is a strong focus on lifelong learning and building national human resources. Advanced capacities are required to take forward the environmental conservation agenda through technology, social norms and values, as well as mindful and ethical consumption. The Sustainable Development Goals (SDGs) expressly detail different targets on conservation and education, and these speak to capacities for policy makers, researchers, teachers, media and public to act/promote the new global agenda for sustainability. SDGs promote access to quality knowledge and information to transform society by reorienting education and helping people develop knowledge, skills, values and behaviours needed for sustainable development. It is about including sustainable development issues – such as climate change and biodiversity – into teaching and learning. Individuals are encouraged to be responsible citizens who resolve environmental challenges, respect cultural diversity, and contribute to creating a world that is kinder to its people and gentler on the environment.

Environmental knowledge and education are defined as a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.' (UNESCO, 1992).

Communicating for Development is:

'A social process based on dialogue using a broad range of tools and methods. It is also about seeking change at different levels including listening, building trust, sharing knowledge and skills, building policies, debating and learning for sustained and meaningful change'. (UNESCO, UNEP 1976)

4.2 CURRENT STATUS: EDUCATION AND SUSTAINABLE DEVELOPMENT IN SRI LANKA

Sri Lanka has achieved high human development with a comparatively low impact on the climate and natural systems (Pascal et al., 2020). Sri Lanka's per capita emissions remain low - at 1.02 tonnes per person (UNFCCC, 2021) - and is lowest among middle-income countries. Approximately 35% of the country is set aside as protected areas (MoMD&E, 2016). The economy is based largely on services, plantations and manufacture. About half the power generation is met through monsoon-dependent renewable energy such as large hydropower generation. The population remains largely rural and agriculture dependent. Cultural and religious norms place value on a simple lifestyle and constrained consumption. In this respect, the country has been highlighted in recent studies, as an example of a nation that has placed value on education, social protection, health and well-being above industrial and consumption-based economic growth. Basically, it is a country that can provide an example of 'sustainable and low-carbon development' (Pascale et al., 2020).

However, recent developments have not been so promising. Sri Lanka is a densely populated country and its forest cover depletes annually, mainly for commercial agriculture and expanding townships. Its Central Highlands UNESCO world heritage site is considered the 'water tower' of the country, but is impacted by forest depletion, encroachment, land erosion through unsustainable agriculture practices and climate change-induced droughts. Sri Lanka's power sector is moving increasingly towards fossil fuels because of unpredictable monsoons, while solid and chemical waste management has become a huge social and environmental issue. The pressure for land in rural areas and expanding human settlements cause conflict between humans and wildlife. In 2019 Sri Lanka recorded 405 elephant deaths and reportedly 12 leopard deaths in 2020. Water quantity and quality have both depleted rapidly both because of increased extraction and pollution. At least three provinces record human mortality and morbidity due to Chronic Kidney Disease, attributed to poor water quality. Despite these challenges, Sri Lanka has set aside some 35% of its lands for conservation as legally protected areas. Sri Lanka's forest cover hovers around 29% and its natural resources are used extensively for tourism promotion and local/traditional industries.

While addressing poverty and reaching middle-income status over the past 20 years and while recovering from a 30-year internal conflict, Sri Lanka has urbanised rapidly. Official statistics do not count the large sprawl that has developed around urban centres and along major road networks. Urban migration is also spurred by low-returns on subsistence agriculture, lack of employment opportunities in rural areas and unwillingness of youth to engage in traditional livelihoods such as fishery, farming and work in plantations. Urban lifestyles and consumption patterns depart significantly from the traditional, sustainable rural life of Sri Lanka. With better incomes, an emerging, urbanised (or aspiring to be urban) middle class has started to embrace a "Western" perspective of a "good life" at the expense of their traditional consumption patterns.

Since the adoption of the Sustainable Development Agenda in 2015, Sri Lanka has developed a number of strategic documents extolling the country's sustainable past, highlighting the current unsustainable development trajectory and the need to find a middle ground - meeting economic and well-being aspirations of the people with environmental conservation. Some critical issues that have arisen consistently in this discourse are the rising inequality between geographical regions and the urban-rural divide, driving increased migration into urban centres, the increasing exposure of rural agricultural life to climatic extremes, high levels of unemployment among more educated youth, and demand for more forest lands for agricultural expansion - exacerbating human-wildlife conflict and water management issues.

With increasing urbanisation and digitalization, Sri Lanka's working population and younger generation are losing their traditional roots that firmly bound people to the environment around them.

A number of recent assessments on Sri Lanka's education opportunities for sustainable development point to opportunities and gaps in this area. An in-country situation analysis National Sustainable Consumption and Production (SCP) Education Plan (SWITCHAsia, 2017) points out that Sri Lanka has historically prioritised the education sector, and placed emphasis on management of natural resources and the environment through legal and institutional mechanisms. Environmental education has become part of the school and university curricula, with many universities offering specialist environmental degree programmes and post-graduate courses. Environmental concepts have been integrated into other mainstream tertiary streams – engineering, economics, architecture, agriculture, legal and communication. The Ministry of Environment has engaged in school awareness programmes for targeted campaigns. One of the most consistent campaigns has been around Protecting the Ozone Layer. Agencies allied to the Ministry or engaged in conservation – such as the Central Environmental Authority, Forest Department and Marine Pollution Prevention Authority – have conducted educational programmes targeting schools, youth and public at different times, generally aiming at commemorative days for Oceans, Forests, Biodiversity, Environment, Water etc. The Environment Education and Awareness Division of the Central Environmental Authority was established three decades ago and imparts education and awareness for various target groups. Programmes developed by this unit are targeted for a diverse audience - ranging from public officials to pre-schoolers. An important legacy of the

CEA is the creation of the Environmental Pioneer programmes for national schools. These programmes have created a new generation of environmental enthusiasts and activists, creating space for a more vibrant youth engagement in conservation activities.

However, Sri Lanka's examination-focused education system also does not deliver practical, tactile education on nature and its components. This gap continues throughout tertiary levels of education in all areas, creating an educated younger generation out of touch with intrinsic and practical environmental awareness with an immediate connection to the natural world, and supports the required propulsion to sustainable lifestyles and consumption. Sustainable production is articulated in some education programmes, particularly at University and Continuing Professional Development education systems, however, sustainable consumption concepts have not been incorporated in the education system. The underpinning principles of sustainable development such as its multidisciplinary context, interdisciplinary insight, systems-thinking and life-cycle approach, which are required to achieve a transformative change in the way education is delivered and received, are still not reflected adequately in Sri Lanka's schools, universities and other avenues for the creation of awareness. As such, the inclusion of SCP as a holistic, lifelong learning opportunity is identified as an urgent need by the stakeholders, not only for the progression of the education sector itself, but also for shaping the entire society to take on the transformative development paradigm demanded of this era.

At the same time, a new wave of environmental consciousness is currently evident. Environmental awareness is promoted, and increasingly through social media channels - by civil society groups and a vigilant media. The Central Bank of Sri Lanka has a green lending programme to encourage banks to adopt more social and environmental safeguards when financing projects. Sri Lanka's Sustainable Development Policy and Strategy is detailed in the following section and promotes a path of balanced human development rooted firmly in the triad of social, economic and environmental indicators of growth and progress.

4.3 POLICY AND LEGAL FRAMEWORK THAT INFLUENCE ENVIRONMENTAL AND SD KNOWLEDGE

4.3.1 Right to Information (RTI)

The right of access to information was introduced in Sri Lanka as a fundamental right, with the incorporation of Article 14 (a) (i) in the 19th Amendment to the Constitution. Thereafter, in giving effect to this right, the Right to Information Act No. 12 of 2016 was enacted by the Sri Lankan Parliament in August 2016, providing for a mechanism to obtain and supply information. With the issuance of Regulations under the Act, the RTI became fully operational in Sri Lanka in February 2017. The RTI Act envisages information disclosure through two predominant means - provision of information in response to a RTI request submitted to a public authority by a citizen and proactive disclosure of information by public authorities[62].

- Proactive information disclosure: Section 9 compels every government minister to disclose information relating to initiation of development projects to the public, and particularly, to persons affected by such projects. There are practical reasons that these requirements are partially followed or observed in the breach. Most of these reasons relate to the lack of appropriate communication strategies to for timely communication.

- There are concerns with regard to the transparency of decision-making on the applicable processes, i.e. whether IEE or EIA should be done. Questions relating to the deciding authority and the criteria for decision-making remain unanswered.

For the RTI to be meaningful in environmental processes, people at the ground level, need to be educated on RTI. There are concerns regarding how public awareness raising can occur sustainably. CSOs cannot be relied

62 in terms of Sections 8 and 9 of the RTI Act and Regulation 20 issued in terms of the RTI Act.

on fully to meet this objective, as CSO interventions are mostly donor-driven and therefore, not sustainable. In addition, both CSO activism and environmental activism are highly politicised, resulting in selective concern regarding issues.

