

Thematic Assessment Climate Change

1. Introduction

Climate change is a major environmental threat facing the world community today. It is a phenomenon that has been occurring due to internal processes in the earth-atmospheric system and also due to anthropogenic activities towards making human lives more comfortable. About a century ago, scientists had warned that the climate would change due to changes of the composition of the gases in the atmosphere, especially through increase in greenhouse gases, due mainly to anthropogenic activities of the world community. However this message had not been taken to heart by the policymakers of the world community then and had eventually led to irreversible series of environmental consequences. During the last two decades, concerns have constantly been growing on climate change and their consequences and as a result, the Intergovernmental Panel of Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and United Nations Environmental Programme (UNEP) to advice and periodically update the world community on climate change and allied issues. A series of synthesis reports/publications was issued on climate change, and future scenarios were developed on greenhouse gas emissions and also on climate variables, based on mathematical models available at climate modeling centers of the world.

According to the Third Assessment Report (TAR), which was published by the IPCC in 2001, global average surface temperature has risen by about 0.6 °C during the 20th century and the sea level has risen by about 10 to 20 cm during the last century. The same report also reveals that minimum temperature has been increasing much faster than the maximum temperature, resulting in decrease in diurnal temperature especially after 1950s. Rainfall has been erratic, causing extreme weather events, resulting in prolonged droughts and floods, which have been more frequent and more intensified than in the past. Cyclones, tornados and thunderstorms have also been intensified and frequent in the recent past due mainly to global warming.

Analyses have also shown that minimum and maximum temperatures have clearly been increasing in all the stations of Sri Lanka, with the highest increase of minimum temperature being about 2.0 °C at Nuwara Eliya. Analysis of rainfall figures reveals that variability has been increasing in the past in most parts of the island resulting in water scarcities in the dry zone of Sri Lanka.

1.1 Objectives of preparing Thematic Assessment

The main objective of this thematic assessment is to assess the present situation relating to activities which have been carried out in meeting each of the requirements of the UNFCCC Convention. In addition, previous capacity assessments and capacity development exercises are evaluated to ensure that the future capacity development activities will build upon the past experiences and lessons learnt.

Therefore, in general, the ultimate objective of preparing this document is to address priority national and global environmental issues, based on guidance from the Multilateral Environmental Agreements (MEAs) such as UNFCCC. It is concerned with a country's capacity – the ability of individuals, groups, organizations and institutions to address the priority environmental issues as part of efforts to achieve sustainable development. This document would therefore be useful to prepare a national capacity development plan, which will serve as a guide to improve the ability of individuals, institutions and systems to make and implement decisions, and to perform functions in an effective, efficient and sustainable manner.

1.2 Methods and Tools used in preparing Thematic Assessment

Most of the requirements of the Convention have been already addressed to some extent. But none of the requirements have been totally fulfilled. The main reason for inadequate attention on these requirements is less awareness on the consequences of climate change on vulnerable sectors.

The relevant information, documents and reports were initially collected through a desk study. A questionnaire survey was conducted to collect basic information, as most of the stakeholders are geographically distributed in different parts of the Island. Personal communications as well as personal interviews by visiting stakeholders were conducted to gather necessary information effectively. Three-stakeholder workshops were conducted with different stakeholders who represent most of the vulnerable sectors of climate change to collect relevant information, prioritize the capacity needs and identify constraints and typical interventions. There were thorough discussions / dialogues at these stakeholder consultative workshops with regard to Convention requirements, capacity to address these requirements and constraints and underlying causes for inadequately addressing these Convention requirements.

1.3 In-country situation in relation to United Nation Framework Convention on Climate Change (UNFCCC)

The debate on global climate change particularly in relation to human interventions has begun since 1980s. As a result of such efforts, the United Nations General Assembly established the International Negotiating Committee (INC) for a Framework Convention on Climate Change in 1990. The INC drafted the Convention and adopted it on 9th May 1992 at the UN Headquarters of New York. It was opened for signature in June 1992 at the Rio de Janeiro Earth Summit. Sri Lanka has ratified this Convention on 23rd November 1993 and the Convention entered into force on the 21st March 1994. About 189 countries have already ratified or acceded to this Convention.

The main objective (Article 2) of this Convention is to stabilize the greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interferences with the climate system. It states that such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and also to enable economic development to proceed in a sustainable manner. Since the Conventions are not legally bounded, this Convention was not properly implemented.

1.3.1 National Obligations under the UNFCCC

Article 4 of the UNFCCC delineates the commitments in order to properly implement the Convention. These commitments / requirements can be listed as;

- i. Preparing national communications.
- ii. Developing national climate change programmes.
- iii. Preparing and managing greenhouse gas inventories, including emission database management.
- iv. Assessing vulnerability and adaptation.
- v. Developing and implementing adaptation plans and measures as may be necessary.
- vi. Assessing mitigation options.
- vii. Research and systemic observation of climate and other functions.
- viii. Developing and transferring technology.
- ix. Improved decision-making, including assistance for participation in international negotiations.
- x. Clean Development Mechanism (CDM.)

- xi. Needs arising out of the implementation of Article 4.8 and 4.9 of the Convention.
- xii. Education, training and public awareness raising.
- xiii. Information and networking, including databases.
- xiv. Institutional capacity-building, notably through the establishment of secretariats or focal points.
- xv. Enhancement of the enabling environment.

1.3.2 The Kyoto Protocol

The Conference of the Parties (Article 7), the Supreme Body of the Convention, held its 3rd session in December 1997 and adopted the Kyoto Protocol, which commits developed countries (Annex I parties) to reduce their collective emissions of greenhouse gases by at least 5% of the 1990 level by the period 2008 –2012. Sri Lanka ratified this protocol in September 2002. About 137 other countries have already ratified this protocol. The protocol came into force on the 15th February 2005, following ratification by Russia in November 2004.

1.3.2.1 The Kyoto Mechanisms

Three Kyoto mechanisms have been proposed by the protocol to achieve the Kyoto targets in reducing greenhouse gases (GHG) from the atmosphere. These mechanisms guide developed as well as developing countries to take collaborative efforts to fulfill the protocol commitments. These measures include:

- i. Clean Development Mechanism (CDM)
- ii. Joint Implementation (JI)
- iii. Emission Trading (ET)

Clean Development Mechanism projects are viable between developing countries and developed countries. Joint Implementation and Emission Trading are the mechanisms, which can be used to reduce the GHG between target countries (Annex I countries). Since Sri Lanka is a developing nation in the world, no direct commitment under the Kyoto protocol is enforced. However Sri Lanka has volunteered to participate in CDM projects, which in turn provide some foreign exchange to the country. Sri Lanka has been already involved in several CDM projects, especially through renewable energy sector.

1.4 Country's Priority Requirement

Sri Lanka being a non-annex 1 country and not being committed to reduce Greenhouse gases to the atmosphere under the UNFCCC, further efforts have been deployed for assessing vulnerability and developing and transferring technology for adaptation to climate change.

It was made known through the wider stakeholder participation in the workshops that all sectors which are vulnerable to climate change, have already taken some steps in adapting to climate change. Therefore, country's priority has gently moved towards adapting to climate change than assessing mitigation options and taking measures to mitigate climate change. However, since Clean Development Mechanism (CDM) has a potential to gain foreign exchange through CDM projects, concerns on CDM have constantly been growing in the recent past.

The prioritization of the capacity needs under the requirements of the Convention was attended to in a workshop with diversified stakeholders in relation to the thematic area. The following matrix was concluded with their views and inputs.

Issue Prioritization Matrix UNFCCC					
		Scale of problem ¹	Level of Concern ²	Ability to Adequately Address the Issue ²	Priority Ranking ³
1	Assessing Vulnerability and Adaptation	L / N	M	L	1
2	Developing and implementing adaptation plans and measures	L / N	M	L	1
3	Developing and transferring technology	N / R / G	M	L	1
4	Research and systematic observations, including meteorological, hydrological and climatological services	L	M	M	1
5	Clean Development Mechanism (CDM)	L / N	L	L	2
6	Preparing national communications	N	M	M	3
7	Preparing and managing greenhouse gas inventories, including emission database management, and systems for collecting, managing and utilizing activity data and emission factors	L / N	L	M	4
8	Education, Training, and Public Awareness	L / N	M	M	4

	raising				
9	Developing national climate change programmes	N	M	M	4
10	Information and networking, including the establishment of databases	N	L	L	5
11	Institutional capacity-building, including the strengthening or establishment, as appropriate, of national climate change secretariats or national focal points	N	M	L	5
12	Improved decision-making, including assistance for participation in international negotiations	N	L	M	5
13	Assessing mitigation options	N	L	M	5
14	Enhancement and / or creation of an enabling environment	N	M	M	5

Table 1.4

Enter: **L**ocal, **N**ational, **R**egional or **G**lobal

2 Enter: **L**ow, **M**edium or **H**igh

3 Provide relative ranking from **1** to **5** of the problem(s) being faced by the country

(**1** = most severe problem(s), **2** = second most severe problem(s), etc..)

The same ranking can be given to different issues where appropriate.

1.5 Progress towards meeting the national obligations

Some sectors, which are more vulnerable to climate change, have already taken some initiatives in assessing and adapting to this natural havoc. However other sectors, which are also vulnerable to climate change, are taking steps only now in assessing their degree of vulnerability and take part in climate change activities. The reason behind the slack participation by the stakeholder sectors is mainly due to low awareness on changes in climate and their consequences associated with the relevant sectors. Though some awareness raising activities have already been conducted in the past, proper coordination within the sectors was not achieved. In other words, the information did not flow to the grass root level of the sector, where the implementations of such adaptive measures are taking place.

1.5.1 Preparing national communications

The initial national communication of Sri Lanka was prepared and submitted to the UNFCCC Secretariat in October 2000.

1.5.2 Developing national climate change programmes

Ministry of Environment and Natural Resources (MENR) has pioneered many national programmes to meet various obligations under the UNFCCC with the financial support from international donors, namely GEF, UNDP, USAID, AusAID, etc.

1.5.3 Preparing and managing greenhouse gas inventories, including emission database management

Greenhouse gas inventory (1993-1995) has been prepared and reviewed to quantify the sectoral emissions, which contribute significantly to global warming in the recent past. This report was published in the first National Communication in 2000.

1.5.4 Assessing vulnerability and adaptation and developing and implementing adaptation plans and measures

Initial National Communication stated that Impacts and Vulnerability have been assessed with regard to the consequences of sea-level rise, temperature rise, droughts, high intense rainfall and increased thunder activity. Affected sectors, hazards and phenomena have already been identified and summarized due to the anticipated changes of climate change.

1.5.5 Assessing mitigation options and Clean Development Mechanism (CDM)

Though Sri Lanka is not committed to take any initiatives under this requirement, Sri Lanka has generously volunteered to participate in the Clean Development Mechanism (CDM), which was adopted by the Kyoto Protocol in 1997. Some institutes have already assessed mitigation measures towards meeting this commitment.

1.5.6 Research and systematic observation of climate and other functions

Some researches have already been conducted at the CCCS especially in rubber, coconut and tea sectors through the NSF and GEF funds. In addition, individual Departments, boards and institutions have started to conduct research on climate change.

The Department of Meteorology is mandated to undertake systematic observations since its inception in 1861. Departments of Agriculture and Irrigation and RRI, TRI, CRI, SRI, Universities and private sector

plantation companies have also been taking systematic observation of atmospheric data such as rainfall, temperature, etc. since mid seventies. NARA and SLPA measure the oceanographic data such as sea water levels, wave heights and other relevant data.

1.5.7 Developing and transferring technology

The Departments of Agriculture and Wildlife Conservation and TRI have been dealing with the introduction of new technologies for the adaptation measures. The Ministry of Industry, NERD, ISB (for Desiccated Coconut mills and service stations) and University of Moratuwa have also been involved in developing new technologies especially for mitigation measures.

1.5.8 Improved decision-making including assistance for participation in international negotiations

The Ministry of Environment has actively been participating especially in international negotiations for over two decades.

1.5.9 Needs arising out of the implementation of Article 4.8 and 4.9 of the Convention

This requirement has to be fulfilled by the developed country parties and other parties included in Annex II of the convention by giving full consideration to what actions should be taken for funding, insurance and transfer of technology to meet specific needs and concerns of developing country parties. As Sri Lanka is a small island nation with areas prone to natural hazards, the above parties should support Sri Lanka under this requirement.

1.5.10 Education, training and public awareness raising.

The school level curriculum has been changed by incorporating climatology, basic concepts of meteorology, environment, biodiversity and climate change. At the University undergraduate level, climate change has been included as a subject in the field of climatology and at post graduate level environment, oceanography and climate change have been included as special subjects.

Several awareness-raising campaigns and programmes on climate change and their impacts have been deployed by the Ministry of Environment and Natural resources, Centre for Climate Change Studies (CCCS) of Department of Meteorology, NGOs and respective organizations

in collaboration with different sector institutes / organizations and their line Ministries.

1.5.11 Information and networking, including databases

There is no proper networking system implemented in Sri Lanka. There are some individual organizations, which are maintaining databases to share information and data for their own activities or requirements. These are Departments of Meteorology, Irrigation, Agriculture, Wildlife Conservation, Coast Conservation and TRI, RRI, CRI, NARA, CEA, UDA, NBRO, Water Resources Board and some Universities.

1.5.12 Institutional capacity-building, notably through secretariats and focal points

The Climate Change Secretariat (CCS) was established under the MENR to coordinate climate change activities /programmes with other stakeholder organizations. The Centre for Climate Change Studies (CCCS) of the Department of Meteorology was established in 2000, to take the lead role of conducting research, training and awareness programmes on climate change and to monitor the climate change and also to execute climate models.

1.5.13 Enhancement of the enabling environment

The MENR has launched some programmes to strengthen and build the capacities among researchers, who are engaged in climate change and related issues with the support of GEF/UNDP. Climate Change Enabling activity - Phase I (1999-2001) and Climate Change Enabling Activity Phase - II (2002-2004) were the related projects under this arrangement. A series of climate vulnerability and adaptation studies were undertaken through these projects. USAID has been constantly supporting the government of Sri Lanka to improve the quality of the environment through several projects, such as, air quality management, use of renewable energy (solar and wind) and solid waste management.

1.6 Overall enabling environment (?)

1.6.1 Overall economic framework (?)

1.6.1.1 The Sri Lanka Economy:

In the nineteen-fifties and sixties, the Sri Lanka economy depended primarily on export-oriented commercial plantations of tea, rubber and coconut. No significant manufacturing existed prior to 1950. By 1973, Sri Lanka was still essentially a plantation-based economy. Over a third

of the food requirements were imported and paddy cultivation was very vulnerable to the vagaries of weather and modern methods along with irrigation and water control had not yet been widely adopted. The modern sector, established mainly towards the end of the nineteen-sixties was heavily dependent on imports and still producing well below full capacity. Until the mid-seventies, the government controlled most economic activities and most industries were government-operated monopolies. In 1977, with the adoption of open economic policies, industrialization led to a market orientation of the economy, emphasizing export led growth and development of the private sector.

By 2005 the major sector of the growing economy was the services sector contributing 55.8% to the Gross Domestic Product (GDP). This was followed by industry and agriculture contributing 27.0 % and 17.2 % respectively. The manufacturing and transport sectors contributed 16.3% and 15.5% respectively.

The volume and value of exports have increased rapidly in recent years and export earnings reached US dollars 6,347 million in 2005. The composition of exports has also changed. Industrial exports led by textiles and garments, have contributed 75% to overall export growth while Agricultural exports have contributed 18% followed by the mineral and other exports by about 10% in 2005.

There has been a declining trend in unemployment with the unemployment rate falling from 16% of the labour force in the early 1990's to 7.7% by August 2005. The key areas of employment generation have been manufacturing, construction and services. The average annual inflation rate has also continued to decline and stood around 9.9% in 2005 as against 11.7% in 1993. The domestic savings rate has increased steadily from 16% in 1993 to 19.9% in 2005, reflecting the country's growing ability to finance a higher level of investment out of its own resources.

1.6.1.2 Source of Energy:

Biomass is the traditional fuel of Sri Lanka and is a major source of energy. Although traded in urban and suburban areas, it is still classified as a noncommercial form of energy. It provides cooking fuel for most Sri Lankan households and is used as a source of heat in many small industries like bakeries, lime, pottery, brick, tile and also in agro-industries such as tea, rubber and coconut. Contribution of alternative energy sources such as wind and solar power was insignificant in the year 2005. The contribution of petroleum in the total energy requirement has been increasing from 32% in 1996 to 45% in 2005, due mainly to increasing demand and slow growth in hydropower generation. Although

there are over 100 river catchments, only seven have significant hydroelectric potential and slow adoption of measures for alternate energy have compelled the government to rely more on thermal energy.

The electricity generation has been increasing moderately contributing 8 -10% annual growth. Hydropower generation of 1287 MW (54%) was produced, capable of providing an average of 3450 GWh, while thermal power generated 1115 MW (46%) thus providing about 5314 GWh of energy in 2005. To meet the growing demand, the electricity generation has to be increased by around 200 MW. Hydropower generation is adversely affected by dry weather conditions. For instance, while 81.9% of the total demand for electricity was met by hydropower in 1992, when there was a severe drought, its contribution increased to 95.4% in 1993, with the return of favorable weather conditions. Continuity of the power supply is ensured by the expansion of the thermal power generating capacity.

Sri Lanka has no fossil fuel reserves. Crude oil is imported and refined locally. Small quantities of local liquefied petroleum gas (LPG) and refined petroleum products such as diesel and kerosene are also imported.

