

PROJECT PROPOSAL

PART I: PROGRAMME INFORMATION

PROGRAMME: **Regular**

COUNTRY: **Sri Lanka**

TITLE OF PROJECT: **Reducing Vulnerability of Communities and Ecosystems to the Adverse Impacts of Climate Change in Critical River Basins of Sri Lanka**

TYPE OF IMPLEMENTING AGENCY: **Multilateral Implementing Agency**

IMPLEMENTING ENTITY: **World Food Programme**

EXECUTING ENTITIES: **Ministry of Environment in coordination with the Ministry of Agriculture and Ministry of Agrarian Services and Wildlife**

AMOUNT OF FINANCING REQUESTED: **US\$ 7,982,555 (over 3 years)**

■ PROJECT BACKGROUND AND CONTEXT

Geographic, Environmental and Socioeconomic Context

While Sri Lanka is a lower middle-income country and performing well against a number of Millennium Development Goals (MDGs), poverty, food insecurity and under-nutrition are still persistently high in lagging regions, including in the districts that are the target of this project. This has been exacerbated by heavy flooding in January and February, 2011, and, as evidenced below, climate change impacts are only expected to get worse. Of course, there is also a huge task for reconstruction and recovery in conflict-affected areas, which means that the provision of external resources to address climate change impacts are more necessary than ever.

On the basis of rainfall distribution, Sri Lanka is classified into three climatic zones: the Wet, Dry and Intermediate Zones. The Wet Zone covers the south-western region including the central hill country and receives relatively high mean annual rainfall over 2,500 mm without pronounced dry periods. The Dry Zone covers predominantly the northern and eastern part of the country, receives a mean annual rainfall of less than 1,750 mm with a distinct dry season from May to September. The Intermediate Zone receives a mean annual rainfall between 1,750 to 2,500 mm with a short and less prominent dry season.

Ensuring food security is the core principle behind the development of the agriculture, fisheries and irrigation sectors in Sri Lanka's national development agenda. This thrust is further bolstered by the emphasis on nutrition in the health sector. Agriculture accounts for a little over 20 percent of GDP and provides nearly 70 percent of the rural employment. More than half of Sri Lanka's food grain production is dependent on irrigated rice. Irrigation is the major user of fresh water consuming over 90 percent of the total annual available water.

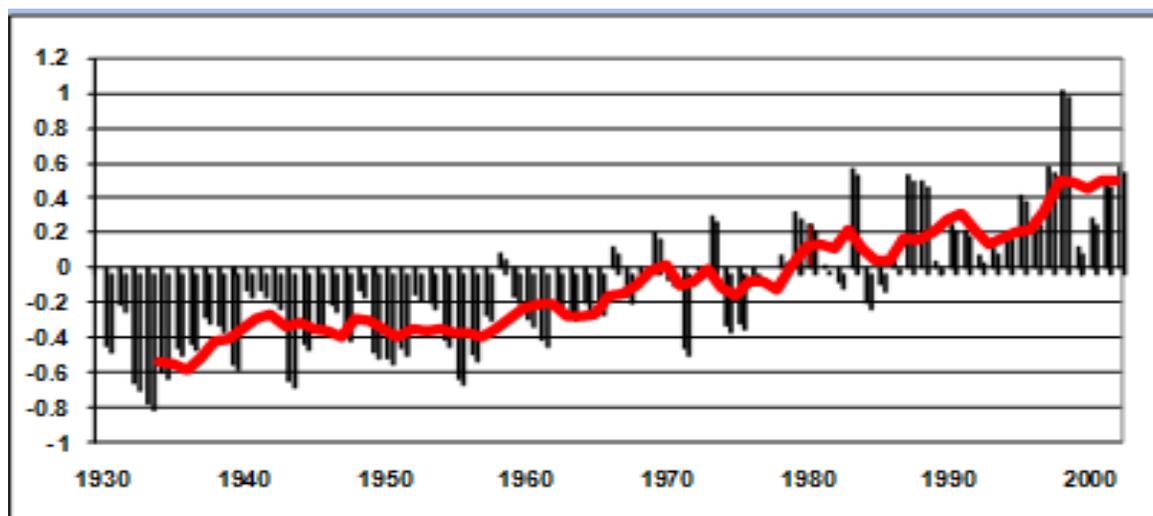
Approximately 44 percent of the paddy on which Sri Lankan food security depends is irrigated under major irrigation schemes and 24 percent under minor irrigation schemes, and the bulk of this land is in the Dry and Intermediate Zones where the proposed project is located. Rice is the staple food of over 20 million Sri Lankans and provides a livelihood for almost 2 million farmers. More than 30 percent of the total labor force is directly or indirectly involved in the rice sector. Sri Lanka produces about 3.1 million tons of paddy annually with a national average yield of 4.0 t/ha. With the current population growth rate of 1.1 percent, Sri Lanka will need about 4.2 million tons of paddy by the year 2020, which is an increase of about 35 percent.