4.3.2 The National Policy and Strategy for Sustainable Development (Draft 2019)

The vision of the national policy and strategy on sustainable development is a "Sustainably Developed Sri Lanka" referring to a nation that is free of poverty, hunger, disease and want. The vision points to a nation that is a just, equitable, tolerant, open and socially inclusive nation, in which the needs of the most vulnerable are met. A country that prioritises not just economic growth, but sustained, inclusive and sustainable growth and decent work. A future where consumption and production patterns are sustainable and wise-use of all natural resources such as land, water, forests, minerals and seas. A nation in which good governance and the rule of law prevail. A nation where development and the application of technology are climate-sensitive, which respects biodiversity and is resilient to natural and man-made shocks and people live in harmony with nature, and protecting other living species and forests. This utopian dream requires policy makers to balance development needs with conservation priorities and social inclusion. Sri Lanka, in this strategic policy and action framework, has expressed its own priorities along the framework of the 17 SDGs, around seven guiding principles - all of which are driven by knowledge and awareness of the foundational building blocks of sustainable development.

4.3.3 National Policy on Sustainable Consumption and Production (SCP)

This policy was approved by the Cabinet of Ministers in 2017, with support from the European Union. The SCP emphasised global concerns relating to sustainable development and the need to incentivise and promote environmentally conscious, socially appropriate production and ethical consumption patterns. The SCP seeks to decouple economic growth from environmental degradation by:

- Reducing material/energy intensity of economic activities by reducing emissions and waste from extraction, production, consumption and disposal;
- Promoting a shift of consumption patterns towards groups of goods and services with lower energy and material intensity without compromising the quality of life;
- Applying life-cycle thinking, which considers the impacts from all life-cycle stages of the production and consumption process; and
- Guarding against the rebound effect, where efficiency gains are cancelled out by resulting increases in consumption.

The Policy Principle on "knowledgeable, conscious, inclusive and empowered nation on SCP" seeks to sensitise all citizens to appreciate SCP as the basis for a good lifestyle; develop a critical mass of human capital to promote SCP; introduce SCP concepts into the Sri Lankan education system as a life skill; promote concepts such as systems analytics, life cycle thinking among all social segments but especially the public sector; make the private sector aware of economic benefits of SCP; establish National Innovation Systems to create/foster innovative research and guide and support consumers' choices for sustainable products and services changes through information, including eco-labels. These are measured by a number of time-bound policy targets, which unfortunately, have not been met.

4.4 STRATEGIES FOR MANAGEMENT

Action that is designed to deliver knowledge and environmental information to build eco-consciousness is presented in six categories: (a) Negotiation: attempting to reach an agreement over an environmental issue, policy or practice through discussion; (b) Persuasion: attempting to modify the other's viewpoints, through public debate, speeches, or media campaigns; (c) Consumerism: discriminating through social action or boycotting goods and services; (d) Political action: lobbying, voting or supporting politicians to strengthen environmental policy; (e) Legal action: ensuring the enforcement of laws and regulations meant to support

conservation and (f) Eco-management: maintaining or improving the environment through practical, physical action (Hungerford and Litherland, 1986). These strategies require knowledge and information that is timely, relevant, accurate and accessible. Information can be data and spatial information, traditional knowledge and practices, research findings, analyses and promotional material. The actions described above have been encapsulated into five main strategies to deliver knowledge and information.

1. Coordinate and incentivise knowledge generation for environmental management.
2. Guide and empower decision-makers with timely access to quality data and information.
3. Influence behaviour and attitudinal change through awareness and advocacy.
4. Promote quality and lifelong environmental and sustainability-oriented education.
5. Build capacities and access financing for research, innovation and monitoring change.

This chapter acknowledges the strategies and actions in Chapter 2 related to knowledge generation, information dissemination, education, advocacy and capacity building embedded in the thematic sectors. This chapter does not attempt to duplicate sector-specific knowledge management activities, which are built in to complement actions proposed by the sector experts and are vested with specific sectoral (often technical) agencies. Instead, this chapter provides an umbrella approach (see Fig. 4.1), with two arms that to support thematic areas and specific knowledge management actions for sustainable development (see Fig. 4.2). Thematic areas will be supported to implement sector-specific actions by creating an enabling environment (providing platforms, policies and protocols for information sharing, technical advisory services); by coordination among agencies and thematics for efficient and cost-effective programmes and by monitoring effectiveness of knowledge delivery (Figure 4.1).

Beyond this umbrella support to the thematic areas and their KM strategies and actions, this chapter outlines some knowledge, advocacy and education pathways that are critical to ensure the transition to a low-carbon, sustainable development paradigm that is well informed and science-based. Actions that have been designed specific to this chapter are outlined in Figure 4.2. These strategies correspond to several SDG targets as detailed in Table 4.1.