1.6.1.3 Alternative Energy:

Electricity generation using fuel-wood has been an emerging area in the recent past and Alternative Energy Division has been setup under the Ministry of Science and Technology to actively support this effort. Owing to the fast growing of fuel wood cultivation, the concept of biomass electricity generation (Dendro power) holds much promise for Sri Lanka.

Harvesting of solar energy is another potential solution to the future energy demand, as Sri Lanka is situated near the Equator without showing marked seasonal variation in a year. Over most parts of the flat dry zone, solar radiation varies from 4.0 to 5.5 kWh/m²/day. Solar radiation at high plains of Nuwara Eliya is reported to be low as 2.0 to 3.5 kWh/m²/day due to cloud cover over most parts of the day.

The Ceylon Electricity Board has pioneered the harvesting of wind energy in Sri Lanka. The Wind Energy Resource Atlas of Sri Lanka has been compiled by the National Renewable Energy Laboratory (NREL) under the USAID technical support, exploring with good-to-excellent windy areas of about 5000 km². About 6% of the total land area (65,610km²) has a potential to harvest wind energy and 4100 km² windy areas in land and 700 km² areas in lagoons. Using a conservative assumption of 5 MW per km², potential windy lands and lagoons could generate 24,000 MW of the potential installed capacity.

1.6.1.4 Energy Supply:

The share of each of the main primary sources of energy in gross energy supply in 2005 was biomass 47%, petroleum 45% and hydroelectricity 8%. Biomass has a dominant position but there is considerable wastage due to inefficient traditional energy. It is, therefore clear that the share of renewable energy is impressive, with biomass and hydropower accounting for nearly 55% of the energy inputs. The remainder is made good from imports.

1.6.1.5 Industrial Structure:

The two major economic activities in the country are agriculture/livestock and manufacturing (factory production). Together they contributed 30.5% of the Gross Domestic Product (GDP) in 2005.

1.6.1.5.1 Agriculture:

The agriculture sector comprises two sub-sectors, one producing the staple crop for the domestic market and the other consisting mainly of Tea, Rubber & Coconut for the export market.

(i) Domestic Sector:

Paddy is the main crop within the domestic sector. It is also the staple carbohydrate of the Sri Lankans. Cultivation is widespread and approximately 850,00 hectares are set apart for paddy. This is surpassed in extent only by the area under coconut. Over three-fourths of the paddy land is located in dry zone. The paddy production has marked a new record in 2005 claiming 20.5% increase to 2,012,706 metric tons during 2004/2005 Maha season and 28.7% increase to 1,233,480 metric tons during Yala season during 2005 having a total production of 3,246,186 metric tons.

(ii) The Export sector:

The export sector is dominated by tea, rubber and coconut. In 2005, tea and rubber accounted for 222,000 ha and 395,000 ha respectively. Total tea production has reached a new record of 317million kg marking a growth of 2.5% in 2005. Rubber production has been increasing at a rate of 10.2% to 104 million kg in 2005. However coconut production has declined by about 2.9% to 2,515 million nuts due to the lagged effect of drought which occurred in 2003 and early 2004. Much of the coconut lands are confined to the lowland areas in the wet and intermediate

zones while most of the rubber and tea land are on the wetter western slopes of the hill country. Production takes place on large estates and partly on smallholdings. These crops, which provide a high dry content and long life span may have a role to play in carbon sequestrations.

1.6.1.5.2 Animal Husbandry:

A variety of animals are raised in the country including neat cattle, buffaloes, sheep, goats and pigs. Cattle and buffaloes are raised for draught, dairy purposes and for slaughter. Total milk production has increased by 1.3% to 193 million liters in 2005.

1.6.1.5.3 Fishing:

Fish production includes both marine fish production (coastal, offshore and deep sea) and aquaculture fish production (inland, coastal brackish water prawns and cultured prawns). Marine fish production has declined to about 48.5% due to loss of fishermen, fishing crafts, fishing gear due to tsunami incident of 26th December 2004. Inland aquaculture production has also declined by 1% as a result of white spot diseases.

1.6.1.5.4 Manufacturing:

The manufacturing sector consists of three sub-sectors, i.e. factory industry, processing of plantation crops and small industries. Together they contributed 16.3 % to the GDP in 2005. Factory industry is the most important of the three sub-sectors accounting for 82% of the value added in the manufacturing sector in 2005.

1.6.1.6 Tourism:

The tourism sector has been making a significant contribution to the national economy in the past. However tourist arrivals has declined by 3% to about 549,000 in 2005 from the highest number of tourists arrivals of 566,000 recorded in 2004 due to the devastating tsunami of December 2004. In 2005, the foreign exchange earnings amounted to approximately 329 million U.S. dollars.

1.6.2 Overall Physical infrastructure and logistics in-country

Increased demands and unplanned use to natural resources for economic development and poverty reduction, lack of policies and poor institutional and regulatory frameworks have degraded the environment at an alarming rate in the past. In order to address this situation, in 1990, the Ministry of Environment and Parliamentary Affairs (MEPA) was

formed to address the environmental issues. With the formulation of the National Environmental Action Plan (NEAP), the environmental challenges, the priorities of the Government of Sri Lanka, institutional structures, planning modalities, economic objectives and policies have gone through substantial changes. In 2001, the MEPA was designated as the Ministry of Environment and Natural Resources thus underscoring the need to strengthen the direct relationship between the environment and natural resources. A number of Departments and agencies are placed under the MENR with a focus on various aspects of the environment in Sri Lanka. These are Department of Wildlife Conservation (DWLC), Forest Department (FD), Geological Surveys and Mines Bureau (GSMB), Department of National Zoological Gardens (DNZG), Central Environmental Authority (CEA), Wildlife Conservation Trust of Sri Lanka (WTS) and State Timber Cooperation (STC).

Alongside these steps to restructure the Ministry, several secretariats have been established within the MENR to address activities related to respective areas covered by the new changes. The Climate Change Secretariat (CCS) was established to facilitate, formulate and implement projects and programmes at national level with regard to climate change. The CCS, through the line Ministry of MENR, has been mainly dealing with policy and legislation matters with regard to climate change since its inception. The Centre for Climate Change Studies (CCCS) was also established in April 2000 under the Department of Meteorology to conduct research on climate change, monitor climate change and raise awareness among the general public about the latest information and updates on climate change and allied issues.

MENR has also proceeded to create Committees on Environment Policy and Management (CEPOM) to streamline the decision-making process and ensure that environmental aspects are integrated into the development programmes and activities of the respective sectors. CEPOMs coordinate environment related policy matters with sectoral ministries including professionals, experts and private sector. The Secretary in charge of the MENR serves as the co-chairperson, while the Secretary in charge of the relevant sector of the CEPOM serves as the chairperson. Two officers from the respective sectoral ministry and the MENR will serve as joint conveners of the CEPOM.

Six committees were formed to represent critical areas of environmental concerns, which include forestry and wildlife conservation (MENR), agriculture, plantation, land development, mining, fisheries, coastal and marine area management (MAR), industry and tourism (MEDIP), health, sanitation and urban development (MHNW) and energy and transport (MPE). CEPOM meets bi-monthly for discussion and decision-making. Complex policy decisions that were raised during the CEPOM

meeting get referred to. the Committee on Integrating Environment and Developing Policy (CIEDP), a higher level committee which is chaired by the Secretary of MENR. This system provides forums to discuss issues related to environment by all stakeholders including the private sector, NGOs, professional, academics, public officers and civil society, who can participate in these coordinating mechanisms.

Provincial Environmental Coordinating Committees (PECC) chaired by Chief Secretaries of provinces and District Level Environment and Law Enforcement Committees (DLELEC) chaired by the District Secretaries have been set up to coordinate Provincial and District level environment related matters respectively. Also a political committee chaired by the Minister of Environment has been created and designated as Parliamentary Consultative Committee on Environment (PCCE)

Ministry of Fisheries and Aquatic Resources (MFAR) has been dealing with coast conservation activities in Sri Lanka. Under this Ministry, several Departments and Institutions have been formed. These are Coast Conservation Department (CCD), Department of Fisheries and Aquatic Resources (DFAR), National Aquatic Resources Research and Development Agency (NARA), Marine Pollution Prevention Authority (MPPA) and National Aquaculture Development Authority (NAQDA).

Several Ministries have been dealing with environmental management, which includes Ministry of Policy Development and Implementation (MPDI), Ministry of Power and Energy (MPE), Ministry of Enterprises Development, Industrial Policy and Investment Promotion (MEDIP), Ministry of Agriculture and Livestock (MAL), Ministry of Land (MoL), Ministry of Irrigation and Water Management (MIWM), Ministry of Tourism (MT), Ministry of Science and Technology (MST), Ministry of Community Development (MCD), Ministry of Plantation Industries (MPI), Ministry of Rural Economy (MRE), Ministry of Housing Plantation and infrastructure (MHPI), Ministry of Transport, Highways and Aviation (MTHA), Ministry of Foreign Affairs (MFA), and the Ministry of Health, Nutrition and Welfare (MHNW).

MFP has been involved in decision making in respect of financial resources and mechanisms with regard to environmental management. The Department of External Resources (ERD) is accountable for obtaining external assistance including financing, while the Department of National Planning (DNP) is responsible for capital budget allocation, approval of public sector projects, national policy formulation and approval of foreign funded environment related projects. Under the DNP, sectoral committees named RSL-Sub-committees have been established to select and approve sectoral projects. The Department of State

Accounts (SAD) is in charge of releasing financial resources in time for smooth functioning of development projects.

1.6.3 Overall approach to environmental protection

Several environmental national action plans and regulations have been developed in Sri Lanka to enforce national commitments to the international community and to achieve national goals in environmental sustainability.

The Convention on Climate Change deals with the emission of greenhouse gases to the environment that changes the climate. It excludes those green house gases that have been dealt with by the Montreal Protocol in order to prevent the changes in the Earth's climate and its adverse effects, which are acknowledged by the parties to the Convention as a common concern of mankind. The Convention in its preamble also acknowledges that the global nature of climate change needs the widest possible cooperation of all countries and their participation in international responses that are effective and appropriate.

The Convention in its preamble, notes that the largest share of historical and current global emissions of green house gases has originated in developed countries and that the per capita emissions in developing countries are still relatively low. It predicts at the same time that the share of global emission originating in developing countries will grow to meet the social and development needs of these countries. The preamble also acknowledges that countries need to participate in the control of emissions in accordance with their respective capabilities and their social and economic conditions.

This admission and acknowledgement of common but differentiated responsibilities, together with the admission that the per capita emission of developing countries is still low but is liable to rise in the future is important to developing countries that needs to take measures to fulfill the obligations under the Convention. A developing country can decide the course of action in terms of the responsibility (the amount and nature of the emission) but more importantly on the capability and in accordance with social and economic conditions. At the same time the Convention recognized the need for developed countries to take immediate action in a flexible manner, based on clear priorities, as a comprehensive response at the global, national and regional levels with due consideration to their relative contribution to the enhancement of green house effects.

According to the Convention, parties are obliged to fulfill the commitments set out in the Article 4 of the Convention together with the Research and Systematic Observations (Article 5) and education, training and public awareness (Article 6). In setting out policies and the legal framework needed to fulfill these objectives, it is necessary to take in to account the facts set about in the preamble, together with the objectives (Article 7) and Principles (Article 3).

The preamble contains certain facts that have been recognized and accepted by the parties concerned. They are:

1. The largest share of previous and current global emission of green house gases have originated in developed countries.
2. The share of emissions that originated in developing countries is still low but will be growing in the course of meeting their social and development needs.
3. The global nature of climate change calls for the widest possible cooperation by all countries.
4. Countries should participate in forming an appropriate and effective international response.
5. Participation by countries can be achieved in accordance with their common and differentiated responsibilities.
6. Participation by countries will have to be in accord with their capabilities and social and economic conditions.
7. Countries do have a sovereign right to exploit their own resources in accordance with their environment and development policies.
8. A country is responsible to ensure that activities within each country or within its control do not cause damage to the environment of other states or of areas beyond their limits.
9. States should enact effective environmental legislation.
10. The environmental standards, priorities and management objectives should reflect the environmental and developmental context to which they apply.
11. Countries should adopt standards that are appropriate to their conditions to prevent unwarranted social and economic cost to them. This is particularly relevant to developing countries.
12. Steps needed to understand and address climate change would be most effective from environmental, social and economic aspects if they are based on relevant scientific, social and economic considerations.
13. Scientific, social and economic considerations need to be continually re-evaluated.

14. Various actions needed to address climate change can be justified economically in their own right.
15. Various actions needed to address climate change can also help in addressing other environmental problems for solutions.
16. The valuable research conducted by countries and other bodies needs to be co-ordinated and results need to be exchanged.
17. Developed countries need to take immediate action in a flexible manner on the basis of clear priorities, with due consideration to their relative contributions to the enhancement of the green house effect.
18. Low-lying and other small island countries and those countries with low-lying coastal areas, arid and semi-arid areas or with areas liable to floods drought and desertification are particularly vulnerable to the effects of climate change.
19. Fragile mountain ecosystems of developing countries are particularly vulnerable to the effects of climate change.
20. Countries that depend on fossil fuel production, use and exploitation for their economic activities will face special difficulties as a consequence of action taken to limit green house gas emissions.

The principles spelt out in the Article 3 reaffirm those that have been acknowledged and accepted by the parties in the preamble. There is a valuable principle in Article 3.3 which obliges the parties to take Precautionary Action to anticipate, prevent or minimize causes of climate change and mitigate its adverse effects. The Precautionary Approach is interpreted in different ways by different countries. The Convention does not define the Precautionary Approach but shows flexibility by stating that when there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures. This Article also states that measures should be taken to ensure that policies and measures should be cost effective so as to ensure global benefits at the lowest possible cost.

The commitments that need to be made by parties are related to Article 4. Among these are Articles 4.2, 4.3, 4.4, 4.5 and 4.6 applying only to those developed countries mentioned in Annexure I and II. Since Sri Lanka is not in either of these Annexures, these commitments are not applicable to Sri Lanka. Thus Sri Lanka has obligations to fulfill only under Article 4.1. These are also subjected to further consideration, viz.

1. Take into account common but differentiated responsibilities; Article 4.1.
2. Specific national and regional development priorities, objectives and circumstances.
3. The extent to which developing countries will effectively implement their commitments under the Convention is dependent on the effective implementation of the commitments by developed countries in respect of financial resources and transfer of technology.

The commitments for Sri Lanka under Article 4.1 have to be viewed in the context of full consideration given to the following that are set out in Article 4.8.

- (a) Small island countries.
- (b) Countries with low-lying coastal areas.
- (c) Countries with forested areas which are liable to forest decay.
- (d) Countries with areas prone to natural disasters.
- (e) Countries with areas liable to drought and desertification.
- (f) Countries with areas subject to fragile ecosystems.
- (g) Countries with areas of high urban atmospheric pollution.

The specific commitments under Article 4.1 are as follows.

- (a) Develop, publish and, periodically update and make available to the Conference parties, national inventories of emissions by sources and removal by sinks of all green house gasses not controlled by the Montreal Protocol.
- (b) Formulate, implement, publish and regularly update national programmes containing measures to mitigate climate change by addressing the emission by sources and removal by sinks of all green house gasses attributed to the Convention.
- (c) Formulate, implement, publish and regularly update national programmes containing measures to facilitate adequate adaptation to climate change.
- (d) Promotion and cooperation in the Development and application of technologies, practices and processes that control, reduce or prevent the emissions in all relevant sectors and the diffusion and transfers of the technologies.
- (e) The promotion, conservation, management and enhancement of sinks and various green house gasses.
- (f) Co-operate in preparing and adopting integrated plans to adapt to impacts of climate change in sections of coastal zone management, water resources and agriculture.

- (g) Protection and rehabilitation of areas affected by drought desertification and floods.
- (h) Take into considerations climate change into account with a view to minimizing adverse effects on the economy, public health and the quality of the environment, and take measures to adopt or mitigate effects of climate change.
- (i) Promote and co-operate in full for open and prompt exchange of information in relevant scientific, technological, technical, socio-economic and legal fields.
- (j) Promote and co-operate in education, training and public awareness related to climate change.

1.6.4 Overall approach in implementing the Convention and related action plans, policies and legislation in Sri Lanka

Environmental Action plans, policies, legislations and regulations have been developed in the past to implement national commitments to the international community and to achieve national goals in keeping environmental sustainability.

1.6.4.1 National Environment Act (NEA)

The Government of Sri Lanka adopted the National Environment Act (NEA) No. 47 of 1980 and amended by Act No. 56 of 1988 and No. 53 of 2000 to protect and maintain the quality of the environment. The Central Environmental Authority (CEA) was established in 1981 under this Act to conduct, promote and coordinate research in relation to any aspect of environmental degradation and also to specify the standards, norms and for maintaining the quality of the environment.

This act also provides, among other things, the making of provisions for the protection, management and enhancement of the environment and for the prevention, abatement and control of pollution.

According to section 23A any one who emits any pollutants to the environment by engaging in an activity that is proscribed by regulations has to do so only under the authority of a license and in accordance with conditions laid down under the Act and also as laid down in the license. This license obtained under the section 23A is known as the Environmental Protection License (EPL). The prescribed activities for which an EPL is needed are set out in the regulations published in the gazette extraordinary No 1159/22 of 22.11.2000.