This project will focus on the manifestations of climate change in key river basins of Sri Lanka which are expected to have the greatest impact on local and national food security, namely: increases in the frequency and intensity of floods and landslides, variability and unpredictability of rainfall, and to a lesser extent and increase in air temperature. These will have the most significant impacts on the water needed for the major food growing basins of Sri Lanka. The adequacy of water supply for food security depends on the supply of water in the source catchments and storage in surface and ground water. This, in turn, depends on an effective tree cover for intercepting rain, sustainable land management to retain soil water, and means to insure adequate water storage. These areas form the pillar of the proposed set of adaptation interventions.

Problem Statement: The Climate Change-induced Problem

There is strong statistical evidence that Sri Lanka's climate is changing. Time series of annual mean temperature anomalies from 1871-1990 show a significant warming trend at most places in the country during the latter half of this period. The rate of increase in temperature from 1961 to 1990 is about 0.016 °C per year, while the global average for the period 1956-2005 is 0.013 °C per year. According to Chandrapala (2010)¹, since 1960, the temperature rise in Sri Lanka is in the order of 0.16°C per decade (Figure 1). Seasonal mean temperatures for the Yala (April–September) and the Maha (October–March) agricultural seasons also display similar warming. Mean (annual and seasonal) daytime maximum and mean (annual and seasonal) nighttime minimum air temperatures have both increased during the period 1960-2001 with trends of 0.026 °C and 0.017 °C per year, respectively.

Figure 1: Change in Mean Annual Temperature in Sri Lanka 1930 to 2000 (Chandrapala 2000)



There is strong higher variability in monthly precipitation and a declining trend in Sri Lanka's overall mean annual precipitation (MAP) during the last century. There are four rainfall seasons in Sri Lanka: (i) the northeast monsoon season (NEM) during December to February; (ii) the 1st inter-monsoon season (IM1) in March and April; (iii) the southwest monsoon season (SWM) during May to September; and (ii) the 2nd inter-monsoon season (IM2) in October and November. Monsoon rains accounts for nearly 55 percent of annual precipitation. The El Niño-Southern Oscillation (ENSO) also influences the country's rainfall. Recent studies have estimated a decrease in MAP by 144 mm (7 percent) during the period 1961-1990 compared to that for 1931-1960. There is also a wide disparity in the magnitude of changes in different rainfall seasons and spatial locations. Although no significant changes in rainfall amount have been observed during the SWM (mean 546 mm) and IM2 (mean 548 mm), rainfall in the NEM (the Maha season when the majority of

¹ Lalith Chandrapala (2009) *Climate Change and Sri Lanka*, Seminar on Climate Change and Food Security, Ministry of Disaster Management and Human Rights, Colombo, Sri Lanka,

agricultural areas in the country receive rainfall - mean 459 mm) and IM1 (mean 260 mm) has decreased, with NEM showing increased variability. The variability in seasonal rainfall is illustrated in Table 1. (See Annex 5 for further detail)

Table 1: Coefficient of Variation of Seasonal Rainfall in Sri Lanka (Department of Meteorology)²

Season	1931-1960	1961-1990
First Inter Monsoon Season	23%	27%
South West Monsoon Season	21%	16%
Second Inter Monsoon Season	22%	23%
North East Monsoon Season	31%	42%
Annual	11%	14%

The unpredictability and extreme nature of rainfall have been evident in the recent rainfall events in Sri Lanka. Since end-December 2010, the country has experienced its highest level of rainfall in almost 100 years. There was especially heavy rainfall in the early part of 2011, with consequent flooding in many areas of the country. The worst case of flooding occurred in mid-January in the Eastern Province, with Batticaloa Town experiencing its third highest ever level of rainfall in a single day (312.3mm). Overall, the flooding in the Eastern Province was the worst since 1913. Parts of the Northern, North Central, North Western, Central, Uva and Sabaragamuwa Provinces were also affected.

The Government believes that 50 percent of agricultural land (or 400,000 ha) was affected by the floods, that the country could lose 15-20 percent of its food harvest, and that the country lost 1.2 percent of its GDP. Also, according to the Sri Lanka Disaster Management Centre (DMC), more than one million people (260,000 families) were affected.

The impact of the rain could have been cushioned had the water catchments been adequately covered with trees and small tanks functioned at full capacity, and the proposed project will focus addressing these gaps.

Climate projections indicate that CC impacts in Sri Lanka are likely to be higher in the Dry Zone, especially in the Northeast and the East, where agriculturally intensive areas are located and are already experiencing water stress. The expected changes may lead to an increase in the Maha (wet) season irrigation water requirement for paddy by 13-23 percent by 2050 compared to 1961- 1990. Observed and projected reduction in rainfall in the Central Highlands is likely to create conflicts between irrigation water supply and hydropower generation from the multipurpose Mahaweli scheme (supplying 23 percent of irrigation water to major irrigation schemes and 29 percent of national power generation).