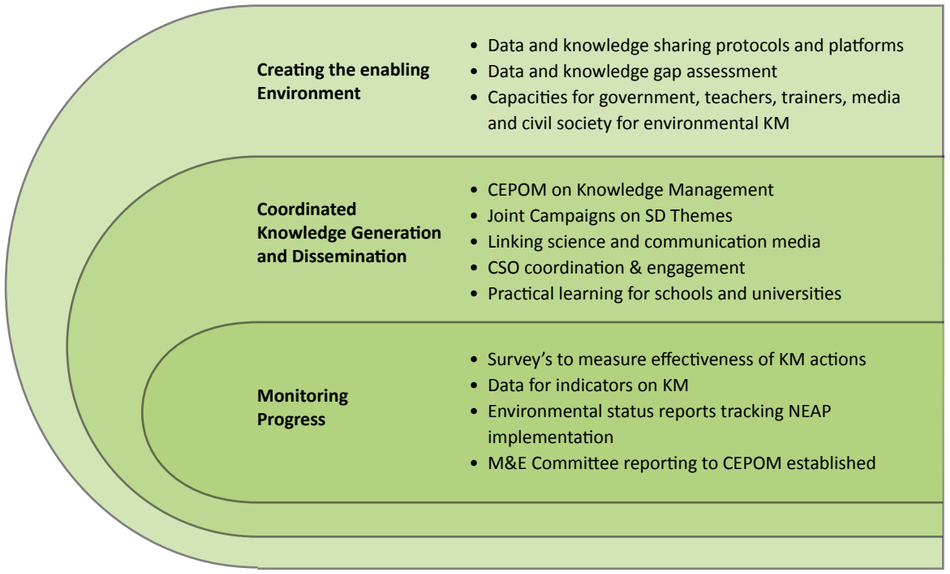

Figure 4.1. Knowledge Management Umbrella Services to support thematic areas

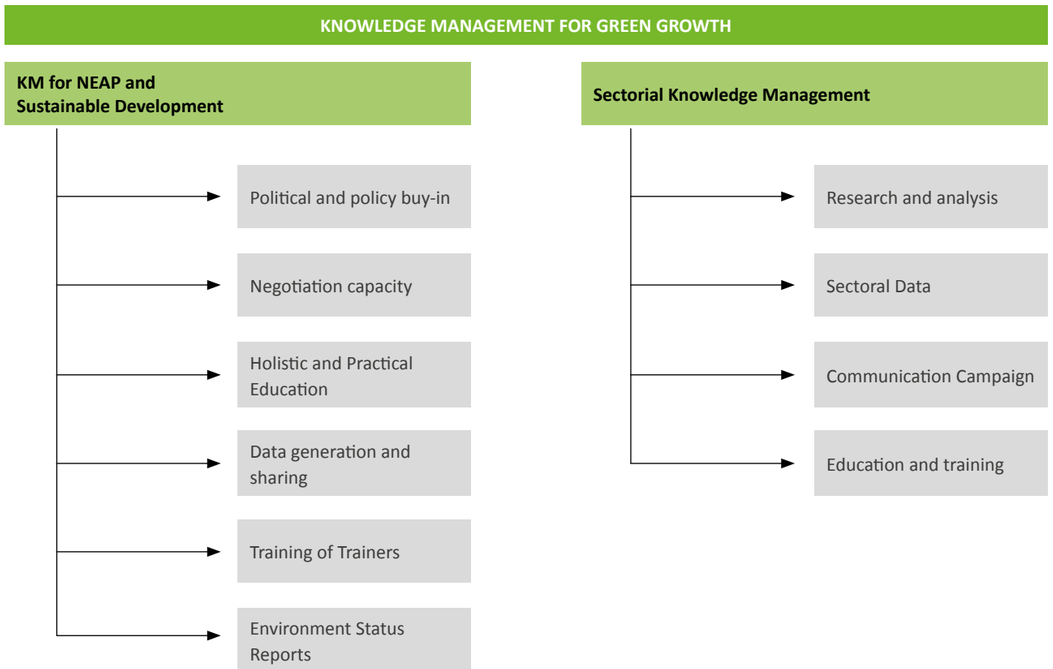

Figure 4.2. Differentiating thematic and overall KM action

Table 4.1: KM Strategies, SDG targets and corresponding thematic KM Strategies

KM Strategy	Corresponding SDG Targets	Thematic Area and relevant Strategy
1. *Coordinate and incentivise knowledge generation for environmental management*	*12a* *14a* *17.16*	Biodiversity Conservation and Sustainable Use (Strategy 4) Air Quality Management (Strategy 9) Holistic Waste Management (Strategy 7) Sustainable Use of Coastal and Marine Resources (Strategy 7)
2. *Guide and empower decision-makers, with timely access to quality data and information*	12.8 13.3 17.14	Climate Actions for Sustainability (Strategy 9) Sustainable Land Resources Management (Strategy 7 & 8) Biodiversity Conservation and Sustainable Use (Strategy 6)
3. *Influence behaviour and attitudinal change through awareness and advocacy*	12.8 8.4 8.8	Environment Management of Cities and Human Settlements (Strategy 7) Greening the Industry (Strategies 8 & 9) Integrated Water Resources Management (Strategy 13)
4. *Promote quality and lifelong environmental and sustainability-oriented education*	*4.4* *4.7*	Biodiversity Conservation and Sustainable Use (Strategy 4) Greening the Industry (Strategy 9) Sustainable Land Resources Management (Strategy 6) Water (Strategy 13)
5. *Build capacities and access financing for research, innovation and monitoring change*	*17.6* *9b* *9c*	Biodiversity Conservation and Sustainable Use (Strategy 6 & 7) Air Quality Management (Strategy 9) Sustainable Use of Coastal and Marine Resources (Strategy 7) Holistic Waste Management (Strategy 7)

Table 4.2: Stakeholder groups

Government			Media	Civil Society		
Development Sector	Education	Politicians & Parliamentarians		Professional Associations	Non-governmental Organizations	Private Sector
National SD Council	Ministry of Education	Provincial Councillors	Electronic/ print journalists	SLAAS	National NGOS	Chambers
Department of Census and Statistics	National Institute of Education	Parliamentarians	Journalism Training Institutes	IEPSL	Regional NGOs	District Industry Chambers
Ministry of Environment	Vocational Training Institutes	Women's Caucus	Media Colleges	OPA	Federations or collectives	Sustainable Banking Network
Central Environmental Authority	University Grants Commission		Social media influencers	SLEMA	Presidential Environmental Medallists Forum	Biodiversity Sri Lanka
District Development Committees	Universities		Media regulator	Bar Association		
District Environmental Committees	Teacher Training Colleges		Electronic/ print journalists	Research and think tanks		
Judiciary	Religious Education centres					
Provincial Councils	Ministry of Higher Education					
SLIDA						
IPS/ NSF/						
District Secretariats						

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4.5 ACTION PLAN FOR INFORMATION AND KNOWLEDGE MANAGEMENT FOR GREEN GROWTH

Strategic Activity/Specific Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
					S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
Strategy 1: Coordinate and incentivise knowledge generation for environmental management.										
1.1 Promote Research for Knowledge gaps	No. of new peer-reviewed, published papers responding to research needs	Research is not coordinated among technical agencies or divisions of the Ministry		Cloud-based portal for environmental research available	✓	✓	✓		MoE	UGC IPS, IFS and NSF
1.1.1 Coordination mechanism for new environmental research established at MoE	Coordination mechanism meetings	0		At least 01 meeting per yr	✓	✓	✓	1	MoE	
1.1.2 Produce bi-annual research gap report and circulate to all technical agencies[63], universities and tertiary institutions through a research needs seminar	Research gap report	0		05 RGP produced (2022,2024,2026,2028, 2030)	✓	✓	✓	10	MoE	
1.1.3 Provide grants for multi-disciplinary research projects with NSF, IFS, IPS and UGC	No. of new grants provided	0		Identify 5 research areas and fund new research projects[64]	✓	✓	✓	25	MoE	
1.1.4 Develop reporting templates to streamline inputs of final year students posted into the Ministry and CEA	No. of reports submitted by research interns	*Ad hoc* reporting		02 reports per intern on prescribed template	✓	✓	✓	1	MoE	CEA
1.1.5 Provide a platform for Environment Research and Information Sharing	Platform operational and accessible	Not available		At least 05 technical agencies and ten universities sharing environmental research findings	✓	✓	✓	2	MoE, CEA	
1.2 Traditional knowledge conservation and use mechanisms developed	No. of TK-based solutions added to the knowledge repository	TK information is collected but not widely disseminated		TK repository at MoE linking to other databases at national/provincial level	✓	✓	✓		MoE, CEA	MoCA SDC, MoEd
1.2.1 Traditional knowledge repositories for biodiversity, food security, climate and water management, agriculture created at MoE and other relevant government agencies	TK repositories available	0		06 sector-based repositories for biodiversity, food security, climate and water management, agriculture and health	✓	✓	✓	5	MoE	MoA, State ministry of Indigenous medicine, MoWS
1.2.2 Competitions for submissions of TK solutions for environmental issues in schools and universities encouraging students to think 'outside the box'	No. of TK-based competitions for schools and universities	0		At least 03 competitions		✓	✓	10	MoE	
1.3 Environmental data standards and data sharing promoted	No. of inter-agency data sharing agreements signed	No. data sharing protocol in place		No. of clearing house mechanisms operational No. of new environmental indicators measured		✓	✓		MoE and SDC	ICTA FD, DWC, CC&CRMD, MEPA,
1.3.1 Environmental data sharing protocols developed linked to National Data and Information Sharing Policy	Data sharing protocols	0		Data sharing protocols gazetted		✓	✓	5	MoE	ICTA
1.3.2 Incentives, training and awareness to increase data collection and standardization for quality environmental data	No. of training programmes for data standardisation	0		1 programme/yr		✓	✓	2	DCS	
1.3.3 Prepare Status of the Environment / Environmental Outlook reports for Sri Lanka	Outlook reports published	Last report published in 2009		Corresponding to the Global Environmental Outlook reports	✓	✓	✓	20	MoE	Uni and Policy Think Tanks

63 Such as Forest Department, Department of Wildlife, Marine Environmental protection Agency, CEA, Coastal Resources and Management Authority

64 Linked to Strategy 5, action 5.1

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Strategic Activity/Specific Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
					S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
1.3.4 Establish inter-ministerial working group for environmental SDGs indicators and data analytics, identify sub-clusters to work on compound indicators and support	No. of SDG indicators/ or localised proxy indicators reported against by 2030	Only 5 out of 44 indicators for environment reported in 2018		Data or proxy data available and collated for 44 indicators or their localised indicators	✓	✓	✓	1	SDC	DCS
1.3.5 Initiate international technical cooperation to overcome environmental data deficiencies and build capacity of national and local public sector officials on environmental SDGs and their data needs	No. of capacity building initiatives for environmental SDGs	0		At least 02 programmes conducted	x	x	x	100 (from donor agencies)	SDC and DCS	
2. Guide and empower decision- makers, with timely access to quality data and information.										
2.1 Empowering national and local political leaders with scientific data and information	No. of parliament debates conducted on environmental issues	None		03-04/ yr	✓	✓	✓		MoE	CEA, SDC
2.1.1 Establish an inter-ministerial committee on environmental issues under the Minister for Environment to support NEAP implementation and link with the Inter-ministerial Coordinating Committee on SDGs	Inter-ministerial committee meetings	0		02/yr	✓	✓	✓	2.5	MoE	CEA, SDC
2.1.2 Develop briefing papers and position papers, policy recommendations for current environmental issues with stakeholder input	No. of briefing papers	Ad-hoc and when requested		Depending on inter-ministerial committee recommendations, develop at least 02 papers/yr	✓	✓	✓	20	MoE	CEA
2.1.3 Establish a NEAP CC[65] for environmental knowledge and communications	NEAP CC established and meet at least 02/yr	Not available		NEAP CC meetings to monitor Knowledge and Communications Action Plan	✓	✓	✓	No additional cost	MoE	
2.2 District and Provincial development planners/ committees access information/data for development decision-making	No. of inter-agency data sharing agreements signed	None		Training for district level officials 02/yr Environmental safeguards programmes 01/yr Electronic content produced 06 modules in all 03 languages	✓	✓	✓		CEA, MoE	ICTA
2.2.1 Updated District environmental profiles are available and have the data repositories online to enable NEAP implementation	District Environmental profiles updated	TBE[66]		All DEP's updated with MoE support by 2025	✓	✓	✓	50	CEA, MoE	
2.2.2 Training to DSs, DDCs and DECs[67] on accessing and using data in Biodiversity and Climate clearing houses and other databases	No. of data related training programmes	0		Initial training pgm-25, bi annually 75	✓	✓	✓	20	MoE	FD, DWC, SD, ICTA, LUPPD
2.2.3 Develop online module on accessing environmental data repositories including Clearing House Mechanisms (Biodiversity and Climate Change) and how to use this data for development decision-making	Online module updated	0		Module available (2023) updated (2027) in 3 languages		✓	✓	40	MoE	ICTA