The relevant section on environmental quality (part IVB) has special provisions to deal with the pollution of the atmosphere. According to section 23J, a person who discharges or emits waste into the atmosphere

can do so only under a permit under Section 23A (an EPL) and in accordance with standards or criteria prescribed by this Act. Section 23K (pollution of atmosphere) further expands on this matter. It says that no person shall pollute the atmosphere or cause or permit the atmosphere to be polluted so that the physical, chemical or biological conditions of the atmosphere is so changed as to make, or reasonably expected to make, the atmosphere or any part to become unclean, noxious, detrimental to health, welfare, safety or to the property of human beings, poisonous or harmful to animals, plants and other forms of life or detrimental to any beneficial use of the atmosphere. Sub-section (2) of Section 23K expands on this and includes the following.

1. Placing or releasing any solid, liquid or gaseous matter that is proscribed under this Act and also regulations to deal with any of the above noxious matter being placed in the atmosphere or to do so in violation of the conditions of any regulations.
2. Burning waste that is in violation of any regulations.
3. Using an internal combustion engine or fuel burning equipment not equipped with any device required by the regulations to be fitted to such engine or equipment in order to prevent or reduce pollution
4. Using or burning any fuel prohibited by the regulations.

According to Section 23L, any one who owns, uses, operates, constitutes, sells, installs or offers to sell or any machinery, vehicle or boat required by or under this Act or under any regulations made under this Act to prevent or limit pollution of the atmosphere does have to build it, fitted with or equip it with such device and the failure to do so is an offence.

Air pollution is defined (under Section 33) as an undesirable change in the physical, chemical or biological characteristics of air which will adversely affect plants, animals, human beings and inanimate objects. Unclean, noxious, poisonous, detrimental to health, welfare safety or to the property of human beings, poisonous or harmful to animals, plants and other forms of life or detrimental to any beneficial use of the atmosphere are covered under the above section.

The power to make necessary regulations in respect of all matters required under the Act is set out in Section 32(1) of this Act. These provisions make it possible to pass regulations to prevent, control, or reduce pollution of atmosphere by the following activities.

1. Specify types of fuel that could be used.

2. Prohibit certain type of fuel from being used.
3. The use of treatment methods that will contribute to the reduction of pollution.
4. Prohibit the use of additives in fuel.
5. Prohibit the use of certain treatment method that causes atmospheric pollution.
6. Emission standards for vehicles.
7. The use of a device in engines to prevent or reduce pollution.
8. The requirement to manage manufactures to build, equip or fit devices that are needed to prevent, reduce or control pollution.
9. Prohibit the use of certain types of machinery, device or equipment.

The regulations under these already imposed are the National Environment (Air Emission, Fuel and Vehicle Importation Standards) Regulations No 01 of 2003, published in Gazette Extraordinary No 1295/11 of 30.06.2003.

1.6.4.2 The Soil Conservation Act

The above Act was adopted by Act No. 25 of 1951 and amended by acts No. 59 of 1953 and 24 of 1996.

The purpose of this act is to take necessary action for the enhancement of productive capacity of soil, to restore degraded land for the prevention and mitigation of soil erosion, for the conservation of soil resources and protection of land against damage by floods salinity, alkalinizing, water logging and drought.

The Director-General of Agriculture can order necessary surveys and investigations to determine the nature of and the extent of soil erosion and land degradation to enable the Minister to declare Conservation Areas under this Act. (These areas have been declared since 1953 as Erodible Areas until the new word was substituted in the amendment in 1996)

The Minister can make regulations to control, restrict or prevent or even order certain types of activities in any Conservation Area under the

provisions of Section 4. In addition, the minister can make regulations in respect of other areas (undeclared areas) under the provisions of Section 6. These regulations can be made to achieve any of the matters specially stated in the Section including the maintenance and promoting of soil fertility, preventing or mitigating erosion, remedying damages from soil erosion, the control of the floods and effects of droughts, prohibiting or restricting of the burning of grasses, to conserve water and watersheds.

If the minister is satisfied that any extent of land already within a conservation area should be withdrawn from cultivation or take any other measures to prevent or mitigate erosion, the minister can declare that the land is needed for a public purpose and get it acquired under the Land Acquisition Act.

1.6.4.3 Coast Conservation Act

This Act was adopted by the Government of Sri Lanka in 1981 by Act No. 57 and amended by Act No. 64 in 1988.

The purpose of this Act is, among others, to control and develop activities in the coastal zone and to formulate and execute a scheme of works for coast conservation within the coastal zone. The term coastal zone is defined in Section 42 of the Act and includes the area lying landwards from the Mean High Water line to an extent of 300 meters and a limit of two kilometers seaward from the Mean Low Water line and in all water bodies connected to sea either permanently or temporally.

According to Section 14, any person who intends to carry out any development activity prescribed under Section 13 has to do so only under a permit issued for the purpose by the Coast Conservation Department. The Director has discretionary powers under Section 16 to call for an Initial Environmental Examination (EIA) report or call for an Environmental Impact Assessment (EIA). When such a report is called for, the developer has to prepare the report and submit it with the application. Then it should be made available to the public in all three languages (Sinhala, Tamil and English) for perusal and comments for a period of 30 days.

The regulations that have been made under the provisions of Section 13 are the Coast Conservation Regulations, No 260/22 of 22.09.1983. According to these the only two types of development activities that do not need a permit are the cultivation of crops and the planting of trees and other vegetation. These regulations have set out the criteria that need to be adhered to in the permits and the reserved area where development activities are not allowed. They also make it necessary to

allow buffer zones in order to accommodate the dynamics of the coastal processes.

This Act mandates the preparation of a Coastal Zone Management Plan (Section 12) based on the results of the Survey of the Coastal Zone, as directed by section 11. This plan has to be revised every four years and the revised documents are open for public comments for a period of 60 days before being made final.

1.6.4.4 Motor Traffic Act

This Act provides for the use of motor vehicles on highways and related activities. Part IX of this Act deals with the examination, inspection and testing of motor vehicles.

According to Section 194(1), the Commissioner can require motor vehicles to be examined for the following.

1. To ascertain whether a motor vehicle has been in compliance with the requirements laid down in this Act or regulations.
2. Whether the information provided in respect of a motor vehicle is correct, incorrect, true or false.
3. Whether it is in, or not in a serviceable condition.

If the Commissioner is satisfied after an inspection and examination of a motor vehicle that it does not comply with this act or regulations, a Notice can be issued on the owner prohibiting the use of such vehicle until the defects specified in the report are corrected and the Commissioner is satisfied after another inspection and examination. Furthermore, the Commissioner can order the revenue license to be surrendered to him in order to impound it until the measures given in the notice have been complied with by the owner.

Regulations prescribing the methods that have to be followed and the tests that needs to be done in the examination of motor vehicles and the reports that need to be provided after an examination under this Act can be made under the provisions of Section 202. These, taken together, can play an important and complementary role to the provisions in the National Environmental Act in the control, regulation and reduction of atmospheric pollution from motor vehicles.

1.6.4.5 Flood Protection Ordinance No. 04 of 1924 as amended by act No. 22 of 1955.

The intention of this enactment is to protect areas subjected to damage from floods.

The Minister can declare, under Section 3 any area as a flood area by a Notification published in the Gazette. When such a declaration is made the Director of Irrigation should prepare a scheme for the efficient protection of the area from floods. Any member of the public whose land would be adversely affected by the scheme can object to the scheme. The Minister may, after the expiry of the three months, after giving consideration to the scheme and objections if any, confirm, vary or reject the scheme. The Director is empowered to carry out the tasks after the Minister makes an Order.

The Minister can, in addition, make regulations applicable to a flood area that has been previously declared. These provisions in Section 9 can be made use to have regulations for the maintenance of the drainage in the flood area, and obligations on owners and occupiers of land to keep any drainage trenches bordering his land and to make and keep clearly any drains that carry water from the land to such trenches.

The Minister can, under provisions of Section 20 acquire land including buildings to carry out the purpose of this Act. It is deemed to be necessary for public purpose and due compensation has to be paid.

1.6.4.6 Urban Development Authority Law, No. 41 of 1978 as amended by Acts No. 70 of, 1979, 4 of 1982, 44 of 1984, 49 of 1987 and 41 of 1988.

The objectives of this enactment is to promote integrated planning, and implementation of economic, social and physical development of areas declared to be Urban Development Areas. The declaration of an area as an Urban Development Area is done by the Minister by a Notice in the Gazette that sets the boundaries of the area, under the provisions of Section 3 of the act.

Once an area is declared as an Urban Development Area, Urban Development Authority should prepare a development plan for the whole area or for any part. The powers and the procedure to be adopted in developing a plan are spelt out in section 8A, 8B, 8C, 8D, 8E and 8F. The final stage is reached after the Minister approves it under Section 8F to make an announcement through Sinhala, English and Tamil daily news papers and by a Notice in the Gazette that the plan has been approved by the Minister and would come into operation from a date mentioned in the Gazette. Any member of the public can view the plan at the Urban

Development Authority or at any local government body (which could be municipal council, urban council or pradeshiya saba) in the area.

Any person who intends to carry out any development activity as defined in section 29 has to get a permit issued under Section 8J and in accordance with terms and conditions in the permit.

1.6.4.7 National Environmental Action Plan (NEAP)

The first NEAP was formulated in 1990 and enforced in 1992, by the then Ministry of Transport, Environment and Women Affairs, to analyze environmental problems, which arise from the socio-economic development of the country. It also deals with human impacts on the natural resources and on the environment. It highlighted the importance of paying attention and addressing specific problems to resolve environmental issues. It also addressed the need of enhancing the financial resources for sustainable environmental management. The second NEAP was prepared for the period of 1998-2001, which envisages actions to be taken in the 21st century. With this NEAP, six (6) Committees on Environmental Policy and Management (CEPOMs) were set up to address their sectoral issues in Land and Minerals, Water, Biodiversity, Coastal and Marine, Industry, Energy and Climate Change, Environmental Health and Urban and Built Environment.

1.6.4.8 National Action Plan on Climate Change (NAPCC)

The NAPCC was formulated in 1999 by then the Ministry of Forestry and Environment to address the national obligations of the UNFCCC. It has discussed the impacts of climate change on vulnerable sectors in Sri Lanka. These sectors were Agriculture, Water Resources, Health, Energy, Transport, Industry, Forestry, Coastal Zone and Human Settlement and Public Utilities. Mitigation options and adaptation responses were also proposed for the above sectors.

1.6.4.9 Caring For Environment (CFE) 2003-2007 - Path to Sustainable Development

The Government of Sri Lanka endorsed the “Caring for Environment 2003-2007” in 2003, which is the successor to the NEAP (1998-2001). National Environmental Action Plans (NEAP) were formulated in the past to safeguard the environment in all development activities. In 1995, the Ministry of Environment and Women Affairs worked out a policy statement on environment to address the major environmental issues facing the country and broad strategies for addressing them. Since there were no clear links between the policy statement and the NEAP, the CFE

was formulated to address these shortcomings. With the formulation of CFE, it was considered necessary to define and declare the National Environmental Policy (NEP). Under the present Caring for Environment, six (6) CEPOMs have been recognized, namely, forestry and wildlife conservation, agriculture, plantation, land development and mining, fisheries, coastal and marine area management, industry and tourism, health, sanitation and urban development and energy and transport.

1.6.4.10 National Environmental Policy (NEP)

The *National Environment Policy (NEP)* was defined and declared with the Caring for Environment (CFE) and sets out the activities to be taken to maintain the vitality and integrity of Sri Lanka's natural resources and the environment. The activities would steer the country between the needs of development and the necessity to protect the environment. It has addressed sectoral and cross-sectoral environmental strategies, when implementing policies and related actions for managing the environment in keeping with the sustainable development of the country.

1.6.4.11 Draft National Policy on Clean Development Mechanism (CDM)

The National Report to the World Summit on Sustainable Development (WSSD) was prepared in 2002 with the support of the UN System. It has paid attention to develop adaptation strategies to climate change impacts and to develop national strategies for carbon trading under the CDM identified by the Kyoto Protocol. As a result, a draft National CDM policy has been prepared and submitted to the Cabinet for the final approval to establish the institutional, financial, human resources and legislative framework necessary to participate in the CDM projects. It was planned to prepare the National CDM Strategy under the National Strategy Study (NSS) funded by the AusAID.

1.6.4.12 Other Environmental legislations, policies, action plans and strategies in Sri Lanka

Several legislations, policies, action plans and strategies have been developed in relation to environmental issues in the country. Some of them are listed below.

- i. National Policy Framework (NPF) in 1995
- ii. National Wildlife Policy (NWP) in 2000
- iii. National Forestry Policy (NFP) in 1995
- iv. National Water Resources policy (NWRP) in 2000
- v. Energy Policy of Sri Lanka in 1997

- vi. Draft National Land Use Policy (NLUP) in 2002
- vii. National Watershed Management Policy (NWMP) in 2004
- viii. National Policy on Agriculture and Livestock (NPAL) in 2003
- ix. National Industrial Pollution management Strategy (NIPMS) in 1996
- x. Coastal 2000 Action Plan (CAP) in 2000
- xi. Clean Air 2000 Action plan in 2002
- xii. National Action Plan for the Protection of Marine Environment from Land Based Activities in 1999
- xiii. National Strategy for Solid Waste Management in 2002
- xiv. Forestry Sector Master Plan in 1995
- xv. National Coastal Zone Management Plan in 1997
- xvi. Biodiversity Conservation Action Plan in 1999
- xvii. National Disaster Management Action Plan in 1999
- xviii. Natural Disaster Management Plan in 1999
- xix. National Conservation Strategy (NCS) in 1988
- xx. State of the Environment in 2001
- xxi. National Status Report on Land Degradation in 2002
- xxii. National Disaster Management Act in 2005
- xxiii. National Cleaner Production Policy in 2005
- xxiv. Forest Ordinance (Amendment) No. 84 in 1993

2. Capacity to meet Priority Requirements

2.1 Assessing Vulnerability and Adaptation

Global warming due to increase in greenhouse gas concentrations in the atmosphere could adversely affect many sectors, which in turn affect human activities in day-to-day life. The Impacts and vulnerability with regard to the consequences of sea-level rise, temperature rise, droughts, high intense rainfall and increased thunder activity have been assessed and reported in the Initial National Communication. Affected sectors, hazards and phenomena have been identified and summarized due to the anticipated changes of climate change. It has been concluded that agriculture, water resources and human health sectors would be more vulnerable to climate change in Sri Lanka.

2.1. a Available Capacity

There are no policies developed at the systemic level specially to address the important aspect of assessing vulnerability and adaptation to climate change in order to develop necessary adaptation strategies or plans. The CEPOMs which have been formed for the purpose of addressing sector specific issues *at the systemic level* have not been able to function properly. However, some programmes to assess impacts and vulnerability of the sectors and to develop adaptation measures had been launched by the Ministry in charge of the subject of Environment, under the Enabling Activity Phase I and II projects.

At the institutional level, Departments of Agriculture (DOA) and Export Agriculture (DEA) have been engaged in assessing vulnerability to climate change to some extent. DOA has been assessing possible adaptation measures for salinity and drought conditions. UDA has assessed the vulnerability to climate change in preparation of urban development plans. Rubber Research Institute (RRI) has undertaken some projects to assess the effect of climate change on rubber plantations. Coconut Research Institute (CRI) has been assessing vulnerability and impacts on climate change under the GEF funded project of AIACC (AS-12). TRI has also been assessing vulnerability of climate change and possible adaptation options for drought, pests and diseases, including socio-economic impacts, growth and productivity impacts of climate change.

The Department of Agriculture, TRI, RRI, CRI, SRI, NBRO and UDA are the principal stakeholders among agencies engaged in assessing vulnerability and adaptation to climate change. Assessment of the vulnerability to climate change in the Health, Forestry, Industry and Water Resources sectors have also been carried out.

At the individual level, a large number of programmes have been conducted to create awareness on sectoral impacts and vulnerability to climate change in different sectors. Ministry of Environment, CCCS and NGOs have been involved in carrying out the programmes.

The capacity needs to fulfill the requirement of assessing vulnerability and adaptation are given in Table 2.1.1.

Capacity needs to fulfill the Requirement of assessing Vulnerability and Adaptation

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Identification and mapping of vulnerable areas to Climate Change	Infrastructure development & provision of required facilities, budgetary allocations & other requirements to relevant institutes. Awareness raising on climate change and their consequences for policy makers, Ministerial level officers, etc. Formulate policies and legislations to take up collaborative research within the sector through the CEPOMs NCSD.	Skill development at institutional level to combat drought, flood, salinity, high temperature stress and sea level rise. share data and information among relevant institutes. Encourage collaborative research within the sector among relevant institutes.	Skill development at personal level to combat drought, flood, salinity, high temperature stress and sea level rise.
2	Assessing sea level rise and climate change impact on flora and fauna in future	Create interagency coordination mechanism* among the relevant Departments and Institutions	Increase number of tide gauge stations to strengthen the data coverage (NARA & Ports Authority).	Awareness raising on sea level rise and their consequences, coastal flooding, etc. (Coast Conservation Department, NARA, UDA, Sri Lanka Tourist Board, Forest Department, Wildlife Conservation Department & Local Authorities, etc.
3	Assessment of ground water supplies for various sectors in drought affected areas. (Assuming surface water, rivers and lakes etc.)	Allocation of funds to expand Water Resources Board (WRB) activities on river basin level, Amendments to the present cadre to increase number of hydro-geologists in WRB, Department of Irrigation, etc.	Improvement of ground water database towards national level, Procurement of hydro-geological equipments for ground water assessments (WRB, Department of Irrigation, etc.)	Training of hydro-geologists on designing of monitoring networks, Training of hydro-geologist on watershed management with emphasis on ground water modeling. Recruit more staff for relevant Institutions (Water Resources Board, Department of Irrigation, etc.)
4	Unable to assess adaptation measures	Formulation of a long-term national Research policy*, Change in attitudes of policy makers & Ministerial level officers, Amendments to the present cadre to increase number of researchers in departments** / institutes**	Formulation of institutional* research agenda to address this issue, Capacity building at institutional* level to conduct research,	Change in attitudes, Awareness raising on sector specific adaptive measures for individuals
5	Co-ordination mechanism for effective programme development to assess climate change impacts	Advocacy & Awareness Seminar for Policy makers and senior managers at the Ministerial* level, creation of new cadre positions at National & Sub national level or provincial level, allocation of budget to carryout programmes,	Mandate the relevant institutions to carryout assessments with regard to climate change impacts, Create inter-institutional links to strengthen the related activities, create awareness on climate change and their consequences within and among the institutions. Incorporate training programmes to address climate change and allied issues, develop basic training curricular to address Environmental issues, recruit necessary staff to carryout mandated activities related to climate change.	Change attitudes by conducting awareness seminars on climate change and their impacts, Training on conducting sector specific research, make available latest information and data to carryout research
6	Failing to assess impacts on power generation requirement	Creation of enabling environment for undertaking relevant research, make available budgetary allocations, create new cadre in relevant institutions, awareness raising at Ministerial level and policy making level on climate change issues,	Increase capacity in CEB, CEA, MOI, BOI, FCCISL, NCPC, and ISB to carry out relevant impact assessments in relation to climate change.	Change attitudes, Training to carryout research in assessing the impacts of climate change, make available latest information and data
7	Unable to assess/demarcate vulnerable areas due to sea level rise	Make necessary actions to identify as a priority task as it affects to many sectors and national economy, allocation of funds to carryout contouring around the country at 50 cm and 100 cm above the mean sea level, increase carder and necessary budgetary allocations, if required to carryout the above work	Make arrangements to establish inter-institutional coordination to address this issue, awareness raising on the consequences of the sea level rise in different sectors, make necessary steps to increase carder and necessary budgetary allocations if required	Change attitudes by conducting awareness programmes on sector specific issues with regard to sea level rise, make available necessary information and data
8	Failure to asses the impact of changes in wave characteristics on coastal zone	Identify as an important issue in coastal and marine area management, Make available necessary budgetary allocations to carryout the tasks	Enhance the capacity to prepare the project proposals in Coast Conservation Department, inter-institutional coordination to address this issue	Awareness raising on sea level rise and wave changes due to climate change among staff members of the relevant institutions

Table 2.1.1

2.1.1 Issue No. 1 Identification and mapping of vulnerable areas to Climate Change

Sectors Affected: ***Agriculture, Plantation, Livestock, Forestry, Wildlife, Tourism, Water Resources, Health***

Underlying causes:

Inadequate skills and information, low priority and inadequate resources, budgetary limitations at systemic level, lack of collaboration among institutions and lack of expertise,

Capacity needed at Systemic Level:

Infrastructure development and provision of required facilities, budgetary allocations and other requirements to relevant institutes*. Awareness raising on climate change and their consequences for policy makers, Ministerial level officers, etc. Formulate policies to take up collaborative research within the sector through the CEPOMs or proposed NCSD.

(*Sugarcane Research Institutes, Forest Department, Tea Research Institute, Department of Agriculture, Department of Irrigation, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and Training Institute, Coconut Research Institute, Department of Animal Production and Health, Health Education Bureau, Anti Malaria Campaign, Epidemiology Division etc.)

Capacity needed at Institutional Level:

Research and scientific training at institutional* level to combat drought, flood, salinity, high temperature stress and sea level rise. Actions should be taken to share data and information among relevant institutes, Encourage collaborative research within the sector among relevant institutes.

(*Sugarcane Research Institutes, Department of Forests, Tea Research Institute, Department of Agriculture, Department of Irrigation, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and Training

Institute, Coconut Research Institutes, Department of Animal Production and Health, etc.)

Capacity needed at Individual Level:

Research and scientific training at personnel level to combat drought, flood, salinity, high temperature stress and sea level rise.

2.1.2 Issue No. 2 Assessing sea level rise and climate change impact on flora and fauna in future

Sectors Affected: Agriculture, Plantation, Livestock, Forestry, Wildlife, Tourism,

Underlying causes:

No data available on sea level rise projections, lack of scientific literature available, Specific agencies may not be aware of their responsibility and their expected commitments.

Capacity needed at Systemic Level:

Create an interagency coordination mechanism* among the relevant Departments and Institutions**.

(*Ministries of Environment, Agriculture, Health, Mahaveli & Irrigation, Plantation, Livestock, Tourism, etc.)

(**Coast Conservation Department, Department of Meteorology, NARA, UDA, Forest Department, Wildlife Conservation Department Sri Lanka Ports Authority & Local Authorities, Sri Lanka Tourist Board, etc,

Capacity needed at institutional Level:

Data on sea level rise is already being collected by the NARA and Ports Authority in a few selected stations. Action should be taken to increase the number of tide gauge stations to strengthen the data coverage (NARA & Ports Authority).

Capacity needed at Individual Level:

Awareness raising on sea level rise and their consequences, coastal flooding, etc. for the respective departmental and institutional staff members to update their knowledge and change their attitudes. (Coast Conservation Department, NARA, UDA, Sri Lanka Tourist Board, Forest Department, Wildlife Conservation Department & Local Authorities, etc.)

2.1.3 Issue No. 3 Assessment of ground water supplies for various sectors in drought affected areas.(Assuming surface water, rivers and lakes etc.)

Sectors Affected: Water Resources

Underlying Causes:

Affected areas have not been properly identified and lack of research studies conducted.

Capacity needed at Systemic Level:

Allocation of funds to expand the activities of the Water Resources Board (WRB) to the river basin level; Amendments to the present cadre to increase the number of hydro-geologists in WRB and Department of Irrigation.

Capacity needed at Institutional Level:

Extension of ground water database to national level; Procurement of hydro-geological equipments for ground water assessments (WRB, Department of Irrigation)

Capacity needed at Individual Level:

Training of hydro-geologists on designing of monitoring networks, Training of hydro-geologist on watershed management with emphasis on ground water modeling. Recruit more staff for relevant Institutions (Water Resources Board and Department of Irrigation, etc.)

2.1.4 Issue No. 4 Assessing adaptation measures

Sectors Affected: Agriculture, Plantation, Livestock, Forestry, Wildlife, Tourism, Water resources, Health

Underlying Causes:

Inadequate research focus; Lack of intra and inter-institutional links; need for cultivating more positive attitudes among personnel in all levels; Frequent policy changes not identified as a thrust area Inadequate information, Low priority

Capacity needed at Systemic Level:

Formulation of a long-term national Research policy*, Change in attitudes of policy makers and among Ministerial level officers,: Amendments to the present cadre positions to increase number of researchers in departments** / institutes**

(*Ministries of Environment, Agriculture, Health, Mahaveli & Irrigation, Plantation, Livestock, Tourism, etc.)

(**Sugarcane Research Institutes, Department of Forests, Tea Research Institute, Department of Agriculture, Department of Irrigation, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and Training Institute, Coconut Research Institutes, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Sri Lanka Tourist Board, Department of Health, Health Education Bureau, Anti Malaria Campaign, Epidemiology Division etc.).

Capacity needed at Institutional Level:

Formulation of institutional* research agenda to address relevant issue, Capacity building at institutional* level to conduct research.

(*Sugarcane Research Institutes, Department of Forests, Tea Research Institute, Department of Agriculture, Department of Irrigation, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and Training Institute, Coconut Research Institute, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Department of Health, etc.).

Capacity needed at Individual Level:

Change in attitudes, awareness raising on sector specific adaptive measures for individuals,

2.1.5 Issue No. 5 Co-ordination mechanism for effective programme development to assess climate change impacts.

Sectors Affected: *Agriculture, Plantation, Livestock, Forestry, Wildlife, Tourism, Water resources, Health*

Underlying Causes:

Lack of awareness among key stakeholders not identified as a priority; environmental issues are not adequately addressed during training, lack of institutional arrangement to address environmental issues within the sector and Inadequate infrastructure development for changing needs.

Capacity needed at Systemic level:

Advocacy and Awareness Seminar for Policy makers and senior managers at the Ministerial* level: creation of new cadre positions at national and sub national level or provincial level, allocation of budget to carryout programmes,

(*Ministries of Environment, Agriculture, Health, Mahaveli, Irrigation, Plantation, Livestock, Tourism, .)

Capacity needed at Institutional level:

Mandate the relevant institutions to carryout assessments with regard to climate change impacts, create inter-institutional links to strengthen the related activities, create awareness on climate change and their consequences within and among the institutions; incorporate training programmes to address climate change and allied issues, develop basic training curricula to address environmental issues, recruit necessary staff to carryout mandated activities related to climate change.

(*Sugarcane Research Institutes, Department of Forests, Tea Research Institute, Department of Agriculture, Department of Irrigation, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and Training Institute, Coconut Research Institute, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Sri Lanka Tourist Board, Department of Health, Health Education Bureau, Anti Malaria Campaign, Epidemiology Division etc.)

Capacity needed at Individual level:

Change attitudes by conducting awareness seminars on climate change and there impacts, training on conducting sector specific research, make available latest information and data to carryout research*,

(* Relevant staff members of the sector specific institutions)

2.1.6 Issue No. 6 Failure to assess impacts on power generation requirement**Underlying Causes:**

Inadequate attention to all issues resulting in lack of enforcement, awareness and standards

Sectors Affected: Power and Energy**Capacity needed at Systemic level:**

Creation of enabling environment for undertaking relevant research, make available budgetary allocations, create new cadre in relevant institutions, raising awareness at Ministerial level and policy making level on climate change issues.

Capacity needed at Institutional level:

Increase capacity in CEB, CEA, MOI, BOI, FCCISL, NCPC, and ISB to carry out relevant impact assessments in relation to climate change.

Capacity needed at Individual level:

Change in attitudes, training to carryout research in assessing the impacts of climate change, and make available latest information and data.

2.1.7 Issue No. 7 Unable to assess/demarcate vulnerable areas due to sea level rise

Underlying Causes:

Contouring at 50 cm and 100 cm above mean sea level is not a priority issue with the Survey Department, Lack of funds allocated, Lack of specialized personnel to carryout such works.

Capacity needed at Systemic level:

Make necessary arrangements to identify as a priority task to allocate funds to carry out contouring around the country at 50 cm and 100cm above the mean sea level, as any failure will have negative effects and cause a deep impact in many sectors of the national economy.

(**Ministries of Land, Environment and Natural Resources, Science and Technology, Disaster management and Human Rights, etc.,)

Capacity needed at Institutional level:

Make arrangements to establish inter-institutional* coordination to address this issue, awareness raising on the consequences of the sea level rise in different sectors, make necessary steps to increase cadre and necessary budgetary allocations as required.

(*Departments of Meteorology, Surveys, Agriculture, Coast Conservation, NARA, Ports Authority, Sri Lanka Tourist Board, etc)

Capacity needed at Individual level:

Change attitudes by conducting awareness programmes on sector specific issues with regard to sea level rise, make available necessary information and data.

2.1.8 Issue No. 8 Failure to assess the impact of changes in wave characteristics on coastal zone**Underlying causes:**

Lack of instruments/equipments, lack of funds.

Sectors Affected: Land Use and Land Development, Tourism, Coastal and Marine Area Management

Capacity needed at Systemic level:

Identify land use and land management as important issues in coastal and marine area management. Make available necessary budgetary allocations to carryout the tasks,
(Ministries of Ports, Fisheries, Land, Tourism, etc.)

Capacity needed at Institutional level:

Enhance the capacity to prepare project proposals in Coast Conservation Department and inter-institutional coordination to address this issue.

(Coast Conservation Department, Sri Lanka Tourist Board, NARA, Ports Authority, Survey Department, Department of Fisheries, Department of Meteorology, etc.)

Capacity needed at Individual level:

Awareness raising on sea level rise and wave changes due to climate change among staff members of the relevant institutions.

2.2 Developing and implementing adaptation plans and measures

As per the Article 4, paragraph 1 (e), all parties are committed to cooperate in preparing for adaptation to climate change, and to develop and elaborate appropriate and integrated plans to benefit most vulnerable sectors.

The Initial National Communication has concluded that agriculture, water resources and human health sectors would be more vulnerable to climate change in Sri Lanka, but very few sectors (agriculture, plantation and land use) have developed suitable adaptation strategies to face this problem. The report has recommended some adaptation measures, which should be taken to cope with climate change, in transport, agriculture, forestry, water resources, health, human settlement and public utility sectors and in coastal zone areas.

2.2.a Available Capacity

At the systemic level, Ministries of Agriculture and Plantations have been developing and implementing plans for adaptation to climate change for their sectors. However no proper policy mechanism has been developed to address this issue at the systemic level.

At the institutional level, UDA has developed adaptation plans and measures by formulating appropriate zoning and regulations for the areas sensitive to climate change and developing urban greening

programmes. RRI has been working to develop drought resistant clones. CRI has been developing adaptation plans / measures to cope with these changes under the GEF funded project of AIACC (AS-12). TRI has been developing suitable cultivars through hybridization and selection by evaluating seedling and cultivar progeny resistance to drought and pest and diseases. TRI has also been developing water management techniques for young and mature tea and improved shade management for tea plantations. They have also been assessing socio-economic impacts and growth and productivity impacts of climate change. Adaptation strategies are yet to be developed in the Health, Forestry, Industry and Water Resources sectors though their vulnerability to climate change has been assessed to some extent.

At the individual level, few awareness raising activities have been conducted especially in the plantation sector (Coconut and Tea) under the AIACC project. In addition, DOA and RRI have been conducting training activities for their own staff in adaptation measures.

A summary of capacity needs at the three levels for developing and implementing adaptation plans and measures, is given in Table 2.2.1

Capacity Needs at Three Levels to Develop and Implement Adaptation Plans and Measures

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Inadequate development & implementation of adaptation plans and measures	Formulation & implementation of long-term sustainable policies, Prioritization of existing policies & implementation programmes, Awareness creation at systemic level and legislative level, budgetary allocation for relevant departments and institutions	Creation of Institutional consultative decision - making process, Capacity building of relevant institutes & financial support, financial assistance for operational activities, strengthening of existing act/mandates, Develop appropriate mechanisms to improve feedback	Change attitudes, Develop appropriate mechanisms to improve feedback
2	Unable to develop Ground water supply in coastal areas as an adaptive measure to sea level rise	Budgetary allocation for purchasing modeling tools, inter-Ministerial coordination	Allocation of funds* for procurement of modeling tools (software and hardware), Improvement of hydrological database (Hardware and Software)	Training of hydro-geologists on design of monitoring networks in coastal aquifers, Training of hydro-geologists on ground water modeling to study fluctuation of saline water/ fresh water interface due to sea level rise
3	Unable to provide water supplies using ground water for various sectors with required quality in vulnerable areas to climate change	Preparation of groundwater development and management plan with suitable water quality guidelines	Allocation of funds for procurement of modeling tools (software and hardware), Improvement of hydrological database (Hardware and Software), Updating of WRB laboratory for analysis of water samples periodically	Training of hydro-geologists on design of monitoring networks on ground water quality, Training of hydro-geologist on watershed management with emphasis on ground water quality modeling, Individual, Training of hydro-geologists/ hydro chemists on groundwater quality management
4	Community preparedness to adapt nutritional requirements in relation to changes in crop patterns and other food security issues	Inter-Ministerial coordination among relevant Ministries**, probably through CEPOMs / CIEDP or newly proposed NCSD, to address the issue, necessary budget allocation for carryout training activities, awareness programmes, etc.	Train Primary Healthcare workers and Health Education Officers in dissemination information.	Awareness raising on consequences of climate change to change attitudes of the staff members, make available necessary information and data

Table 2.2.1

2.2.1 Issue No. 1 Inadequate development and implementation of adaptation plans and measures

Sectors Affected: Agriculture, Plantation, Livestock, Forestry, Wildlife, Tourism, Water resources, Health

Underlying Causes:

Inconsistent policies, failure to identify priority tasks, lack of information, lack of feedback, lack of community's interest, absence of a leading authority with proper mandate, inability to conduct research due to lack of funds.

Capacity needed at Systemic Level:

Formulation and implementation of long-term sustainable policies, prioritization of existing policies and implementation programmes, awareness creation at systemic level* and legislative level, budgetary allocation for relevant departments and institutions.

(Ministries of Environment, Agriculture, Health, Mahaveli & Irrigation, Plantation, Livestock, Science and Technology and Tourism)

Capacity needed at Institutional Level:

Creation of an institutional* consultative decision-making process, capacity building in relevant institutes and provide financial support, financial assistance for operational activities, strengthening of existing act/mandates, develop appropriate mechanisms to improve feedback.

(*Sugarcane Research Institutes, Department of Forests, Tea Research Institute, Department of Agriculture, Department of Irrigation, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and Training Institute, Coconut Research Institutes, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Sri Lanka Tourist Board, Department of Health, Health Education Bureau, Anti Malaria Campaign, Epidemiology Division etc.)

Capacity needed at Individual Level:

Change attitudes, develop appropriate mechanisms to improve feedback,

2.2.2 Issue No. 2 Unable to develop ground water supply in coastal areas as an adaptive measure to sea level rise

Sectors Affected: Water Resources

Underlying Causes:

Extent of saline water intrusion (due to sea level fluctuation) not studied as yet No research studies conducted due to lack of funds and lack of future projection of sea level rise data.

Capacity needed at Systemic Level:

Budgetary allocation for purchasing modeling tools, inter-Ministerial coordination.

(Ministries of Environment, Irrigation, Mahaweli, etc)

Capacity needed at Institutional Level:

Allocation of funds* for procurement of modeling tools (software and hardware), Improvement of hydrological database (Hardware and Software).