65 Please refer Chapter 4 on Implementing Arrangements

66 To be established in 2022

67 District Secretariat, District Development Committees, District Environmental Committees

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Strategic Activity/Specific Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
					S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
2.3 Promote landscape level planning tools and Strategic Environmental Assessments for development planning.	No. of national and district planning officials aware of SEA and landscape approaches	unknown		All national and district planning officials are aware of SEA approach and are trained to use it	✓	✓	✓		CEA	
2.3.1 Develop training modules i) landscape approaches for ecosystem restoration and sustainable development and ii) applying strategic environmental assessments as a development planning tool	Training modules available	0		02	✓	✓	✓	10	CEA	MoE, Uni
2.3.2 Conduct awareness programmes for public sector, private sector developers, project proponents, Ministry of Finance, National Planning Department, Sustainable Development Council	No. of officials with improved knowledge on SEA and Landscape Approach	TBE		At least 25 national and 25 subnational officials/ yr	✓	✓	✓	30	CEA, MoE	SLIDA
3. Influence behaviour and attitudinal change through awareness and advocacy.										
3.1 Develop and maintain a pool of trainers/ resource persons with deep understanding and commitment to eco-conscious development/ sustainable living	No. of trainers registered in MoE and available for programmes	No training pool available		At least 25 trainers added every year through ToT	✓	✓	✓		MoE, CEA	CEA, SDC
3.1.1 Develop a localised, unique training and awareness package for sustainable living and green development adapted to Sri Lankan context	Training programme available	0		Training programme developed in 2022, updated in 2025	✓	✓		10	CEA, MoE	SDC Uni
3.1.2 Training of trainers conducted for a wide range of resource persons drawn from media, academics, government and private sectors	ToTs conducted	0		02/yr	✓	✓	✓	15	CEA	MoE
3.1.3 Mobilise retired public and private officials and teachers as trainers and promoters of eco-conscious lifestyles	No. of retired officers trained and mobilised	0		25 per year	✓	✓	✓	5	CEA	MoE, SDC
3.1.4 Build environmental consciousness among religious leaders, preachers and influential religious personalities to promote environmental awareness through religious programmes	No. of religious persons trained as trainers	0		100 per district		✓	✓	10	CEA	MoCA
3.2 Promote public awareness on sustainable consumption and eco-conscious lifestyles	Localised awareness programme development	Not available		At least 01 campaign/yr	✓	✓	✓	3	CEA	SDC
3.2.1 Develop content for new and conventional media (social media, print, web-based and electronic) on sustainable lifestyles and sustainable consumption	Promotional content developed	02-03 graphics		At least 05-06 graphic and video-based content created/yr	✓	✓	✓	5	CEA	MoE, SDC
3.2.2 Environmental promotional campaigns designed and disseminated through multiple media channels	Reach of media campaigns	Currently CEA has a small budget for annual environmental promotions		Budget increased by 100% and at least 10 successful campaigns conducted by 2030	✓	✓	✓	25	CEA	MoE
3.2.3 Poster and video-based knowledge products annually for social media with women social media influencers (artists/ sportspersons and religious) to speak on sustainable lifestyles	New media influence measured. No. of posts and messages with over 1,000 hits	10 Posters Social Media 02 videos		At least 20 new social media posts and 04 videos created/yr Social media following increased	✓	✓	✓	15	CEA	MoE

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Strategic Activity/Specific Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
					S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
3.2.4 Conduct annual surveys through online or WhatsApp based platforms to monitor effectiveness of information campaigns	Survey results available on website	0		At least 09 surveys administered after awareness campaigns are launched	✓	✓	✓	2	CEA, MoE	Uni,
3.2.5 Training of Trainers (ToTs) for environmental promotions on using professional communications tools and new media	No. of officials trained in new media	0		01 ToT conducted every year for communications officials from all technical agencies	✓	✓	✓	10	CEA, MoE	MoMM
3.3 Target youth and especially young entrepreneurs for sustainable development, consumption and production related awareness	Youth targeted programmes for sustainable consumption and production	Ad hoc programmes conducted on demand		Prepared plan to reach younger generation through 03 youth clubs and 02 entrepreneurs with programmes on SCP (2023) Funded and implemented Plan (2024-2030)	✓	✓	✓	10	MoE, CEA	CEA, MoE, NYSC
3.3.1 Initiate partnership with NYSC and youth clubs to promote sustainable concepts and a youth awards scheme for sustainability	No. of youth clubs with sustainability programmes	0		At least 01 programme/yr	✓	✓	✓	30	NYSC	CEA, MoE
3.3.2 Develop programmes targeting young entrepreneurs promoting sustainable production and environmental-friendly, green technologies	No. of programmes conducted for green technology at Province/ District Chambers	0		02 programmes/yr	✓	✓	✓	20	MoYS	Sustainable Banking Network, MoF, NYSC
3.3.3 Create IT or app-based knowledge platforms that can be used by young entrepreneurs	Green Technology App	0		App available (2024) Downloads monitored (2025-2030)	✓	✓	✓	10	ICTA	MoYS CEA, MoE, NYSC, SMED, NEDA
3.4 Groom a new generation of environmentally-literate political actors	No. of young parliamentarians involved in environmental action	TBE[68]		At least 02 young (below 40) parliamentarians engaged every year in environmental action/ negotiations	✓	✓	✓		MoE	CEA
3.4.1 Include select young politicians in delegations representing Sri Lanka for international convention meetings / missions/ negotiations	Environmental negotiation mission composition	0		Transparent process established to include youth politicians and ministers in 02 country negotiation missions/yr	✓	✓	✓	2	MoE	Parliament
3.4.2 Commemorate international days (Forest/Ocean/ Environment/Water/Biodiversity, land, air quality & Ozone) with young political leadership	Participation and speeches made by young politicians at national/provincial	1 national Programme 25 District programmes		Youth political participation increase by 20% by 2024, 30% by 2026 50% by 2030	✓	✓	✓	2	MoE	Parliament, PCs
3.5 Improved engagement with civil society	No. of joint programmes with Civil Society	0		One joint advocacy campaign conducted with civil society	✓	✓	✓		MoE and CEA	NGOs, NGOS, CSO federations
3.5.1 Conduct regular dialogues with civil society groups under Minister's patronage	Dialogues with NGOs and CSOs	Ad hoc		Structured discussions with CSOs (02/yr)	✓	✓	✓	5	MoE and CEA	NGOs, NGOS, CSO federations
3.5.2 Engage civil society groups for environmental advocacy by providing technical and other support to conduct thematic campaigns	No. of grants provided for advocacy campaigns	Ad hoc		10-15/yr	✓	✓	✓	10	MoE and CEA	NGOs, NGOS, CSO federations
3.6 Build media capacity and knowledge to report on sustainable, eco-conscious development projects	No. of journalists reporting on environmental issues with facts and data	TBE[69]		50% increase by 2025 100% increase by 2030	✓	✓	✓		MoMM, SLPC	CEA
3.6.1 Education and awareness on sustainable consumption and production for advertising industry	No. of advertising companies participated in awareness programmes	0		10/yr	✓	✓	✓	20	CEA	CEA
3.6.2 Conduct practical programmes and courses for journalism	No. of field visits conducted for journalists	0		At least 05 visits/yr[70]	✓	✓	✓	25	MoMM, SLPC	Journalism and media undergraduate programmes

68 To be established through a survey of parliamentarians and provincial politicians in 2022

69 To be Established through a survey in 2022

70 This target should be discussed with other thematics such as biodiversity, coastal, water and waste

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Strategic Activity/Specific Actions		Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
						S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
3.6.3	Journalism awards to promote consistent reporting on environmental issues (Develop a programme that offers mentoring and stipend for environmental reporting for 10-12 media annually)	No. of journalists trained	0		Programme established and funded (2023) Journalists trained 10-15/yr from 2025 onwards	✓	✓	✓	20	MoMM, SLPC	CEA
3.7	Establish baseline and monitoring system on environmental awareness and engagement to support KM activities	Monitoring standards and system operational	Baseline established in 2022		Monitoring protocol developed (2022) annual data collection (2022 onwards) Surveys (2022, 2024, 2027, 2030)	✓	✓	✓		CEA	Independent evaluators, Uni
4.	**Promote quality and lifelong environmental and sustainability-oriented education.**										
4.1	Improve and upgrade content in school and university curricula	No. of upgrades added to national school and university curricula	Upgrades are not coordinated		At least 04 coordinated and upgraded. 02 for schools and 02 for universities	✓	✓	✓		NIE and UGC	MoE, CEA
4.1.1	Review current environmental subjects and technical curricula every five years to upgrade with new developments (coordinate across MoE and allied agencies such as CEA, FD, CCD, MEPA etc)	Curriculum committee established	None		Committee established with membership from across MoE and CEA	✓	✓	✓	3	NIE and UGC	MoE, CEA
4.1.2	Develop more accessible on-line courses for environmental/ sustainable development learning as elective subjects for students above Grade 6	Online platforms for schools and universities	0		Content developed for 02 courses	✓	✓	✓	15	MoEd. NIE and UGC	MoE, CEA
4.1.3	Develop Educational Materials including Poster, videos documentaries, animation videos etc. relevant to upgraded curricula	No. of videos documentaries per year	0		05 videos documentaries/yr	✓	✓	✓	25	CEA	MoE
4.2	Promote practical environmental education and nature-based learning opportunities	% of schools providing space for practical environmental education	Currently environment education is theory based		Every student coming out of the national education system has a basic understanding of sustainable living and green development		✓	✓		MoEd, CEA	MoE, CEA
4.2.1	Promote and engage students in practical environment related programmes in their area/ or cross-learning among urban and rural schools	Environment Clubs established in schools	TBE		10% of schools to have Environmental Clubs by 2023 50% by 2025		✓	✓	10	MoEd	MoE, CEA, PDoEds
4.2.2.	Nature-based field visits made mandatory for every grade	Circular on nature-based learning issued	None		Circular issued to all education zones to promote and fund nature field visits for every class annually		✓	✓	To be estimated	MoEd	MoE, CEA, PDoEd
4.2.3	Environmental Pioneer Programme to be promoted with greater incentives	No. of Env Pioneers achieving presidential medals	TBE[71]		At least 100 Presidential medallist/yr Increased by 10%/yr	✓	✓	✓	250	CEA	MoEd
4.2.4	Green schools with SCP clubs or environmental councils to develop better practices in waste, water, energy management within schools	No. of Green Schools	TBE[72]		Increased by 50% by 2025 100% by 2030	✓	✓	✓	10	MoEd	MoE, CEA
4.2.5	Foreign and local study tour to motivate the best performance presidential medallists, teachers and others who involve in EPP.	No. of programmes with knowledge and skill sharing	Motivate to eco-friendly generation		01 programme for merit holders/yr 01 programme for others/yr	✓	✓	✓	125	CEA	MoEd

71 To be Established by CEA

72 To be Established by CEA and NIE

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Strategic Activity/Specific Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
					S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
4.3 Invest in building teacher capacity	No. of teachers trained with new material	Teacher training programmes are mostly theoretical and not integrating practical aspects		30% of teaching cadre trained by 2023 50% by 2025	✓	✓	✓		MoEd, PDoEds, NCoE, Religious Education Centres, CEA	SDC
4.3.1 New training material on sustainable development and integrated teacher training programmes at all Training Colleges to build cadre of Green Teachers	No. of programmes and training material available	TBE[73]		Training material available	✓	✓	✓	50	CEA	SDC
4.3.2 Implemented Green Leaders' programme for trained teachers.	No. of Green Leaders	None		At least 1,000 Green Leaders/yr Increased by 50% by 2025	✓	✓	✓	10	CEA, NCoE	MoEd, NIE
4.3.3 School syllabi reviewed bi-annually with input from all environmental sectors and aligned with educational reforms being rolled out for primary and secondary schools	No. of syllabus upgrades conducted	Ad hoc[74]		At least 03 upgrades aligned with core educational reforms by 2030	✓	✓	✓	3	MoEd, NIE	CEA, MoE
4.3.4 Teachers to be provided with incentives and budget to conduct practical environmental programmes and monitoring of environmental quality of local areas with students	Budgets for environmental programmes for Env. Clubs	TBE		Budgets secured in 2022 Increased by 50% in 2025	✓	✓	✓	200[75]	CEA	SDC
4.3.5 Best Environmental Teacher awards schemes at province level	No. of applicants for awards	TBE[76]		Increased by 30% by 2025	✓	✓	✓	10	CEA	MoEd, SDC
4.4 Professional development opportunities for public and private sector	No. of professional development courses and discussion forums conducted on NEAP	Not available		At least 03 short courses conducted in the SLIDA curriculum, Central Bank training programmes for sustainable banking/ yr	✓	✓	✓		MoE	CEA
4.4.1 Develop/ improve content for short courses with SLIDA on NEAP implementation focusing on overall green development concepts with modules on thematics such as climate change, biodiversity (land and ocean), air quality, land management and forestry, industry, water, waste etc	Course content upgraded	TBE		Improved environmental courses available for all levels of public sector training	✓	✓	✓	25	SLIDA	MoE
4.4.2 Course on environmental safeguards introduced through SLIDA (with CEA)	Course available	None		Course developed	✓	✓		10	SLIDA	MoE, CEA
4.4.3 Integrate more updated environment-related content and information to the SLIDA course on SDGs, focusing on modules on environmental goals and their targets	No. of public sector officials trained using upgraded course and new content	Course currently being conducted by SLIDA for public officials		Environmental content reviewed and upgraded every 03 yr	✓	✓	✓	25	SDC	MoE
4.4.4 District-level workshops and forums on environmental sustainability and safeguards in development programmes (focus on environmental SDGs)	No. of national and district levels discussions	TBE		At least 03/yr	✓	✓	✓	1	DECs with CEA leadership	MoE, NPD, SDC

73 SCP education programme would have developed training material for teachers

74 Environmental activities have been incorporated in to the primary learning curricula and the Grade 6 (upwards) science on an ad hoc basis, as need arises

75 At least Rs. 20 -25 million per year for 09 years

76 CEA's Teacher Awards Scheme should be studied for replication

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Strategic Activity/Specific Actions		Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
						S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
4.5	Environmental education for Divisional and Field based staff working in rural development, health and extension services of agriculture, fisheries and livestock etc	% of extension workers, by sector, with improved knowledge of sustainable alternatives	*Ad hoc* training		Extension and field officers are equipped to provide sustainable alternatives to current practices	✓	✓	✓		MoE	MoPP&L/DoA, DFAR, DoH, CEA
4.5.1	Include environmental education, green development concepts and sustainable production into in-service. training curricula for extension services of agriculture, livestock, fishery and health etc	No. of in-service training institutes with green development programmes	TBE		All in-service institutes training field-based extension services have green development modules			✓	25	MoE with relevant government agencies	SMoPC&L
4.6	Lifelong environmental learning promoted	No. of new programmes available in local language	None		At least 05programmes available in Sinhala and Tamil	✓	✓	✓		MoE, MoEd	International agencies, foreign Uni
4.6.1	Localize existing online programmes with global institutes/ universities (IUCN, WRI, FAO and UNDP etc.) and promote for learning for public, civil society, private and media	No. of online programmes available in local languages	None		Develop and roll out 02 training programmes in Sinhala and Tamil (2023 and 2027)		✓	✓	25	MoE	International agencies, foreign Uni, MoEd
4.6.2	Develop cross-discipline programmes at tertiary education establishments and encourage lifelong learning for retired public private sector participants, unemployed, professionals from other disciplines (lawyers, health workers, artists)	No. of new tertiary programmes in local language	None		At least 03 universities include tertiary programmes for adult learning on sustainable development	✓	✓	✓	30	MoE, MoEd	International agencies, foreign Uni
5.	**Build capacities and access financing for research, innovation and monitoring change.**										
5.1	Develop new partnerships to foster research and innovation	% of increase in research grants compared to 2020	Research grants are underfunded		Allocate research/innovation grants in MoE budget to universities. Increase in multi-partner research projects with private sector and institutes	✓	✓	✓		MoE, NSF, UGC,CEA	Inventors Association, SLINTEC
5.1.1	Build partnerships with foreign research institutes and universities to promote cross-learning between countries	No. of collaborations and exchange programmes with foreign research institutes	TBE[77]		Increased by 50% by 2025	✓	✓	✓	25	MoE	UGC, ERD
5.1.2	Financing research through industry-based CSR or Trust Funds; or through innovative taxes, levy (such as the funding mechanism for air quality research)[78]	No. of innovative funding mechanisms for research	TBE[79]		At least 02 new funding mechanisms by 2025		✓	✓	2	MoE	MoF
5.2	Innovation and sustainability awards schemes promoted for private sector	No. of new innovations from Sri Lanka patented	TBE[80]		Patented innovations increased by 25 by 2025 By 50% by 2030		✓	✓		CEA	SLIC
5.2.1	Presidential Awards scheme further developed and widely promoted	No. of applicants for Presidential Awards	01 event/yr		01 event/yr	✓	✓	✓	150	CEA	Private sector, media
5.2.2	Sustainability awards for private sector industry (targeting SMEs as well) targeting new innovations for sustainable development in collaboration with SDC's new awards scheme for private sector	Innovations awards schemes Patented innovations available for wider use	TBE		Increased by 25% in 2025 By 50% in 2030	✓	✓	✓	50	SDC	EDB, SLIM Private sector Chambers and associations, NIPO