(*Water Resources Board)

Capacity needed at Individual Level:

Training of hydro-geologists on design of monitoring networks in coastal aquifers, training of hydro-geologist on ground water modeling to study fluctuation of saline water/ fresh water interface due to sea level rise.

2.2.3 Issue No. 3 inability to provide water supplies using ground water for various sectors with required quality in vulnerable areas to climate change

Sectors Affected: Water Resources

Underlying Causes:

Lack of ground water vulnerability assessment maps , absence of research studies conducted due to lack of funds and technical know-how.

Capacity needed at Systemic Level:

Preparation* of groundwater development and management plan with suitable water quality guidelines.

(*Ministry of Irrigation)

Capacity needed at Institutional Level:

Allocation of funds for procurement of modeling tools (software and hardware), improvement of hydrological database (Hardware and Software), updating of WRB laboratory for analysis of water samples periodically.

[*Water Resources Board (WRB)]

Capacity needed at Individual Level:

Training of hydro-geologists on design of monitoring networks on ground water quality, training of hydro-geologist on watershed management with emphasis on ground water quality modeling, individual, training of hydro-geologists/ hydro chemists on groundwater quality management.

2.2.4 Issue No. 4 Community preparedness to adapt nutritional requirements in relation to changes in crop patterns and other food security issues.

Underlying Causes:

Lack of data on crop changes due to climate change, lack of knowledge with regard to food security issues due to climate change and lack of resources

Sectors Affected: Health & Nutrition, Agriculture,

Capacity needed at Systemic Level:

Inter-Ministerial coordination among relevant Ministries**, possibly through CEPOMs / CIEDP or proposed NCSD, to address the issue, necessary budget allocation for carryout training activities, awareness programmes, etc.

(**Ministries of Health and Nutrition, Environment and Natural Resources)

Capacity needed at Institutional Level:

Train Primary Healthcare workers and Health Education Officers in the dissemination of information.

(*Department of Health; Health Education Bureau, staff of the MOH Offices, etc.)

Capacity needed at individual level:

Raising awareness on consequences of climate change in order to change attitudes of the staff members, make available necessary information and data.

2.3 Developing and transferring technology

Article 4, paragraph 1 (c) emphasizes that all parties shall promote, cooperate in developing, applying, including transfer, of technologies, practices that control, reduce or prevent anthropogenic GHGs in all sectors. This is one of the key components with regard to adaptation as well as mitigation of climate change. This requirement has to be fulfilled in order to properly address these two areas. If a CDM project is proposed where old machines / technology is replaced with new machines / technology to do the same work, then the newest technology should be made available to have a fruitful CDM project, which reduces GHG. When adaptation measures are to be developed, in some cases, new technology should be introduced. Therefore developing and transferring technology is very much an essential component in this whole area of addressing climate change.

2.3.a Available Capacity

At systemic level, this has not been properly addressed as yet. However Ministry of Industries has been working with NERD and ISB in fulfilling this requirement.

At the institutional level, very few organizations, namely, Departments of Agriculture and Wildlife Conservation and TRI have been dealing with introducing new technologies for adaptation measures. NERD, ISB (for D/C mills and service stations) and the University of Moratuwa have also been involved in developing new technology especially for mitigation measures.

At the individual level, very few awareness and training programmes have been conducted for sector specific groups.

A summary of capacity needs at three levels,. Table 2.3.1

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Inadequate development and transfer of technology	Prioritization of policies & implementation programmes through Committees on Environment Policies and Management (CEPOM)s / Committee on Integrating Environment and Developing Policy (CIEDP) or NCSD, make available necessary budgetary allocations, Inter-Ministerial coordination, Increase cadre in relevant institutions, make budgetary allocations	Establishment of inter and intra institutional linkages for sharing information and resources, Capacity building of each training institute, make necessary actions to increase cadre search for new technology developed abroad for possible adaptation	Capacity building of relevant personnel in institutes on new technology and transferring technology
2	Failure to develop and transfer renewable energy, energy efficiency and productivity technologies	Make available necessary funds and resources to acquire new technology from abroad	Take necessary steps to acquire technology from overseas and enhance research and development in relevant institutions	Train institutional staff to develop or adapt technologies

Table 2.3.1

2.3.1 Issue No. 1 Inadequate development and transferring of technology

Underlying Causes:

No prioritization of policies and implementation, insufficient technology generation and dissemination, needs are not recognized, lack of trained personnel and budgetary limitations and low weightage given to the problem.

Sectors Affected: Agriculture, Forestry, Wildlife conservation, Plantation, Health & Nutrition, Land development, Coastal and marine area management, Industry, Tourism, Energy & Transport, Sanitation and Urban Development

Capacity needed at Systemic Level:

Prioritization of policies and implementation programmes through Committees on Environmental Policy and Management (CEPOM), Committee on Integrating Environment and Developing Policy (CIEDP) or NCSD, make available necessary budgetary allocations, Inter-Ministerial** coordination, increase in cadre in relevant institutions, make budgetary allocations.

(**Ministries of Environment and Natural Resources, Land, Mahaveli & Rajarata Development, Tourism, Irrigation, Power and Energy, Fisheries and Ocean Resources, Health & Nutrition, Plantation, Science & Technology, Disaster Management and Human Rights, Industry, etc.)

Capacity needed at Institutional Level:

Establishment of inter and intra institutional* linkages for sharing information and resources, Capacity building of each training institutes, make necessary actions to increase cadre, search for new technology developed abroad for possible adaptation.

(*Sugarcane Research Institutes, Department of Forests, Department of Wildlife Conservation, Tea Research Institute, Department of Agriculture, Department of Irrigation, Coast Conservation Department, Department of Fisheries, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Agrarian Research & training Institute, Coconut Research Institutes, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Sri Lanka Tourist Board, Department of Health, NERD, ISB, CDM study Centers, etc.)

Capacity needed at Individual Level:

Capacity building of relevant personnel in institutes on new technology and in the transfer of technology.

2.3.2 Issue No. 2 Failure to develop and transfer renewable energy, energy efficiency and productivity technologies

Underlying causes:

Lack of knowledge and research and development, lack of funds.

Sectors Affected: Power and Energy

Capacity needed at Systemic Level:

Make available necessary funds and resources to acquire new technology from abroad.

Capacity needed at Institutional Level:

Take necessary steps to acquire technology from overseas and enhance research and development in relevant institutions.

(CEB, NERD, ISB, CDM study centre at Moratuwa University)

Capacity needed at Individual Level:

Train institutional staff to develop or adapt technologies.

2.4 Research and systematic observation of climate and other functions

In carrying out the commitments stated under the Article 4, paragraph 1 (g) and subsequent Article 5, of the Convention, all parties are expected to promote research and systematic observations of climate and other functions. Research and development play an important role, especially in assessing vulnerability and impacts and developing adaptation and mitigation measures in dealing with climate change.

2.4.a Available Capacity

As a *systemic level* activity, the Ministry of Science and Technology had formulated a Cabinet memorandum in 2000, to establish the Centre for Climate Change Studies (CCCS) under the Department of Meteorology to conduct research on climate change and allied issues and to create awareness on climate change among the general public.

At the institutional level, Centre for Climate Change Studies (CCCS) of the Department of Meteorology was specially established to conduct research on climate change and allied issues and to monitor climate change. Some researches have already been conducted at the CCCS especially in rubber, coconut and tea sectors with NSF and GEF funds. Some adaptation measures with regard to tea and coconut plantations were developed under the Assessment of Impacts and Adaptation of Climate Change Project (AS-12), which was coordinated by the SLAAS and funded by the GEF through START/UNEP/TWAS. Future climate change scenarios (rainfall and temperature) were developed under the Climate Change Enabling Activity Programme Phase II project, funded by the GEF through the Ministry of Environment and Natural Resources. The Ministry of Healthcare and Nutrition has been working on identification of health impacts due to climate change and preparation of national Action plans. RRI has also been involved in many research activities on climate change, which were funded through the Climate Change Enabling Activity Phase II programme, CCCS block grant scheme and APN/START/ENPHO. Water Resources Board is planning to set up a Research and Training centre in 2006. In addition, CRI has been

conducting a variety of research projects on climate change, especially on impacts of climate change and effect of CO₂ elevation, etc. TRI has been working to develop suitable cultivars through hybridization and selection by evaluating seedling and cultivar progeny resistance to drought and pest and diseases. TRI has been researching to develop water management techniques for young and mature tea and improved shade management for tea plantations. They have also been conducting research to assess socio-economic impacts, growth and productivity impacts of climate change.

In addition, individual departments, boards and institutions have also started to conduct research on climate change. These are Departments of Agriculture and Wildlife Conservation and RRI, TRI, CRI, NARA, NERD, ISB (with ARPEEC) and NBRO. USAID and NSF are providing financial support to conduct research through various programmes.

The Department of Meteorology is mandated to do systematic observations on climate since its inception in 1861. Departments of Agriculture and Irrigation and RRI, TRI, CRI, SRI, Universities and private sector plantation companies have also been taking systematic observation of atmospheric data such as rainfall, temperature, etc. since mid seventies. NARA and SLPA measure the oceanographic data such as sea water levels, wave heights and other relevant data.

As institutions identified closely with the subject, several Departments and Institutes have also been involved in creating awareness on climate change issues and conducting research on climate change and allied issues to enhance the capacity of the individuals in the respective organizations.

A summary of capacity needs at three levels, is given in Table 2.4.1

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Inadequate research and systematic observations	Changes in financial policy at systemic level for promoting research and systematic observations, take necessary steps to negotiate with foreign donors to increase foreign funds for research.	Appreciation of the service and the commitment, Access and coordination with the agencies involved in research and make available necessary data. Inter institutional coordination, Preparation of project proposals to seek funds from donors	Appreciation of the service and the commitments, Training on conducting research, Build consensus on importance of quality of the observational data, Training on proposal writing (scientists)
2	Applied research in the area of correlation of environmental issues and health impacts	Creation of an apex body to co-ordinate and rationalize research activities – in different sectors including health, Develop a research policy, which will identify the scope and also the roles and responsibilities of different sectoral agencies like Post graduate Institutes, Department of Health, Universities, etc.	Allocation of funds for specific research (research areas to be identified by the health sector eg. Epidemiology, vector control)	Train institutional staff to develop or adapt technologies

Table 2.4.1

2.4.1 Issue No.1 Inadequate research and systematic observations

Underlying Causes:

Lack of policy directive, inadequate human and financial resources, Management problems, low priority for budget allocation, lack of enthusiasm and appreciation, absence of measures for coordination among the specific agencies involved in research, lack of instruments and equipments, lack of training.

Sectors Affected: Agriculture, Forestry, Wildlife conservation, Plantation, Health & Nutrition, Land Development, Coastal and marine area management, Industry, Tourism, Energy & Transport, Sanitation and Urban Development

Capacity needed at Systemic Level:

Changes in financial policy at systemic level** for promoting research and systematic observations, take necessary steps to negotiate with foreign donors to increase foreign funds for research.

(**Ministries of Environment and Natural Resources, Land, Mahaveli & Rajarata Development, Tourism, Irrigation, Power and Energy, Fisheries and Ocean Resources, Health & Nutrition, Plantation, Science & Technology, Disaster Management and Human Rights, Industry, etc.)

Capacity needed at Institutional Level:

Appreciation of the services and the commitments of the employees, coordinate with the agencies* involved in research and make available necessary data, inter institutional coordination.

(*Sugarcane Research Institutes, Department of Forests, Department of Wildlife Conservation, Department of Meteorology, Tea Research Institute, Department of Agriculture, Department of Irrigation, Coast Conservation Department, Department of Fisheries, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and training Institute, Coconut Research Institute, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Sri Lanka Tourist Board, Department of Health, NERD, ISB, CDM study Centers, CEA, NBRO, Universities, etc.)

Capacity needed at Individual Level:

Appreciation of the services provided and the commitments, training on conducting research, build consensus on importance of quality of the observational data, training on proposal writing (scientists).

2.4.2 Issue No. 2 Applied research in the area of correlating environmental issues and health impacts.**Underlying Causes:**

Not considered a priority by the health sector, lack of funds, lack of expertise and lack of a research policy

Sectors Affected: Health and Nutrition**Capacity needed at Systemic Level:**

Creation of an apex body to co-ordinate and rationalize research activities, in different sectors including health, Develop a research policy which will identify the scope and also the roles and responsibilities of different sectoral agencies like Post graduate Institutes, Department of Health, Universities, etc.

(Ministry of Health and Nutrition, Environment and Natural Resources,)

Capacity needed at Institutional Level:

Allocation of funds for specific research; (research areas to be identified by the health sector eg. Epidemiology, vector control).

(Department of Health; Epidemiology Unit, Anti malaria campaign, etc.)

Capacity needed at Institutional Level:

Training on conducting sector specific research, creating awareness on consequences of climate change on health sector.

2.5 Clean Development Mechanism (CDM)

Though Sri Lanka is not committed to take any initiatives under this requirement, Sri Lanka has generously volunteered to participate in the Clean Development Mechanism (CDM) which was adopted by the Kyoto Protocol in 1997. Sri Lanka will be benefited through this mechanism by gaining foreign exchange from the developed countries, who will buy our carbon credits.

2.5.a Available Capacity

As a *systemic level* activity, two CDM study centers were established at the Universities of Peradeniya and Moratuwa. In addition, Ministry of Environment has forwarded number of CDM projects for funding and some of them have been already accepted. Ministry of Industry has also been involved in CDM activities through BOI projects in Sri Lanka. A Draft CDM policy was formulated and submitted to the Cabinet by the Ministry of Environment.

At the institutional level, the CDM study centre (Agriculture and Forestry) at University of Peradeniya has been designated to conduct research on carbon sequestrations by the different species of plants, trees, in order to value the carbon credits in Sri Lanka. The CDM study centre, which is located at University of Moratuwa is mainly dealing with power and energy research. However these two centers are not functioning well due to lack of funds allocated to conduct research. RRI has been assessing rubber plantation as a system to mitigate negative effect of climate change. RRI has also done economic assessments on carbon sequestration capabilities and timber production in the rubber plantation in Sri Lanka.

At the individual level, several awareness programmes were conducted by the Ministry of Environment and CDM study centre at University of Peradeniya to promote CDM projects in Sri Lanka.

A summary of capacity needs at three levels for Clean Development Mechanism (CDM), is given in Table 2.5.1

Capacity Needs at Three Levels for Clean Development Mechanism

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
¹	Lack expertise in developing CDM project proposals for submission to the relevant agencies	Implement the draft National Policy on Clean Development Mechanism (CDM), Inter Ministerial coordination among relevant Ministries, make available budgetary allocations for relevant CDM study centres, Universities, and institutions to conduct related research. Increase awareness on CDM concepts among all senior policy makers	Developing projects to undertake research on CO ₂ sequestration data of potential candidate tree species; Conducting awareness programs for potential sectors; Conduct training activities on preparing CDM proposals; Capacity building of CDM study centers; Increase training activities in all sectors of CDM, (Energy, waste, forestry, tourism, Health, Industry, transport); Increase awareness on CDM concepts among all senior officers	Awareness raising on potential CDM projects areas among stakeholders (Plantation, forestry, energy, etc.), Training on baseline methodologies for proposal writing
²	Inadequate facilitation for CDM	Streamline CDM Process; establish units in ECF, FCCISL; Constitute a Specific Project for implementing CDM	Imparting CDM Expertise to Professionals	Awareness raising on potential CDM projects areas among stakeholders (Plantation, forestry, energy, etc.), Training on baseline methodologies for proposal writing

Table 2.5.1

2.5.1 Issue No.1 Lack expertise in developing CDM project proposals for submission to the relevant agencies

Underlying Causes:

Non-availability of required data; lack of knowledge on CDM among the CDM potential sectors; lack of expertise in CDM project development; lack of institutional coordination; absence of CO₂ sequestration data for different plant species; lack of monitoring facilities of GHG; inadequate awareness on CDM projects; high cost involved in consultation for preparing proposals, validation, verification and registration; lack of an

institutional framework; to adopt structured process for human resource development.

Sectors Affected: Power and Energy, Forestry, Plantation,

Capacity needed at Systemic Level:

Implement the draft National Policy on Clean Development Mechanism (CDM), Inter Ministerial coordination among relevant Ministries, make available budgetary allocations for relevant CDM study centres, Universities, institutions to conduct related research, Increased awareness on CDM concepts among all senior policy makers.

(Ministries of Environment and Natural Resources, Power and Energy, Plantation, Finance, etc.)

Capacity needed at Institutional Level:

Developing projects to undertake research on CO₂ sequestration data of potential candidate tree species; conducting awareness programs for potential sectors; conduct training activities on preparing CDM proposals; capacity building of CDM study centers; increase training activities in all sectors of the CDM (Energy, waste, forestry, tourism, Health, Industry, transport); increase awareness on CDM concepts among all senior officers.

(CDM study centers at Universities of Peradenya and Moratuwa, CEB, CEA, ISB, Wayamba Environmental Authority, FCCISL, EFC, TRI, CRI, RRI, Forest Department, etc.)

Capacity needed at Individual Level:

Awareness raising on potential CDM projects areas among stakeholders (Plantation, forestry, energy, etc.), training on baseline methodologies of proposal writing.

2.5.2 Issue No. 2 Inadequate facilitation for CDM

Underlying Causes:

Lack of competent resource persons to prepare CDM Project Reports, lack of finance, lack of expertise and lack of staff for promoting CDM activities.

Capacity needed at Systemic Level:

Streamline CDM Process, establish units in ECF, FCCISL, constitute a specific project for implementing CDM.