77 To be Established by 2022

78 This indicator is linked to the research gaps identified in Strategy 1 above.

79 To be Established by CEA

80 To be Established by 2022 by Sustainable Development Council

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Strategic Activity/Specific Actions	Key Performance Indicators (KPIs)	Baseline		Targets	Time Frame (in years)			Budget (LKR M)	Implementation Responsibility	
					S 1- 2	M 2–5	L 5–10		Lead Agency	Other Key Agencies
5.3 Build capacities to access environmental financing and access innovative novel financing for environmental sustainability	No. of new proposals developed for environmental finance by national agencies	0		At least 05 new fundable proposal developed and submitted to / approved by Ministry of Finance/yr		✓	✓	20	NPD	MoE, NPD, ERD
5.3.1 Training module on innovative environmental and green financing and green auditing among key officials in Ministry of Finance, National Planning Department and Central Bank	No. of awareness programmes in green financing	*Ad hoc* programmes		Training module developed and conducted, at least 02 programmes/yr	✓	✓	✓	10	MoF, MoE	CBSL. International Agencies
5.3.2 Systematize green Accounting and auditing / natural capital accounting for key sectors	Green accounting used in key sectors	0		TBE	✓	✓	✓	10	DCS, MoE	MoF, CBSL

CHAPTER 5

IMPLEMENTATION AND MONITORING ARRANGEMENTS FOR THE NEAP

5.1 INTRODUCTION

The Government of Sri Lanka has demonstrated, in many ways, the commitment to environmental conservation, aligned with its Constitutional provision that “the state shall protect, preserve and improve the environment for the benefit of the community”. Since the concept of sustainable development gathered momentum in 1980’s, some noteworthy initiatives in environmental planning in Sri Lanka include the establishment of the Central Environmental Authority; the establishment of a ministry dedicated to the subject of environment; preparation of the National Conservation Strategy in 1988; the National Environmental Action Plan (NEAP) in 1992 and its revisions in 1993 and 1998; the National Environmental Policy (NEP) in 2003 and 2022; Caring for the Environment 2003 and 2008 and the National Action Plan for Haritha Lanka Programme 2009. These progressive environmental plans, prepared under the leadership of the MoE, were ambitious and visionary in addressing environmental degradation. However, there were many setbacks in the successful implementation of those plans. Therefore, in the current iteration of the NEAP 2022-2030, more emphasis is given for the effective implementation of the proposed plan, to better achieve its intended objectives.

The proposed implementation and monitoring arrangements for the NEAP will facilitate smooth implementation and easy tracking of the progress of delivery of the targets set in the NEAP. It will also help to identify barriers to implementation and find remedial measures to overcome such impediments. It will provide a clear process of monitoring and periodic review. Implementation strategies for environmental actions have been discussed since the introduction of the National Conservation Strategy (1988), which highlighted the need for close coordination and cooperation of organizations. The process that is presented here is built upon the coordinating mechanisms proposed in the first generation of National Environmental Action Plans (1992, 1993 and 1998) and subsequently, in Caring for the Environment (2003 and 2008). Where needed, changes to those mechanisms are also incorporated to address weaknesses encountered in operationalizing those measures.

With the mandate for sustainable development and management of the environment, the Ministry of Environment, together with its line agencies, shall take the lead role in preparing and coordinating the implementation and monitoring, reviewing and adapting facets of the NEAP, while entrusting the respective agencies responsible for implementing each action identified in the NEAP.

Because the NEAP is a national plan for environmental management, it requires the coordination and engagement of many agencies. The MoE has developed the NEAP covering the period 2022-2030 to operationalize the National Environment Policy, 2022 and taking all environment related sectoral policies, strategies, programmes and action plans.

The NEAP 2022-2030 is organized under nine thematic areas as discussed in the Chapter 2. These thematic areas cover strategies and action plans identified in the NEAP for the period covering 2022-2030 and include Resource Mobilization and Knowledge and Information Management for Eco-conscious Development as cross-cutting areas, in addition to the Implementation and Monitoring Arrangements being discussed in this chapter. These cross-cutting areas were formulated as a way of addressing setbacks in the previous versions of national environmental plans in achieving the objectives laid down therein.

Figure 5.1 provides a schematic diagram of the mechanism for implementation and coordination of the NEAP.

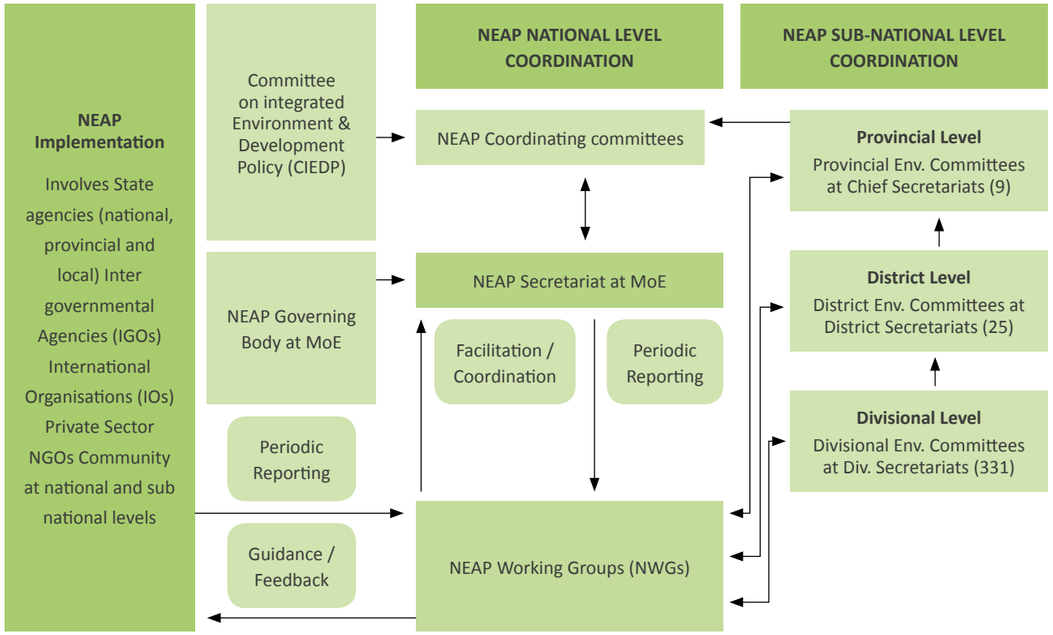

Figure 5.1. NEAP Implementation and Monitoring arrangements

5.2 INSTITUTIONAL ARRANGEMENTS FOR COORDINATION OF NEAP IMPLEMENTATION AND MONITORING

5.2.1 Committee on Integrated Environment & Development Policy (CIEDP)

It is proposed that a Committee on Integrated Environment and Development Policy (CIEDP), is convened as an apex body for harmonizing environment and development decision-making. The purpose of the CIEDP is to handle any policy inconsistencies/complex policy decisions that may arise in the process of implementing NEAP. This same arrangement can be used for other programmes including the implementation of Nationally Determined Contributions (NDCs). The CIEDP should be chaired by the President's Secretary and will have Environment, Finance, Planning and Secretaries of development-oriented ministries as members.

5.2.2 Coordinating Committees (NEAP CCs)

NEAP proposes over 650 environmental actions, within nearly 100 strategies, under nine thematic and three cross-cutting areas. Responsibility for implementing most of these actions are under various national, provincial and local authority level stakeholders, outside the ambit of the MoE and its line agencies. Therefore, an appropriate institutional mechanism for the coordination of activities across various ministries is essential for smooth implementation of the NEAP. NEAP Coordinating Committees (NEAP CCs) are proposed for coordinating action and monitoring progress amongst line agencies across ministries. As recommended in this NEAP, eleven NEAP Coordinating Committees (NEAP CC) for NEAP implementation will be established, representing nine thematic areas and two cross-cutting areas (Communication and Knowledge Management, as well as Resource Mobilization). Each NEAP Coordinating Committee is expected to focus on these actions within its area of authority that affect the whole or any part of the environment.

The proposed NEAP CCs are given below:

NEAP CC 1: Air Quality Management
NEAP CC 2: Biodiversity Conservation and Sustainable Use
NEAP CC 3: Climate Action for Sustainability
NEAP CC 4: Conservation and Sustainable Use of Coastal and Marine Resources
NEAP CC 5: Sustainable Land Resources Management
NEAP CC 6: Holistic Waste Management
NEAP CC 7: Integrated Water Resources Management
NEAP CC 8: Environmental Management in Cities and Human Settlements
NEAP CC 9: Greening Industry
NEAP CC 10: Information and Knowledge Management for Green Growth
NEAP CC 11: Resource Mobilization

These NEAP CCs should be constituted with agency heads of responsible agencies in all thematic / cross-cutting areas under each committee. Meetings should be convened on quarterly basis, under the joint Chairpersonship of the Secretary MoE and respective Secretaries of the Ministry/Ministries relevant to the subject area/s of the specific NEAP CC. The joint Chairpersonship of each NEAP Coordinating Committee could be held on a rotational basis by the Secretary of the lead ministry (ies) within the sectoral group, in instances where there are many ministries involved. The NEAP CCs for subjects within the jurisdiction of the MoE will be Chaired solely by the Secretary MoE.