(Ministries of Environment and Natural Resources, Power and Energy, Plantation, Finance, etc.)

Capacity needed at Institutional Level:

Imparting CDM expertise to professionals.

(CDM study centers at Universities of Peradenya and Moratuwa, CEB, CEA, ISB, Wayamba Environmental Authority, FCCISL, EFC, TRI, CRI, RRI, Forest Department)

Capacity needed at Individual Level:

Awareness raising on potential CDM projects areas among stakeholders (Plantation, forestry, energy, etc.), training on baseline methodologies for proposal writing,

2.6 Preparing national communications

As per the Article 12, paragraph 5 of the Convention, developed country parties and other parties included in Annex I of the Convention shall make their Initial National Communication within six months of the entry into force of the Convention. Other parties shall make their Initial National Communication within three years of the entry into force of the Convention or the availability of financial resources in accordance with Article 4, paragraph 3 of the Convention. The Conference of Parties (COP) shall determine the frequency of subsequent communications by all parties.

The Initial National Communication of Sri Lanka was prepared and submitted to the UNFCCC Secretariat in October 2000. Many governmental and non-governmental institutions were involved in the preparation of this important document. It comprises national circumstances, greenhouse gas inventories (1994), impacts and vulnerability, mitigation options and adaptation responses, policies and measures, education training and awareness programmes, constraints and technological needs and recommended research studies and a portfolio of projects. This is mainly a systemic level activity of the Ministry of Environment.

A summary of capacity needs at three levels for preparing national communications is given in Table 2.6.1.

Capacity Needs at three levels for preparing National Communication.

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Shortcomings of National Communications to UNFCCC	Awareness raising at higher level or Ministerial level officers on the importance of national communication to the UNFCCC, Inter Ministerial level collaboration, make available necessary budgetary allocation for awareness raising.	Formations of inter and intra institutional information network, Regular update of current situation on climate change issues, Capacity building on assessing and conducting research on vulnerability, impacts, adaptation and mitigation of climate change.	Change attitudes by conducting awareness on climate change issues, long and short term training on assessing and conducting research on vulnerability, impacts, adaptation and mitigation of climate change.

Table 2.6.1

2.6.1 Issue No. 1 Shortcomings of National Communications to UNFCCC

Underlying Causes:

Inadequate expertise and required information, lack of a national information dissemination mechanism, non availability of trained personnel and high cost to hire appropriate consultants, inadequate data on current situation about the country profile, lack of institutional collaboration and plan.

Sectors Affected: Agriculture, Forestry, Wildlife Conservation, Plantation, Health & Nutrition, Land development, Water Resources, Coastal and Marine Area Management, Industry, Tourism, Energy & Transport, Sanitation and Urban Development, Human Settlement and Public Utilities.

Capacity needed at Systemic Level:

Awareness raising at higher level or among Ministerial level officers on the importance of submitting the national communication to the UNFCCC, inter Ministerial level collaboration, enabling the provision of necessary budgetary allocation for awareness raising,

(**Ministries of Environment and Natural Resources, Land, Mahaveli & Rajarata Development, Tourism, Irrigation, Power and Energy, Fisheries

and Ocean Resources, Health & Nutrition, Plantation, Science & Technology, Disaster Management and Human Rights, Industry, etc.)

Capacity needed at Institutional Level:

Formations of inter and intra institutional information network, regular update of current situation on climate change issues, capacity building on assessing and conducting research on vulnerability, impacts, adaptation and mitigation of climate change,

(*Sugarcane Research Institutes, Department of Forests, Department of Wildlife Conservation, Department of Meteorology, Tea Research Institute, Department of Agriculture, Department of Irrigation, Coast Conservation Department, Department of Fisheries, Rubber Research Institute, Coconut Research Institute, Department of Export Agriculture, Hector Kobbekaduwa Agrarian Research and training Institute, Coconut Research Institutes, Department of Animal Production and Health, Water Resources Board, Department of Irrigation, Sri Lanka Tourist Board, Department of Health, NERD, ISB, CDM study Centers, CEA, NBRO, Universities, etc.)

Capacity needed at Individual Level:

Changing attitudes among relevant officers by creating awareness on climate change issues, long and short term training on assessing and conducting research on vulnerability, impacts, adaptation and mitigation of climate change,

2.7 Preparing and managing Greenhouse gas inventories

As per the Article 4, paragraph 1 of the Convention, all parties shall develop, periodically update and publish national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. It is very urgent requirement to update the inventories of the gases to evaluate the present situation of emissions and removal of greenhouse gases, which support CDM activates in Sri Lanka.

A Greenhouse gas inventory (1993-1995) has been prepared to quantify the sectoral emissions, which significantly contribute to the global warming in the recent past. Greenhouse gases originate mainly in energy industries, livestock, agriculture, forestry and waste disposal sectors. These gases are found to be Carbon Dioxide, Methane, Nitrous

Oxide and Carbon Dioxide. This inventory has been prepared by analyzing the following sectors;

1. Energy and Transportation Industries
2. Manufacturing Industries and Constructions
3. Transport
4. Other sectors producing emissions from energy consumption
5. Industrial Processes
6. Livestock sector
7. Agriculture sector
8. Forestry and Land use sector
9. Waste disposal sector

2.7.a. Available Capacity

As a systemic level activity, Ministry of Environment had been playing a leading role in preparing the Greenhouse gas inventory as a part of the preparation for the Initial National Communication. Ministries of Agriculture and Industry have also been involved in preparing this inventory. Ministry of Industry has facilitated a National Cleaner Production Centre (NCPC) and FCCISL to carry out audits and surveys on GHG emissions. Ministry of Industries has also coordinated Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC) project with ISB and FCCISL to carry out the project activities on climate change.

At the institutional level, Departments of Agriculture, Meteorology and TRI, ISB, Universities of Sri Jayawardanapura and Moratuwa, CEB and some NGOs were also involved in preparing greenhouse gas inventories in Sri Lanka. Due to non availability of country specific emission factors, the first inventory was not accurately prepared.

At individual level, awareness on greenhouse gas emissions and about their source areas have been generated to some extent. However more awareness and training programmes are needed to facilitate the preparation of this inventory.

A summary of capacity needs at three levels for Preparing and managing Greenhouse gas inventories, is given in Table 2.7.1

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Shortcomings of national greenhouse gas inventories	Provision of adequate funds to relevant institutions for purchasing equipments and create awareness programmes for the stakeholders, prioritize the existing policies and regulations to enhance the activities	Creating awareness on preparing GHG audits and surveys among institutional level, capacity building on surveying methods, Take necessary steps to develop country specific emission factors, strengthening inter institutional collaboration, Incorporate inventory data into EPL process, Incorporate bulk fuel delivery data into inventory data	Create awareness among personal level on GHG sources and evaluating methods

Table 2.7.1

2.7.1 Issue No. 1 Shortcomings in national greenhouse gas inventories

Underlying Causes:

Lack of activity data, lack of country specific emission factors, lack of inter-institutional collaboration, high costs involved, absence of proper reporting procedure, Low priority for proper management, lack of expertise in the field, lack of equipments and a forward thrust.

Capacity needed at Systemic Level:

Provision of adequate funds to relevant institutions to purchase equipments, create awareness programmes for the stakeholders, prioritizing the existing policies and regulations to enhance the activities.

(Ministries of Environment and Natural Resources, Industry)

Capacity needed at Institutional Level*

Creating awareness on preparing GHG audits and surveys among relevant institutions, capacity building on surveying methods, take necessary steps to develop country specific emission factors, strengthening inter institutional collaboration, incorporate inventory data into EPL process, incorporate bulk fuel delivery data into inventory data.

(*National Cleaner Production Centre (NCPC), FCCISL, ISB, Departments of Agriculture, Export Agriculture, Animal Production and Health, CEB, etc.)

Capacity needed at Individual Level:

Create awareness among personnel on GHG sources and evaluating methods.

2.8 Education, Training, and Public Awareness raising

Article 4, paragraph 1 (i) of the Convention and subsequent Article 6, clearly states that all parties shall promote and cooperate in education, training and raising public awareness relating to climate change and encourage widest participation in this process. Some efforts have been deployed by the sectors which are vulnerable to climate change in meeting this requirement.

2.8.a Available Capacity

As *systemic level* activities, Ministry of Environment and Natural Resources has deployed many programmes for training and raising public awareness. Enabling Activity Phase I and II are programmes designed to assess impacts and vulnerability to climate change in different sectors in Sri Lanka. Public awareness raising on climate change and CDM are some of the activities conducted with support from systemic level. Since 1990 s Ministry in-charge of the Environment has conducted many awareness-raising activities on climate change in collaboration with the Department of Meteorology for school children. Ministry of Industry has coordinated awareness raising programmes in collaboration with ISB and FCCISL on GHG emissions and energy savings in Sri Lanka.

At the *institutional level*, several awareness-raising campaigns / programmes on climate change and their impacts, have been conducted by the Centre for Climate Change Studies (CCCS) of the Department of Meteorology, NGOs and respective organizations in collaboration with different sector institutes, organizations and their line Ministries. These programmes have covered the agriculture, plantation, forestry, health and water resources sectors which seem to be more vulnerable to climate change. In 2001, the Centre for Climate Change Studies (CCCS) and the MIND were jointly awarded a climate change awareness raising project by the Working Group III of the Intergovernmental Panel on Climate Change (IPCC) in Netherlands, under which 10 seminars were conducted for the policy makers, district level administrators, school children, university teachers, private sector and NGOs in different districts in Sri Lanka. The Centre for Climate Change Studies (CCCS) was granted a project titled "Development of Rainfall and Temperature Scenarios for Sri Lanka" by the MENR in 2003 under the Climate Change Enabling Activity Phase II of the Senior Research Programme, in which 14 seminars have been

conducted during 2003 and 2004. The CCCS was granted a project by the Asia Pacific Network (APN) for Global Change Research under the CAPaBLE programme, in 2005, on “climate change outreach in Sri Lanka”. Eighteen (18) seminars have been scheduled under this project, of which nine seminars have already been conducted.

The National Institute of Education (NIE) has already taken steps to include climatology, basic concepts of meteorology, environment, biodiversity and climate change in their school level curriculum. At the University undergraduate level, climate change has been included as a subject in the field of climatology, and at the post graduate level environment, oceanography and climate change have been included as special subjects. UDA has participated in CHPB’s training programmes, which address natural disaster reduction and management strategies. NSF has been providing financial support for conducting research, awareness and training programmes on climate change. NSF has also conducted a workshop on “Global Environmental Change” in collaboration with IGBP and LOICZ in 2005. Water Resources Board is planning to set up a Research and Training centre in 2006. TRI has been conducting awareness-raising activities as an extension programmes, especially for stakeholders.

Ministries / Departments / Institutions, which were involved in meeting this national obligation are Ministries of Environment and Natural Resources, Agriculture, Industry and Healthcare and Departments of Agriculture, Meteorology, Coast Conservation, Wildlife Conservation and Forest and TRI, CRI, RRI, Water Resources Board, NERD, NBRO, ISB, UDA and NSF and Universities of Moratuwa, Sri Jayawardanapura, Peradenya and Kelaniya and Green Movement of Sri Lanka, MIND and Environmental Foundation Limited.

At individual level, awareness raising and training of individuals on climate change and allied aspects have taken place with the activities stated above at systemic and institutional level.

A summary of capacity need at three levels for education, training and public awareness raising, is given in Table 2.8.1

Capacity Needs at three levels for education, training and for raising public awareness

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Lack of Education, training and public awareness raising	Changes in financial policies to allocate more budgets for relevant institutions, Awareness creation among policy makers on climate change issues, Prioritization of existing policies & implementation programmes, make arrangements to strengthen and periodically update the school curriculum with the latest findings on climate change issues, make arrangements to incorporate climate change as a separate subject in university curriculum including science degree programmes	Changes in institutional financial policies for conducting awareness programmes, incorporate more training programmes in relation to climate change, encourage climate change research at graduate and undergraduate levels	Awareness creation among personnel in the relevant institutions, government officers, policymakers & general public on climate change and their consequences, make arrangements to train staff members on specific issues on climate change

Table 2.8.1

2.8.1 Issue No. 1 Lack of Education, training and public awareness raising

Underlying Causes:

Inadequate financial resources, low priority, budgetary limitations, lack of an institutional mechanism,

Sectors Affected: All vulnerable sectors

Capacity needed at Systemic Level:

Changes in financial policies to allocate more budgetary funds for relevant institutions, awareness creation among policy makers on climate change issues, prioritization of existing policies and implementation of programmes, arrangements to strengthen and periodically update the school curriculum with the latest findings on climate change issues, and arrangements to incorporate climate change as a separate subject in university curriculum including science degree programmes are some of the key policy concerns relevant to capacity enhancement.

(All relevant Ministries; Ministries of Environment and Natural Resources, Science and technology, Disaster management and Human Rights, Education, Agriculture, Plantation, Land, Health, etc.)

Capacity needed at Institutional Level:

Changes in institutional financial policies for conducting awareness programmes, incorporate more training programmes in relation to climate change, encourage climate change research in graduate and undergraduate levels are relevant for capacity building at Institutional level.

(All relevant institutions including CCCS of the Department of Meteorology, NIE of the Department of Education)

Capacity needed at Individual Level:

Awareness creation among personnel in the relevant institutions, government officers, policymakers and general public on climate change and their consequences, make arrangements to train staff members on specific issues on climate change, need to be considered for capacity enhancement at individual level.

2.9 Developing National Climate Change Programmes

As per the Article 4, paragraph 1 (b) all parties are compelled to formulate and implement national / regional programmes to mitigate climate change by reducing GHG and increasing sinks and to take necessary measures to adapt to climate change.

2.9.a. Available Capacity

As *systemic level* activities, MENR has pioneered many national programmes to meet various obligations under the UNFCCC with the financial support from various international donors, namely GEF, UNDP, USAID, AusAID, etc. GEF/UNDP supported to prepare the preparation of first national communication (2000) and also to carry out the Climate Change Enabling Activity – Phase I (1999-2001) under the UNFCCC. As a follow up to this activity, Climate Change Enabling Activity Phase – II (2002-2004) was carried out through which a series of climate vulnerability and adaptation studies were undertaken (further details are given below). UNDP has also supported in 2002 the preparation of the national report to World Summit on Sustainable Development (WSSD), to coordinate national activities, and to create awareness with reference to sustainable development among the broader public. A draft National CDM policy has been prepared and submitted to the Cabinet for the final approval. AusAID and WB have extended their support for the National Strategy Studies (NSS) on Climate Change to develop national CDM strategy during the period from 2002 to 2003. In addition, Ministry of Healthcare has also launched awareness programmees at national level to address the climate change issues.

At institutional level, Departments of Agriculture, Meteorology and University of Moratuwa have implemented such national programmes especially in raising awareness and promoting research and development in the field of climate change.

2.9.a.(i) Climate Change Enabling Activity Phase - II (2002-2004)

This project was launched to address the following issues;

1. Technological Transfer
 - (a) Identification and submission of technology needs
 - (b) Capacity building to assess technology needs, modalities to acquire and absorb them, design, evaluate and host projects
2. Studies leading to the preparation of national programme to address climate change improvement of emission factors.

Four activities were conducted to achieve the above goals.

i. Senior research programme

Twenty projects were conducted of which one was on general patterns, two were on greenhouse gas emission, ten were on vulnerability and seven were on adaptation.

ii. Junior research programme

A total of 40 projects were funded: four of them were on general patterns, two were on GHG emissions, fifteen were on vulnerability, eleven on adaptation / mitigation and six on general topics pertaining to climate change.

iii. Training workshop on technology transfer and emission factors.

Eighteen research studies, both from senior and junior research programmes were focused on technology transfer and technology needs assessments. Several research studies under these programmes were also focused in preparing national programmes to address the climate change.

- iv. *Participation of junior and middle level officers at international conferences as a capacity building initiative.*

In fulfilling the above objective, five young officers have participated in the eighth Conference of Parties (COP-8), which was held in Delhi in October 2002.

A summary of capacity needs at three levels for developing national climate change programmes, is given in Table 2.9.1

Developing national climate change programmes for capacity needs at 3 levels.

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
⁶	Lack of national climate change programmes	Awareness creation among policy makers, prioritization of existing policies & implementation programmes, make available budgetary allocations for conducting and promoting national climate change programmes	Inter Institutional coordination, make available information and data through networking, promote and encourage climate change programmes	Change attitudes through awareness raising on climate change issues, provide Long-term training for personnel in relevant institutes
²	Lack of a Health Promotion Programme to address health issues caused by climate change	Awareness creation among policy makers, prioritization of existing policies & implementation programmes	In- service training for primary healthcare workers (eg. PHI, PHM etc), make available Information on Education & Communication (IEC) material	Change attitudes through awareness raising on climate change issues, make available latest information and data

Table 2.9.1

2.9.1 Issue No. 1 Lack of national climate change programmes

Underlying Causes:

Inadequate financial resources, lack of human resources, budgetary limitations, insufficient policy attention, brain-drain, low priority, weak inter-institutional collaboration.

Sectors Affected: All relevant sectors

Capacity needed at Systemic Level:

Awareness creation among policy makers, prioritization of existing policies and implementation programmes, make available budgetary

allocations for conducting and promoting national climate change programmes.

(Ministries of Environment and Natural Resources, Agriculture, Health and Nutrition, Irrigation, Education, etc.)

Capacity needed at Institutional Level:

Inter Institutional coordination, make available information and data through networking, promote and encourage climate change programmes,

(CCS, CCCS, Departments of Agriculture, Health, Irrigation, CDM study centers, Universities, CRI, TRI, RRI, Forest Department, Wildlife Conservation, etc.)

Capacity needed at Individual Level:

Change attitudes through awareness raising on climate change issues, provide long-term training for personnel in relevant institutes.

2.9.2 Issue No. 2 Lack of a Health promotion programmes to address health issues due to climate change

Underlying Causes:

Lack of information and data, lack of trained personnel, lack of Information on Education, Communication (IEC), and material, lack of inter sectoral – inputs.

Capacity needed at Systemic Level:

Awareness creation among policy makers, prioritization of existing policies and implementation programmes.

(Ministry of Health)

Capacity needed at Institutional Level:

In - service training for primary healthcare workers (eg. PHI, PHM etc), make available of Information Education and Communication (IEC) material

(Department of Health; MOH offices, Health Education Bureau, etc.)

Capacity needed at Individual Level:

Change attitudes through awareness raising on climate change issues, make available latest information and data,

2.10 Information and networking, including the establishment of databases

Networking of information through databases is very essential to share and exchange information, ideas and data among the organizations.

2.10.a Available Capacity

At systemic level, no such networking system or database is implemented in Sri Lanka. Therefore there is a strong necessity to implement such networking at the national level.

At institutional level, there are some individual organizations, which are maintaining databases to share information and data for their own activities or requirements. These are Departments of Meteorology, Irrigation, Agriculture, Wildlife Conservation, Coast Conservation and TR, RRI, CRI, NARA, CEA, UDA, NBRO, Water Resources Board and some Universities. The Department of Meteorology has been maintaining CLICOM database to store and analyze meteorological and climatological data. UDA Geographical Information System (GIS) division is one of the best among other organizations in the country for mapping of environmentally sensitive areas in regional as well as urban structural planning. Water Resources Board has been maintaining a database on groundwater quality and quantity since 2000.

A summary of capacity needs at three levels for information and networking, including the establishment of databases, Table 2.10.1

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Inadequate information and networking	Formulation of a national policy on data sharing and networking. Changes in financial policies to facilitate networking of data and information, make available financial resources to facilitate networking and sharing data and information	Inter institutional collaboration among relevant institutes to have common platform for data and information networking and sharing, Increase IT facilities for all the institutions (Universities, Research Institute, Government Departments.)	Training on technical know-how of database management, change attitudes on the importance of data and information networking towards national development

Table 2.10.1

2.10.1 Issues No.1 Inadequate information and networking

Underlying Causes:

Inadequate financial resource, weak inter-institutional collaboration, attitudes, budgetary limitations, policies and attitudes, low IT facilities, lack of trained people.

Sectors Affected: All relevant sectors

Capacity needed at Systemic Level:

Formulation of a national policy on data sharing and networking, changes in financial policies to facilitate networking of data and information, make available financial resources to facilitate networking and sharing data and information.

(Ministries of Environment and Natural Resources, Science and Technology, Disaster Management and Human Rights, Land, Agriculture, Finance, Plantation, Health, Mahaweli, etc.)

Capacity needed at Institutional Level:

Inter institutional collaboration among relevant institutes to have common platform for data and information networking and sharing. Increase IT facilities for all the institutions (Universities, Research Institute, Government Departments.)

(All relevant institutions)

Capacity needed at Individual Level:

Training on technical know-how of database management, change attitudes on the importance of data and information networking towards national development.

2.11 Institutional capacity-building, including the strengthening or establishment, as appropriate, of national climate change secretariats or national focal points

2.11.a Available Capacity

At systemic level, the Climate Change Secretariat (CCS) was established under the MENR to coordinate climate change activities /programmes

with other stakeholder organizations. CCS mainly deals with the policies and legislations with regard to climate change, and the MENR continues as the focal point for UNFCCC.

At institutional level, Centre for Climate Change Studies (CCCS) of the Department of Meteorology was established in 2000, to take the lead role of conducting research, training and awareness programmes on climate change and to monitor the climate change and also to execute climate models. The Department of Meteorology is the focal point of the Intergovernmental Panel on Climate Change (IPCC). Two CDM study centers were established in the Universities of Peradeniya and Moratuwa to conduct research especially on carbon sequestration of forest vegetation and other vegetation types.

A summary of capacity needs at three levels for institutional capacity-building, including the strengthening or establishment, as appropriate, of national climate change secretariats or national focal points, Table 2.11.1

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
¹	Lack of resources to fulfill mandated activities of the Secretariat and relevant centers	Awareness raising on climate change issues and their importance for policy makers and higher level officers, need for budgetary allocation to carryout mandated activities, inter Ministerial coordination, etc.	Inter institutional coordination, budgetary allocation to implement mandated activities, organization and coordination of training programmes on specific research themes (CO ₂ sequestration on some plant species), awareness raising on climate change, infrastructure development	Not applicable

Table 2.11.1

2.11.1 Issue No. 1 Lack of resources to fulfill mandated activities of the secretariat and relevant centres

Underlying Causes:

Lack of thrust, lack of financial resources allocated, lack of inter institutional coordination, low priority.

Sectors / Institutions Affected:

CCS, CCCS, CDM study centres, etc.

Capacity needed at Systemic Level:

Awareness raising on climate change issues and their importance for policy makers and higher level officers, necessary budgetary allocation to carry out mandated activities, inter Ministerial coordination, etc.

(Ministries of Environment and Natural Resources, Disaster Management, finance, etc)

Capacity needed at Institutional Level:

Inter institutional coordination, budgetary allocation to implement mandated activities, organization and coordination of training programmes on specific research themes (CO₂ sequestration on some plant species), awareness raising on climate change, infrastructure development.

(CCS, CCCS, CDM study centres, etc.)

Capacity needed at Individual Level: Not applicable

2.12 Improved decision-making, including assistance for participation in international negotiations

2.12.a Available Capacity

At systemic level, MENR as the national focal point has been actively participating in international negotiations for over two decades.

At institutional level, Departments of Wildlife Conservation, NBRO and CEA are the other organizations, which have shown involvements towards meeting this requirement.

A summary of capacity needs at three levels to address the issue of obtaining optimum national benefits, is given in Table 2.12.1

Issue No.	Issue	Capacity needed at		
		Systemic level	Institutional level	Individual level
1	Unable to obtain optimum national benefits at International negotiations	Make necessary arrangements to include technical members in negotiation team	Enhance Capacity building in legal skills amongst negotiating team	Create awareness on climate change issues and their consequences and coping mechanisms, make available latest information on current issues on climate change, enhance legal skills

Table 2.12.1

2.12.1 Issue No. 1 Unable to obtain optimum national benefits at International negotiations

Underlying Causes:

Lack of legal skills amongst negotiating team, non-representation by technical team.

Capacity needed at Systemic Level:

Make necessary arrangements to include technical members in negotiation team.

(Ministries of Environment and Natural Resources, Science and Technology, Disaster management and Human Rights, Agriculture, Land, Finance, etc.)

Capacity needed at Institutional Level:

Enhance capacity building in legal skills amongst members of the negotiating team,

(CCS, CCCS of Department of Meteorology, Department of Agriculture, CDM study centres, University staff, etc.)

Capacity needed at Individual Level:

Create awareness on climate change issues and their consequences and coping mechanisms, make available latest information on current issues on climate change and enhance legal skills.

3. Description of the process of preparing Thematic Assessment

The final thematic assessment is usually prepared through collecting and analyzing of existing documents and information through desk studies, questionnaire surveys, interviews, personal communications, group discussions, workshops, mini workshops, etc.

3.1 Desk study

Since some initiatives on capacity development in meeting the requirements under the United Nations Framework Convention on Climate Change (UNFCCC), have already been taken in the past, a desk study was conducted to collect some important documents related to

Climate Change. As a result of this exercise, the following documents / reports were collected.

- i. UNFCCC
- ii. Kyoto Protocol
- iii. NCSA resource kit
- iv. NCSA project proposal
- v. A guide for Self-Assessment of Country Capacity Needs for Global Environmental Management
- vi. Initial National Communication report prepared and submitted to UNFCCC in 2000
- vii. National Greenhouse Gas Inventory
- viii. National Environment Action Plan (NEAP) prepared in 1990 and updated in 2003
- ix. National Action Plan for Climate Change (NAPCC) prepared in 1999.
- x. Project reports / proceedings of the Climate Change enabling activity Phase I (1999 – 2001) and Phase II (2002 – 2004)
- xi. National Policy on CDM
- xii. Caring for the environment 2003 – 2007
- xiii. National Report of Sri Lanka to World Summit on Sustainable Development (WSSD) in 2002, which recognized the need to develop adaptation strategies to climate change and also to develop national strategies for carbon trading under the CDM.
- xiv. National Strategy Studies (NSS)
- xv. Project report / proceedings of the National Strategy Studies (NSS) on Climate Change 2002 – 2003)
- xvi. Proceedings of the National Consultative Workshop for the NCSA Project formulation (some capacity needs were identified during the workshop).
- xvii. Final project report of the National Climate Change, Public Awareness Information and Outreach in Sri Lanka, which was funded in 2002 by the Technical Support Unit (TSU) of Working Group III (WG III) of the IPCC.
- xviii. Annual Report 2004/2005 of Environmental Foundation Ltd.
- xix. Annual Report of Central Bank – 2005
- xx. Sri Lanka Energy Balance 2003

3.2 Questionnaire Survey

As the stakeholders are geographically distributed in different Districts in Sri Lanka, a questionnaire survey was conducted to gather information

on activities / programmes / projects of the individual departments / institutions / private sector and NGOs, who are identified as stakeholders in the thematic area of climate change. A copy of the questionnaire used is attached as Annex I.

3.3 Personal Communications / interviews

A number of personal communications was made with relevant institutes to gather information on the past and ongoing activities on climate change in their respective organizations and also to clarify some issues arising from the distributed questionnaire. A number of interviews were also conducted by visiting the stakeholders, who did not respond to the questionnaire in time.

3.4 Stakeholder Workshops /mini workshops

Four consultative workshops were conducted in preparing this Thematic Assessment. These were designed to collect basic information with regard to the Convention to prioritize the capacity needs under the requirements and to identifying constraints /underlying causes and typical interventions to overcome these problems. The detailed report of each consultative workshop is attached as an Annex I.

4. Conclusions and Recommendations

This thematic assessment discusses a number of capacity development areas or intervention efforts to improve the ability of individuals, institutions and systems to function in an effective, efficient and sustainable manner to address climate change issues in Sri Lanka with reference to the requirements of UNFCCC. The identified capacity interventions are summarized as follows;

At Systemic Level

1. *-Research Policies*
Formulate policies, legislations and strengthen the existing policies through CEPOMs / CIEDP or proposed NCSD to take up research, especially in assessing vulnerability and adaptation to climate change in more vulnerable sectors and developing and transferring technology to combat adverse impacts of climate change. –
2. *- Policy on data sharing and networking*
Formulate policies for sharing and networking of meteorological, climatological and climate change data and

information, through the CEPOMs / CIEDP or proposed NCSD.

3. *CDM Policy*
Implement draft CDM policy. –
4. *Provision for cadre increase*
Take necessary actions to increase cadre at national and sub national level or provincial level Departments and Institutions to take up relevant research and other relevant duties in an effective and efficient manner. –
5. *Change attitudes*
Change attitudes of higher level / Ministerial level or policy maker level officers to build consensus on climate change issues.
6. *Provision for Budgetary allocations*
Take necessary steps to make available budgetary allocations for expanding institutional capacities through purchasing necessary equipments and software for conducting research, executing training programmes, awareness raising programmes, etc. –
7. Create enabling environment to address climate change issues while maintaining sustainable development in the country.

At Institutional Level;

1. *Collaboration among institutes*
Create intra and inter institutional collaboration in addressing climate change issues.
2. *Data & information sharing*
Take necessary steps to establish databases, which could be shared and networked among relevant institutions
3. *Training facilities*
Provide training facilities, including trainer-trainee programmes, for staff members to conduct research, to execute climate model-data sharing and develop basic training curricula to address environmental issues.
4. *Research Agenda*
Formulate institutional research agenda to address environmental issues. –
5. *Decision making process*
Creation of institutional consultative decision-making process.

At Individual Level;

1. *Change attitudes*
Change attitudes of the individuals on climate change and their consequences by conducting awareness programmes.
2. *Skill development*
Research and scientific training on climate change and their consequences. -
3. *Feedbacks*
Developing appropriate mechanism to improve feedbacks in strengthening the cooperation between the individuals and institutions. -

5. References

A Guide for Self-Assessment of Country Capacity Needs for Global Environment Management, 2001, GEF Secretariat, USA.

A Guiding Frame for mainstreaming Biodiversity and development in to National Adaptation Programmes of Actions (NAPAs), 2004, IUCN-The World Conservation Union, Regional Biodiversity Programme, Asia, Sri Lanka.

Annual Report 2005, Central Bank of Sri Lanka, Colombo, Sri Lanka.

Basnayake, B.R.S.B., 2006, "Climate Change", 2nd Edition of the National Atlas of Sri Lanka, Department of Surveys, Colombo, Sri Lanka.

Basnayake, B.R.S.B. and Vithanage, J.C., 2004, "Rainfall change Scenarios for Sri Lanka under the anticipated Climate Change", Proceeding of the International Conference on Sustainable Water Management in the Changing Environment of Monsoon Region", Colombo, Sri Lanka, 17 – 19, November 2004. 1-8.

Basnayake, B.R.S.B. 2004, "Development of Rainfall and Temperature Scenarios for Sri Lanka", Climate Change Secretariat Working Paper No. 17, Study Report of the Climate Change Enabling Activity Phase II, Climate Change Secretariat (CCS), Ministry of Environment and Natural Resources, Colombo, Sri Lanka.

Caring for the Environment 2003 – 2007 – Path to Sustainable Development, Ministry of Environment and Natural Resources, Colombo, Sri Lanka.

Climate Change 2001; Impacts, Adaptation and Vulnerability, A report of Working Group II, Intergovernmental Panel on Climate Change (IPCC), Cambridge Press, United Kingdom.

Climate Change 2001; Mitigation, A report of Working Group III, Intergovernmental Panel on Climate Change (IPCC), Cambridge Press, United Kingdom.

Climate Change 2001; The Scientific Basis, A report of Working Group I, Intergovernmental Panel on Climate Change (IPCC), Cambridge Press, United Kingdom.

Climate Change in Sri Lanka, 2004, Project Terminal Report, Volume I, Climate Change Enabling Activity-Phase II Project, Climate Change Secretariat (CCS), Ministry of Environment and Natural Resources, Colombo, Sri Lanka

Final Report of IPCC WGIII Seminars, 2002, Centre for Climate Change Studies (CCCS), Department of Meteorology, Colombo, Sri Lanka.

Final Report of the Sri Lanka Climate Change Country Study, 1998, US Country Studies Programme, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Human Settlements and Public Utilities (HS & PU), Sectoral Action Plan for preparation of NAPCC, 1998, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Initial National Communication (INC) of Sri Lanka, 2000, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Initial Sub-Sectoral Draft on National Action Plan on Climate Change and Health – Sri Lanka, 1998, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Integrating the Rio Conventions into Development Co-operation, 2002, Organization for Economic Co-operation Development (OECD), France.

Jayathilake, H.M., Chandrapala, L., Basnayake, B.R.S.B. and Dharmarathna, G.H.P., 2004, "Water Resources and Climate Change", United Nations World Water Assessment Programme (UNWWAP)- Sri Lanka National Water Development Report and Country case study for World Water Assessment Programme, Ministry of Agriculture, Livestock, Lands and Irrigation in collaboration with UNWWAP.

National Capacity Self Assessment: Resource Kit, 2005, Global Support Programme, UNDP-GEF, USA.

National Capacity Self Assessment: A Resource Kit, 2004, Global Support Programme, UNDP, USA.

Preparation of National Action Plan (NAPCC), 1998, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Report to Assist in the Preparation of A National Action Plan on Climate Change, Sub sector - Forestry, 1998, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Sri Lanka Case Study on Inter-Linkages among Multilateral Environment Agreements (MEAs), Results of the Questionnaire, 2004, Untitled Nations University & University of Peradeniya.

Sri Lanka Energy Balance 2003, Energy Conservation Fund, Colombo, Sri Lanka.

Sri Lanka's Middle path to Sustainable Development in the 21st Century, 2002, National report of Sri Lanka to the WSSD, Ministry of Environment and Natural Resources, Colombo, Sri Lanka.

Methodological and Technological Issues in Technology Transfer, 2000, A special Report of the IPCC Working Group III, IPCC, Cambridge Press.

National Symposium on Climate Change - Symposium Report, 1998, National Committee of the International Geosphere-Biosphere Programme (IGBP), Colombo, Sri Lanka.

Understanding Climate Change; A beginner's guide to the United Nations Framework Convention and its Kyoto Protocol, 1999, United Nations Environmental Programme (UNEP) & UNFCCC, Switzerland.

United Nations Convention to Combat Desertification, 1996, UNCCD Secretariat, Germany.

United Nations Convention on Biological Diversity, Secretariat of the Convention on Biological Diversity, Montreal, Canada.

United Nations Framework Convention on Climate Change, 1999, Information Unit on Climate Change (IUCC), United Nations Environment Programme, Switzerland.

Working Paper to Assist in preparation on A National Action Plan on Climate Change, Energy, Industry, Transport & Highways, 1998, GEF-UNDP Enabling Activity on Climate Change, Ministry of Forestry and Environment, Colombo, Sri Lanka.