Membership of each committee should include, ideally,

a) key officials of the agencies responsible for implementing NEAP actions (ministries, departments, statutory bodies);
b) inter-governmental and international organizations relevant to the specific subject areas;
c) recognized experts in the relevant subject areas;
d) civil society organizations and community-based organizations;
e) private sector representation; and
f) provincial planning secretariats.

The Department of National Planning and any other relevant agency can be included in every NEAP Coordinating Committee. Also, depending on the need, agencies which are not in NEAP CCs can also be invited for meetings.

NEAP CC functions are detailed under the broad categories of coordination, facilitation and monitoring of the NEAP implementation as follows:

1. Periodically reviewing the progress of the implementation of the NEAP thematic areas.
2. Identifying any constraints/hindrances for smooth implementation of NEAP actions within the NEAP CC area and through respective ministries/line agencies, providing guidance/support as needed, to overcome these.
3. Providing guidance for resource mobilization for areas lacking resources for implementing actions in the NEAP.
4. Identifying important new issues related to environmental management, that need new or different policy, regulation or legislative directions/approaches than those mentioned in the NEAP.
5. Assisting in the smooth collaboration of NEAP Focal Points of development agencies, assess capacity needs and coordinate capacity enhancement for better NEAP implementation.

Identifying specific issues that cannot be resolved by the respective NEAP Coordinating Committees and preparing relevant papers on these sectoral issues should be referred to the higher-level Committee of Secretaries (the Committee on Integrated Environment and Development Policy - CIEDP) to obtain solutions.

5.2.3 NEAP Secretariat

The Ministry of Environment is expected to create a dedicated unit, with required capacities as the NEAP Secretariat within the MoE, to facilitate and coordinate NEAP implementation and monitoring. Within the existing structure of the MoE, the Policy Planning & Monitoring Division is identified for this function. The NEAP Secretariat will have the task of overall coordination of the NEAP implementation and monitoring. At the national coordination level, organizing meetings of the NEAP Coordinating Committees, preparing agendas, drafting technical papers to be tabled at the meetings, briefing the meetings and preparing meeting minutes are selected tasks of the NEAP secretariat.

It is also essential that the entire MoE contributes to the implementation of the activities of the NEAP Secretariat, though the Secretariat will be housed within the Policy Planning & Monitoring Division. It is also recommended that the newly appointed MoE Development Officers at the Divisional Secretariat level are also managed under the NEAP Secretariat, and be used to coordinate NEAP implementation at the Divisional Secretariat level. Figure 5.2 indicates the NEAP CCs (thematic and cross-cutting areas) and subject areas under their management, as well as the responsible divisions within the ministry and their responsibilities.

NEAP Coordinating Committee		Relevant Division in MoE	Responsibility
1. Air Quality Management	←	Air Resource & National Ozone Unit	Provide leadership in coordinating the implementation and monitoring aspects relating to NEAP thematic areas + IKMGG and Resource Mobilization crosscutting areas identified under the Unit/Devision with overall guidance provided by the NEAP Secretariat
2. Biodiversity Conservation and Sustainable Use	←	Biodiversity Secretariat	
3. Climate Actions for Sustainability	←	Climate Change Secretariat	
4. Conservation and Sustainable Use of Marine and Coastal Resources	←	Biodiversity Secretariat	
5. Sustainable Land Resources Management	←	Land Resource Division	
6. Holistic Waste Management	←	Pollution Control and Chemical Management Division	
7. Integrated Water Resources Management	←	Environment Planning and Economics Division	
8. Environmental Management in Cities and Human Settlements	←	Pollution Control and Chemical Management Division	
9. Greening Industries	←	Climate Change Secretariat	
10. Information and Knowledge Management for Green Growth	←	Education Training & Research Division	
11. Resource Mobilization	←	International Relations Division	

Figure 5.2. NEAP Coordinating Committees and Responsibilities of Units/Divisions within MoE

Responsibilities for NEAP thematic areas are identified for existing divisions of the MoE. Some divisions are assigned with two thematic areas. Therefore, it is vital that mandates and capacities within the current divisions are reviewed and restructured if required, and thematic areas redistributed for the better aligning of subject areas with the NEAP. Themes that may require reallocation are Greening the Industry, Environmental Management in Cities and Human Settlements and Sustainable Use of Coastal and Marine Resources.

5.2.3.1 NEAP Governing Body at MoE

This will consist of the Secretary/MoE as the Chair, Director General, Planning as the Secretary Governing Body, as well as Additional Secretaries/MoE and all Directors. Its function will be the internal governance of the NEAP.

5.2.3.2 NEAP Working Groups

Required technical support for the above NEAP CCs are expected to be provided by operational NEAP Working Groups (NWGs) for each thematic/cross-cutting area. The respective Directors of MoE are expected to lead and convene NWGs for all 11 areas. These NWGs will include appointed representatives from all lead agency (NEAP Focal Points of respective agencies) and outside experts, as appropriate, in the given nine thematic areas and two cross-cutting areas.

NEAP focal points are key persons in coordinating activities relating to NEAP within their institutions, such as integration of identified NEAP actions into their plans, facilitation of implementation and reporting of progress of implementation periodically. Capacity building required for these NEAP focal points is discussed in the next chapter. Respective Directors of the MoE, as the convenors the NWGs, should represent the NEAP CC at their quarterly meetings, which will have required progress reports and technical inputs in relation to their respective thematic areas. NWGs are also responsible for preparing provincial, district and divisional level plans of the NEAP for the implementation and monitoring of the NEAP. These implementing agencies/ development agencies extending across both government and non-government agencies are expected to appoint NEAP focal points to spearhead agency specific NEAP actions. They will be the liaisons for the NEAP Secretariat for its implementation and monitoring. Mid to senior level focal points should be appointed from the respective agencies.

5.2.4 Sub national level coordination of NEAP

5.2.4.1 Provincial Environmental Committee (PEC)

Provincial Environmental Committees (PECs) are to be set up at the Chief Secretariats of each Province. Provincial CCs are to be represented at the NEAP CC convened at the national level, linking NEAP implementation at sub national level with the national level. The DEC (see below) is also encouraged to be represented at respective PEC, though there is no mechanism for this at present.

All sub-national coordinating mechanisms will be linked to appropriate planning divisions. Linkages with the NEAP Secretariat (Policy Planning and Monitoring Division) will be easy to establish as it is in the same area of expertise. Sub-national NEAP plans will be kept as single plans (without separating them into thematic area specific plans), although the identity of each thematic area will be retained.

5.2.4.2 District Environmental Committee (DEC)

District Environmental Committees (DEC) of the District Secretariats are expected to coordinate the NEAP implementation at District level. These meetings should be convened by the District Secretaries with coordination support from the Director Planning for respective District Secretariat. Required assistance should be provided by Development Officers (DOs) of MoE assigned to each Divisional Secretariat covering the whole district. The NEAP Secretariat should coordinate with the DECs regarding the NEAP. When the MoE Assistant Directors are appointed at the district level, they can take over the role that MoE DOs played at the DECs.

5.2.4.2.1 Divisional Environmental Committee (DivEC)

Integration and implementation of the NEAP at a sub-national level can be coordinated through existing mechanisms at these levels. Divisional Environmental Committees (DivEC) are to be revived and used for coordinating the NEAP at the divisional level. There are 331 Divisional Secretariats with many field level officers, including the Development Officers (DOs), of the MoE within each DS office. By building their capacity to own the NEAP and the NEAP process, these committees can play a vital role in facilitating the coordination of the implementation and review of the NEAP. This can be effected under the overall leadership of the Divisional Secretary and divisional meetings can be coordinated by the Assistant Director Planning at each divisional secretariat, with the MoE DOs facilitating the process, with guidance from the NEAP Secretariat. These Divisional Environmental Committees are expected to be represented at the District Environmental Committee meetings.

5.3 IMPLEMENTATION OF THE NEAP

Based on the overall institutional framework proposed, the responsibility of implementation of NEAP actions lies with respective government and non-government[81] agencies at national and sub - national levels, as identified in respective action plans given in the Chapter 2.

Each action in NEAP Action Plans must be integrated into programmes and annual plans of the agencies with implementation responsibility, as identified in the NEAP, for effective implementation of NEAP. In addition, these agencies must undertake detailed spatial planning - covering appropriate Provinces, Districts and Divisions - based on where actions must be implemented.

Implementation mechanisms at the district level can be revisited when Assistant Directors of the MoE operate from district secretariats.

A draft reporting format for implementation agencies is given in Annex 1. These formats can be further developed on finalization of the NEAP and provided on a retrievable electronic platform (database managed by the NEAP Secretariat) where agency specific action plans and reporting formats can be retrieved and submitted electronically for reporting progress.

5.4 FINANCING THE NEAP

Funds for the NEAP will be generated based on a resource mobilization plan, that looks at the NEAP as an investment plan. Initial ideas on costing, valuation and financing were presented in the previous chapter. As indicated there, thematic area specific resource mobilization plans must be generated though appropriate sources of funding for implementation of the NEAP for its successful implementation.