Annex I

1. Stakeholder Workshops /mini workshops

1.1 Stakeholder consultative workshop held on 1st September 2005

The Climate Change Stakeholder Workshop was held on 01st September 2005 at the Sri Lanka Foundation Institute with a view to discuss the questionnaires distributed among a wide range of stakeholders from different sectors for the purpose of gathering information on present status of systemic, institutional & individual coordination and participation in the implementation of United Nations Framework Convention for Climate Change (UNFCCC) in Sri Lanka, and identifying the capacity needs for meeting Sri Lanka's commitments under the UNFCCC.

The workshop began with a welcome and introductory speech by the Additional Secretary to the Ministry of Environment and Natural Resources, Mr. W.R.M.S. Wickramasinghe, and followed by the address of Mr. Anura Jayatilake, Director, Environmental Economics & Global Affairs Division, Ministry of Environment and Natural Resources and National Project Coordinator, on 'National Obligations under the Climate Change Convention'.

The Opening Session was concluded with a presentation on 'Introduction to the NCSA Project' by Mr. M Watson, National Project Manager for the NCSA Project.

The Technical Session commenced with a detailed explanation of capacity assessment and the questionnaire survey by Dr. Senaka Basnayake, Thematic Consultant – Climate Change. This was followed by a series of presentations from different sectors.

Dr. B.V.R. Punyawardena, Natural Resource Management Center, Peradeniya, dealt with the programmes relevant to the requirements of the UNFCCC in the agriculture and plantation sector.

Prof. Hemanthi Ranasinghe of the University of Sri Jayawardenapura, made a presentation on 'Forestry and Climate Change'. The presentation by the Industrial sector was done by Mr. Nimal Perera of Project SMED, Federation of Chambers of Commerce & Industry of Sri Lanka (FCCIISL), where he made reference to two major regional programmes on climate

change in which Sri Lankan industries had participated. The Energy and Transport sectors were covered Dr. T. Sugathapala, University of Moratuwa. Representing the Science and Monitoring Sector, Mr. L. Chandrapala of the Department of Meteorology, made a presentation on Climate Change related activities of the Department of Meteorology. Miss P.P.G. Dias of the Irrigation Department and Mr. K.A.W. Kodituwakku of the Water Resource Board made presentations on the Irrigation Sector and Ground Water Resources respectively.

In the Session after the lunch participants were grouped under the following themes for breakout group discussions and completion of the questionnaires.

- Group 1 - Agriculture / Plantation/Land/Water Resources
- Group 2 - Power, Energy & Transport/Industry/Private Sector
- Group 3 - Forestry / Wildlife /NGOs
- Group 4 - Science / Monitoring/Education/Forces
- Group 5 - Health / Animal Health/Urban Development / Fisheries / Coastal Resources/Tourism

Dr. B.V.R. Punyawardena, Mr. P.G.P. Joseph, Prof. Hemanthi Ranasinghe & Ms. Senani Perera, Mr. L. Chandrapala, and Mr. Suresh Kumar facilitated the respective group discussions in order to clarify and fill up the questionnaires.

The completed questionnaires were collected at the end of the group discussions.

1.2 Prioritization Workshop held on 27th January 2006

A Workshop on prioritization of Climate Change issues was held on 27th January 2006 at the Institute for Construction Training and Development (CETRAC) with a view to prioritize the capacity needs under the national obligations of the UNFCCC. Stakeholders from different sectors were invited for the workshop to prioritize the Climate Change issues.

The workshop began with Welcome and Introductory remarks by the National Project Coordinator of the NCSA Project & Director of the Environmental Economics & Global Affairs Division of the Ministry of Environment, Mr. Anura Jayatilake which was followed by an Introduction of the NCSA Project and the Objective of the Workshop by Mr. M Watson, National Project Manager for the NCSA Project.

Dr. B R S B Basnayake, Thematic Consultant - Climate Change, made a presentation on Convention Requirements and Prioritization Process.

The participants were invited to give their comments and suggestions at this stage. Dr. B.V.R. Punyawardena, Natural Resource Management Center, Peradeniya, explained his idea about the prioritization matrix and made the following suggestions;

1. There is no legal commitment for Sri Lanka to do mitigation. Mitigation of GHG is a lower option specially for the Agriculture sector in the context of development.
2. With regard to information and networking, including the access to databases held by institutes, this may be difficult as the institutes would like to maintain their identity and ownership of data.
3. Education, training and public awareness is an important area and can reduce vulnerability and damage.

Mr. Anura Jayathilake said that Sri Lanka is a non Annex I country and should look into national priorities when implementing the UNFCCC. While we can get benefits from the global community through Clean Development Mechanism (CDM), it also involves high up front cost.

The Technical Session commenced with a discussion of the prioritization matrix. The following were agreed by the participants.

1. To change the scale of problem as Local (Sub national), National, Regional, & Global levels.
2. To address present situation, under the scale of problem, level of concern and ability to adequately address the issues.
3. Level of concern and ability to addresses the issue should be used for priority ranking, but the ranking may be adjusted according to the situation which we are expecting in the future.
4. Fill the prioritization matrix individually according to their representative sectors.
5. Have a final workshop to conclude the priority ranking
6. Issue No 11 relating to Article 4.8 & 4.9 of the convention will not be considered since its implementation is relevant to developed counties.

During the discussion it was pointed out that CDM study centers were set up to determine emission factors, which is required for CDM proposals. The centers should also facilitate the stakeholders. The following were also decided,

1. Participation of the most important sectors like health, forestry and transport, should be ensured for the final workshop (Health sector- Dr. Shanmugarajah)

2. Cluster the sectors into the following groups,

1. Group 1- Energy, Industry, Transport, Urban development, Tourism
2. Group 2- Agriculture, Livestock, Plantation, Water Resources
3. Group 3- Health

1.3 Workshop on Identification of Capacity needs to implement UNFCCC, 27-28 February 2006

A Workshop on Identification of Capacity needs to implement UNFCCC was held on 27th & 28th February 2006 at the Pegasus Reef Hotel, Wattala with a view to identify the capacity needs to implement UNFCCC. Stakeholders from different sectors were invited for the workshop to identify the capacity needs & constraints.

The workshop began with Welcome and the Introduction to the NCSA Project by National Project Manager for the NCSA Project, Ministry of Environment, Mr. M Watson. This was followed by a presentation on the Prioritization matrix for Convention requirements by Dr. B R S B Basnayake, Thematic Consultant - Climate Change, where he explained the results of the prioritization process done at the previous workshop. (Attached)

The participants were invited to give their comments and suggestions with a view to finalize the prioritization matrix. After a long discussion the participants, agreed on a revised Prioritization Matrix. (Attached)

As a introduction to the Technical Session II, Dr. B R S B Basnayake, Thematic Consultant - Climate Change made a presentation on the Identification of capacity constraints, needs and opportunities and formats to be used for the group discussions to identify the sector wise capacity needs in details. It was decided to have two breakout groups as follows;

1. Group I - Agriculture, Livestock, Plantation, Water Resources, Forestry, Wildlife
2. Group II - Energy, Industry, Power, Coastal Resources, Transport, Health

The groups were facilitated by Dr. B V R Punyawardane & Mr. P G Joseph respectively. The members of the two groups were as follows;

Group I

1. Ms. Lithika Hapuarachchi
2. Dr. Lionel Gunaratne
3. Mr. K A W Kodituwakku
4. Dr. S P Nishsanka
5. Mr. D S Pattiarachchi
6. Mr. A.S. Premasundara
7. Dr. B.V.R. Punyawardane
8. Ms. Wasana Wijesuriya
9. Mr. Achala Nawarathna
10. Ms. K K Kasturiarachchi
11. Ms. Sujeewa Fernando

Group II

1. Mr. A M K B Attanayake
2. Mr. D R Gunarathne
3. Mr. P.G. Joseph
4. Mr. Anil Kumara
5. Mr. H S Premachandra
6. Mr. Asitha K. Senevirathna
7. Mr. I H Sumathipala
8. Ms Buddhimala P Mendis
9. Mr. Suresh Kumar
10. Mr. T H Karunatileke
11. Mr. A Jayathilake
12. Dr. S M Arnold

The discussion in groups continued on the second day of the workshop.

The final plenary session (Technical Session II) was chaired by Mr. Anura Jayatilake, Director & National Project Coordinator of NCSA project, Ministry of Environment. Dr. B R S B Basnayake, Thematic Consultant presented the two capacity constraints matrix done by the two groups, according to the prioritization requirements and invited comments. The following suggestions were made by the participants:

1. Regarding Requirement No. 1- Assessing Vulnerability and Adaptation.
 - a. Necessary to include the names of the relevant institutes for capacity development of the institute level.

- b. Survey Department has a mandate for contour surveys.
- c. Health sector inputs should be added, specially in view of the increase of vector-borne diseases due to Climate Change.
- d. Agriculture department & Meteorological department should be responsible for the drought and rainfalls plans and measures.

2. Regarding Requirement No. 4 - Research and systematic observations.

- a. Collaborative approach to address the issues is important because there is a lack of financial & physical resources. The collaborative effort of CEA & NBRO for the Air Quality monitoring is a good example of such collaboration.
- b. Poor allocation of funds from the Treasury for not showing the immediate impact to the society through the Research & Development.
- c. Available R & D information on specific areas should be compiled.
- d. Research institutes like CRI, RRI, SRI, TRI, NARA etc: play an important role and should be included in the recommendations.
- e. Ministry of Science and Technology has new direction that Research and Development organizations do not have to show profits.

3. Regarding Requirement No. 5 - Clean Development Mechanism (CDM)

- a. CDM study centers should have proper linkage with the Ministry of Environment to carry out their activities. Undergraduates and post graduate students can be mobilized to do research and projects at the CDM study centers in universities.
- b. Lack of sector specific GHG emission factors.

4. Regarding Requirement No. 6 – Strengthening of national focal point.

- a. Low priority is given by the national focal point (Ministry of Environment) compared with other environmental issues.

5. Regarding Requirement No. 7 - GHG inventories.

- a. No proper system to acquire data from the grass root level on extents cultivated.
- b. Use of IPCC default values to estimate the greenhouse gas inventories, resulting in overestimation of the values of above data.
- c. Lack of inter-institutional collaboration.

6. Regarding Requirement No. 8 – International negotiations.

- a. The need to have a technical representative for international negotiation.
- b. Lack of clear policy on relevant matters by the Foreign Ministry policy affects the ability to negotiate.
- c. Since Sri Lanka has negligible amount of GHG emissions compared to other developing countries like India, we do not have bargaining power in the international negotiations. There should be collaboration with other regional countries and continuous informal dialogue with SARRC countries.

7. Regarding Requirement No. 11 - Developing national climate change programmes.

- a. Weak coordination among the local institutes.
- b. Urgent need to create awareness among policy makers.

8. Regarding Requirement No 12 - Information and networking.

- a. Lack of inter-institutional collaboration.
- b. Policies and attitudes of the institutes have to change for improved sharing of data.

1.4 Roundtable Meeting to finalize the capacity needs to implement the UNFCCC, 10th March 2006

A roundtable meeting was held at the auditorium of the CEA on the 10th March 2006 to finalize the capacity needs under the Convention. A detail discussion was carried out in specific capacity needs under each requirement with diversified group of stakeholders from various sectors, namely, agriculture, livestock, plantation, tourism, water resources, health, etc.

ANNEX II

Questionnaire Survey **for gathering information on present status of systemic,** **institutional and individual coordination and stakeholder** **participation in UNFCCC implementation in Sri Lanka**

1. Name of the Ministry/ Department/Institution/NGO:
.....
2. Contact Information:
- i. Address:
- ii. Telephone No. iii. Fax. No.
- iv. Email address:
3. Does your organization have any activities / Programmes related to climate change?

Yes

☐

No

☐

4. If yes, please list down the activities / programmes.

	Activities / Programmes	Conducted on	Duration
1			
2			
3			
4			
5			
6			
7			
8			
9			

5. Is your organization mandated to carry out such activities / Programmes on climate Change?

Yes

☐

No

☐

6. Does your organization liaise with any other institution in carrying out these activities / programmes?

Yes

☐

No

☐

7. If yes, please list down the activities / programmes jointly coordinated.

	Institutions	Activities / Programmes	Conducted on
1			
2			
3			
4			
5			
6			
7			

8. What are the legal instruments / policies in effect in your organization, which are relevant to climate change activities / programmes?

	Legislations	Policies
1		
2		
3		
4		
5		
6		
7		
8		

9. Does your organization have any activities / programmes, which are related to the requirements (listed below) under the UNFCCC?

	Requirements under the UNFCCC	Activities/Programmes	Conducted on
1	Developing national climate change programmes		
2	Assessing vulnerability, Impacts and Adaptation to climate change		
3	Developing and implementing adaptation plans and measures		
4	Assessing mitigation options to climate change		
5	Research and systematic observation of climate change and other functions		
6	Education, training and public awareness raising		
7	Preparing National Communications		
8	Preparing greenhouse gas inventories and managing emission database		
9	Clean Development Mechanism (CDM)		
10	Developing and transferring Technology		
11	Information and networking including databases		
12	Improved decision making, including assistance for participation in international negotiations		

10. What are the mechanisms / strategic plans to implement the above activities / programmes under the above convention?

	Activities	Mechanisms/Strategic plans
1		
2		
3		
4		
5		

11. Are there any capacity development components involved in these activities / programmes?

Yes

☐

No

☐

12. If yes, please specify in which level (individual, institutional or systemic)

	Activities / Programmes	Individual	Institutional	Systemic
1				
2				
3				
4				
5				
6				
7				

Individual level - capacity building refers to the process of changing attitudes and behaviors, most frequently through imparting knowledge and developing skills through training.

Institutional level - capacity building is concerned on overall organizational performance and functioning capabilities, as well as ability of organization to adapt to change.

Systemic level - capacity building is concerned with the creation of “enabling environment”, i.e. the overall policy, economic, regulatory and accountability framework within which institutions and individuals operate.

13. What are the outcomes / recommendations of such activities / programmes? Please give the details of the available proceedings, reports, documents, etc.

	Activities/ Programmes	Proceedings/Reports/Documents
1		
2		
3		
4		
5		
6		
7		
8		

14. Any capacity development needs identified in your organization under each requirement? If yes, please mark "X" in appropriate boxes.

	Requirements	Function No. 1* (A)	Function No.2* (B)	Function No. 3* (C)	Function No. 4* (D)	Function No. 5* (E)
1	Developing National climate change programmes	1A	1B	1C	1D	1E
2	Assessing Vulnerability, Impacts and Adaptation to climate change	2A	2B	2C	2D	2E
3	Developing and implementing adaptation plans and measures	3A	3B	3C	3D	3E
4	Assessing Mitigation options to climate change	4A	4B	4C	4D	4E
5	Research and systematic observation of climate change and other functions	5A	5B	5C	5D	5E
6	Education, Training and Public awareness raising	6A	6B	6C	6D	6E
7	Preparing National Communications	7A	7B	7C	7D	7E
8	Preparing greenhouse gas inventories and managing emission database	8A	8B	8C	8D	8E
9	Clean Development Mechanism (CDM)	9A	9B	9C	9D	9E
10	Developing and transferring Technology	10A	10B	10C	10D	10E
11	Information and networking including databases	11A	11B	11C	11D	11E
12	Improved decision making, including assistance for participation in international negotiations	12A	12B	12C	12D	12E

* Functions to be performed to meet the requirements

Function N0.1 = Capacity to conceptualize and formulate policies, legislations, strategies

and programmes

Function No. 2 = Capacity to implement policies, legislations and strategies

Function No. 3 = Capacity to engage and build consensus among all stakeholders

Function No. 4 = Capacity to mobilize information and knowledge

Function No. 5 = Capacity to monitor, evaluate, report and learn

15. Please give the details of the identified capacity needs.

	Details of the capacity needs
1A	
2B	
3C	

16. Any capacity constraints / underlying causes identified in your organization under each requirement? If yes, please mark “X” in appropriate boxes.

	Requirements	Function No. 1* (A)	Function No.2* (B)	Function No. 3* (C)	Function No. 4* (D)	Function No. 5* (E)
1	Developing National climate change programmes	1A	1B	1C	1D	1E
2	Assessing Vulnerability, Impacts and Adaptation to climate change	2A	2B	2C	2D	2E
3	Developing and implementing adaptation plans and measures	3A	3B	3C	3D	3E
4	Assessing Mitigation options to climate change	4A	4B	4C	4D	4E
5	Research and systematic observation on climate change and other functions	5A	5B	5C	5D	5E
6	Education, Training and Public awareness raising	6A	6B	6C	6D	6E
7	Preparing National Communications	7A	7B	7C	7D	7E
8	Preparing greenhouse gas inventories and managing emission database	8A	8B	8C	8D	8E
9	Clean Development Mechanism (CDM)	9A	9B	9C	9D	9E
10	Developing and transferring Technology	10A	10B	10C	10D	10E
11	Information and networking including databases	11A	11B	11C	11D	11E
12	Improved decision making, including assistance for participation in international negotiations	12A	12B	12C	12D	12E

*Functions to be performed to meet the requirements

Function NO.1 = Capacity to conceptualize and formulate policies, legislations, strategies.and programmes

Function No. 2 = Capacity to implement policies, legislations and strategies.

Function No. 3 = Capacity to engage and build consensus among all stakeholders.

Function No. 4 = Capacity to mobilize information and knowledge.

Function No. 5 = Capacity to monitor, evaluate, report and learn.

17. Please give the details of the identified capacity constraints / underlying causes

	Details of the Capacity constraints/underlying courses
1A	
2B	
3C	

18. Does your organization have any financial resources allocated to execute projects / programmes / activities with regard to above requirements of the UNFCCC. If yes, please give details.

.....

19. Specify the areas / projects / programmes where the funds are needed to minimize the adverse effects of climate change and to implement response strategies.

.....

20. Any other relevant information. Please specify.

.....