5.5 MONITORING THE NEAP

The main focus of this section is to establish a mechanism to review the progress of implementation of NEAP actions by respective implementation agencies, identifying challenges and reporting progress to the NEAP CCs. Under the overall leadership of the proposed NEAP Secretariat, NEAP implementation reports from individual implementing agencies will be reviewed by respective divisions of the MoE. These progress report should be written electronically and uploaded to a database for easy review against the NEAP Actions. The entire process should be coordinated at each agency by the NEAP focal points.

While monitoring is mainly confined to implementation progress review as explained above, some degree of monitoring of outcomes of the NEAP at the thematic area level is also recommended. Appropriate thematic area level representative KPIs, baselines and targets should be identified for all thematic areas to capture outcome level impacts before commencement of the formal implementation of the NEAP. Such monitoring can be undertaken with the help of Central Environmental Authority (CEA), other specialized organizations, academics, eligible NGOs, international organizations and community-based organizations. It is proposed that the university system is engaged for quality monitoring at affordable cost. In addition, this will provide training to undergraduates and new graduates, particularly if students from different geographic areas of the country are represented in this process of training.

Quarterly reporting and bi-annual reviews must be undertaken based on monitoring results and the revision of NEAP should be carried out after five years of implementation (in 2025).

Research and development, policy advocacy and data and information sharing institutions also will be necessary to successfully implement the NEAP.

81 Non-government agencies are all agencies other than the government agencies including private sector, civil society, NGOs and International Organizations etc.

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5.6 NEAP IMPLEMENTATION AND MONITORING ACTION PLAN

Actions	Key Performance Indicators (KPI)	Baseline		Target	Time Frame (in years)			Indicative budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10		Lead Agency	Other Key Agencies
Strategy 1. Ensure enabling conditions for successful implementation of the NEAP.										
1.1 Publish NEAP with Cabinet approval	Finalization of the NEAP	Draft final text of NEAP is available		Published NEAP	✓			2.5	MoE	UNDP
1.2 Convert NEAP Action Plans to a retrievable database for easy querying and tracking	NEAP on an easy-to-use e platform	Not available		NEAP in a functional database	✓			0.5	MoE	UNDP
1.3 Establish and operationalize the NEAP Secretariat with required resources	Dedicated mechanism for coordinating NEAP implementation and monitoring	Non-existent		NEAP Secretariat established and operational	✓	✓	✓	35	MoE	MoPP&L
				NEAP Working Groups appointed and functional	✓	✓	✓			
1.4 Establish NEAP coordinating mechanisms at all levels	NEAP Coordinating mechanisms at							No additional cost	MoE	Respective ministries, related agencies
	• National			07 national NEAP CC	✓					
	• Provincial	None		09 Provincial Environmental Committees	✓					
	• District and			25 District Env. Committee	✓					
	• Divisional levels			331 Divisional Env. Committees	✓					
1.5 Establish functional NEAP Working Groups for each thematic / cross-cutting area represented at NEAP CC	NEAP WGs	None		11 working groups	✓			10	MoE	All lead agencies
	Quarterly NWG meeting minutes			4x11 meetings/yr	✓	✓	✓			
1.6 Ensure functionality of NEAP coordinating mechanisms at all levels	Quarterly meetings of coordinating committees convened	None		04 meetings /yr for NEAP CC, PEC, DEC and DivEC	✓	✓	✓	To be estimated	NEAP	PCs, DS, DivS all lead agencies
1.7 Build capacity of NEAP coordinating mechanisms at Provincial, District and Divisional levels	No. of capacity building programmes conducted	None		01 in each province	✓			100	MoE	MoPP&L, PC, DS, DivS
				02 in each district	✓					
1.8 Integrate NEAP actions of all lead agencies into their annual plans	% of NEAP actions integrated into agency a nnual plans at thematic area level	To be determined		50%	✓			No additional cost	Lead agencies	MoE, respective ministries, NPD
				75%		✓				
				100%			✓			

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Actions	Key Performance Indicators (KPI)	Baseline		Target	Time Frame (in years)			Indicative budget (LKR M)	Implementation Responsibility	
					S 1-2	M 2-5	L 5-10		Lead Agency	Other Key Agencies
Strategy 2. Effective tracking of the implementation of the NEAP.										
2.1 Create an online platform for implementation monitoring of NEAP	Online platform for NEAP reporting	None		Functional online database in place for reporting NEAP	✓			0.5	MoE	Lead agencies
2.2 Monitoring report from all key agencies received	Quarterly reports from each lead agency	None		4 reports /agency/yr	✓	✓	✓	No additional cost	MoE	Lead agencies
2.3 Prepare quarterly thematic area-wise reports for NEAP CCs	Quarterly reports	None		4x7/ yr	✓	✓	✓	10	MoE	Lead agencies
2.4 Convene NEAP CCs on a quarterly basis	NEAP CC minutes	None		4x7/ yr	✓	✓	✓	6	MoE	Lead agencies
2.5 Conduct special monitoring missions on issues directed by NEAP CCs	Inspection reports	None		No. of cases	As and when required	✓	✓	50	MoE	Lead agencies
2.6 Conduct programme review every other year	Programme review reports	None		Every other year		✓	✓	20	MoE	Lead agencies
2.7 Review and revise NEAP in 2025	Revision of NEAP	None		Revised NEAP		✓		10	MoE	Lead agencies
2.8 Monitor the smooth implementation of the Resource Mobilization action plan	Quarterly reports	None		4 reports/yr	✓	✓	✓	2	MoE	Lead agencies
2.9 Monitor smooth implementation of the Communications and KM Action Plan	Quarterly reports	None		4 reports/ yr	✓	✓	✓	2	MoE	Lead agencies

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6. LIST OF STAKEHOLDER PARTICIPATION

1. Ministry of Agriculture
2. Ministry of Defense
3. Ministry of Education
4. Foreign Ministry
5. Ministry of Fisheries
6. Ministry of Industries
7. Ministry of Lands
8. Ministry of Plantation
9. Ministry of Ports & Shipping
10. Ministry of Power
11. Ministry of Tourism
12. Ministry of Transport
13. Ministry of Urban Development and Housing
14. Ministry of Water Supply
15. Ministry of Wildlife and Forest Conservation
16. State Ministry of Agriculture
17. State ministry of Canals and Common Infrastructure development in settlements in Mahaweli Zones
18. State Ministry of coconut, Kithul, Palmyra Cultivation promotion and related industrial product manufacturing & Export diversification
19. State Ministry of Estate Housing and Community Infrastructure
20. State Ministry of Ornamental Fish, Inland Fish & Prawn Farming, Fishery Harbor Development, Multiday Fishing Activities and Fish Exports
21. State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticide Use
22. State Ministry of Provincial Councils and Local Government Affairs
23. State Ministry of Urban Development, Coast Conservation and Community Cleanliness
24. State Ministry of Wildlife Conservation, Elephant Round and Trench Construction, Protection and Replanting and Forest Resources Development
25. Department of Agriculture
26. Department of Agrarian Development
27. Department of Land Use Policy Planning
28. Department of National Physical Planning
29. Department of National Planning
30. Department of National Zoological Gardens
31. Department of Irrigation
32. Coastal Conservation and Coastal Resource Management Department

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33. Central Environment Authority
34. Marine Environment Protection Authority
35. National Aquaculture Development Authority of Sri Lanka
36. Road Development Authority
37. Sri Lanka Ports Authority
38. Sri Lanka Sustainable Energy Authority
39. Waste Management Authority
40. Urban Development Authority
41. Board of Investment of Sri Lanka
42. National Water Supply and Drainage Board
43. Water Resources Board
44. Disaster Management Center
45. Geological Survey & Mines Bureau
46. Industrial Development Board
47. Industrial Technology Institute
48. Sri Lanka Foundation Institute
49. Institute of Architects
50. Institute of Development Administration
51. International Water Management Institute
52. National Engineering Research and Development Center of Sri Lanka
53. Natural Recourse Management Center
54. University of Jayawardhanapura – Faculty of Technology
55. University of Moratuwa – Department of Mechanical Engineering
56. University of Moratuwa – Department of architecture
57. University of Wayamba – Faculty of Agriculture & Plantation Management
58. University of Peradeniya – Department of Environmental and Industrial Sciences Faculty
59. University of Peradeniya – Department of Civil Engineering Faculty of Engineering
60. National Building Research Organization
61. Food & Agriculture Organization
62. United Nations Development Programme
63. Sri Lanka Energy Managers Association
64. International Union for Conservation of Nature
65. Sustainable Development Council
66. Center for Environmental Justice

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7. ANNEXE

Annex 1: Sample of a progress reporting format on NEAP

Name of the Implementing Agency							
Reporting period							
Thematic Area							
Strategy							
Action	KPI	Baseline	Target	Time Frame	Progress	SDG Target / contributing NDC	Remarks