The expected impacts on water resources and the agriculture sector may trigger serious impacts on the country's food production, livelihoods and the economy. A

² Department of Meteorology: Personal Communication by Dr. Punniyawardane, Natural Resources Management Centre, Department of Agriculture, Peradeniya, Sri Lanka.

recent study finds Sri Lanka to be one of the hotspots of food insecurity in the Asia-Pacific region (ESCAP 2010). Prolonged and more frequent drought is expected to reduce the availability of water for irrigation and this in turn could lead to a drop in crop production. Rice cultivation in major irrigation schemes will be substantially affected in severe drought years while production in other major and minor irrigation schemes will show significant shortfalls with greater frequency than in the past. The combined effect of higher temperatures and less rain is projected to lead to a greater than 11 percent loss in revenue from paddy by 2050 (Munasinghe Institute, 2010). A number of other field crops, including coarse grains, grain legumes, oil seeds and condiments are grown on rain-fed upland areas in the Dry Zone. The production of these crops will also be adversely affected by fluctuations in rainfall.

According to the International Water Management Institute (IWMI, 2010)³ the farming districts on which this project will focus - including Nuwara-Eliya, Ratnapura and Anuradhapura Badulla, Matale and Polonnaruwa - are more sensitive to climate change than the rest of the country due to existing soil erosion (up to 60 percent of the land area in Nuwra-Eliya district is affected) and heavy reliance on primary agriculture (see Figure 2). Coupled with their low infrastructural and socioeconomic assets and high level of exposure to flooding hazards (some of the highest rainfalls in Sri Lanka have been experienced in the last two decades in these districts), these areas are the most vulnerable to adverse impacts of climate change. (See Annex 6 for details)

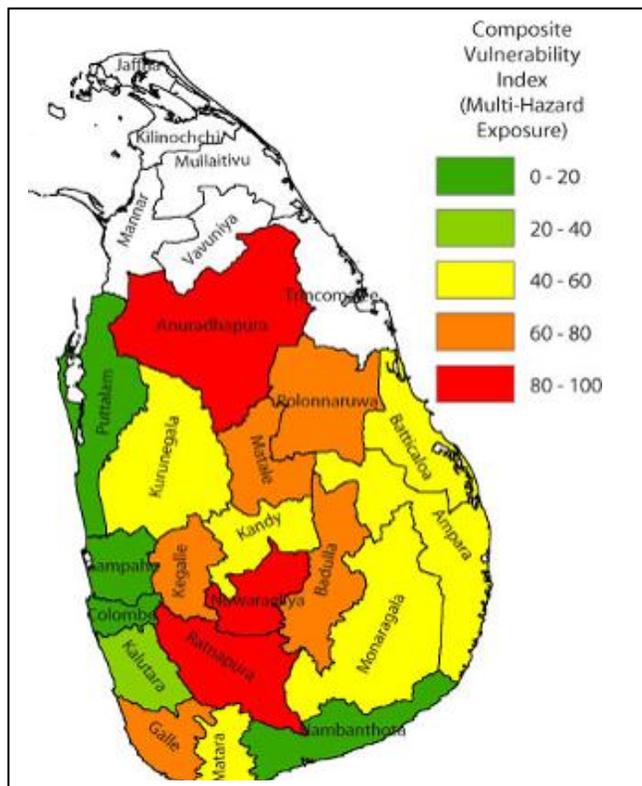


Figure 2: District Level Vulnerability Index for Multi-Hazard Exposure

³ The study attempts to identify the country's agricultural vulnerability hotspots through the development of a Vulnerability Index consisting of three indices, namely, Exposure, Sensitivity and Adaptive Capacity. The study further sub divided the exposure index into sub-indices, namely, flood hazard, drought hazard and cyclone hazard and a fourth index called the multi-hazards, (combining the drought, flood and cyclone hazards). Vulnerability was mapped at the district levels

Barriers to Addressing the Climate Change-Induced Problem

The proposed project focuses on the country's forests and historical tank systems as a critical buffer against climate impacts, especially food insecurity. Sri Lanka's forests and tank systems play an important regulating role with regard to water on which the country critically depends for its food staple, irrigated rice (and also power generation and drinking water). Forests and reservoirs have also directly provided for livelihoods of the poorest people in the upland and dryland areas.

Over the years, illegal logging, collection of timber for cooking and heating, and shifting cultivation has reduced forest cover from 44 percent of land area in 1956 to 24 percent in 1992 and 23 percent in 1999. In 1999, the total forest cover of the island was reported to be 1.94 million ha (Figure 3). Of this, dense forest cover was 1.47 million ha and sparse forest cover was 0.47 million ha. Since that time, estimates are that forest cover has been further reduced by 2-3 percent.

Figure 3: Sri Lanka Forest Cover in 1999 (Source: Forest Department)



Successive governments have taken steps to conserve forests and introduce laws and regulations to control deforestation and forest degradation. Over the past few years, the Government has put in place a National Forest Policy and Forest Sector Master Plan as well as a National Watershed Management Policy and various strengthened regulations on land use. And it has recently significantly improved its capacity for effective enforcement of laws governing land and water resources. Last year, H.E. the President announced that the replanting of barren hilltops was a matter of national priority and has banned human incursion in areas 1,500 meters above mean sea level.

Notwithstanding this commitment and the attention to sustainability of forests through enforcement of regulations, the impact of increasing frequency and intensity of the northeast monsoon on the drier (northeast) steep hilltops and catchment areas of the island poses a critical threat to the retention of water in key river basins and the availability of water for the main food growing areas of the country.

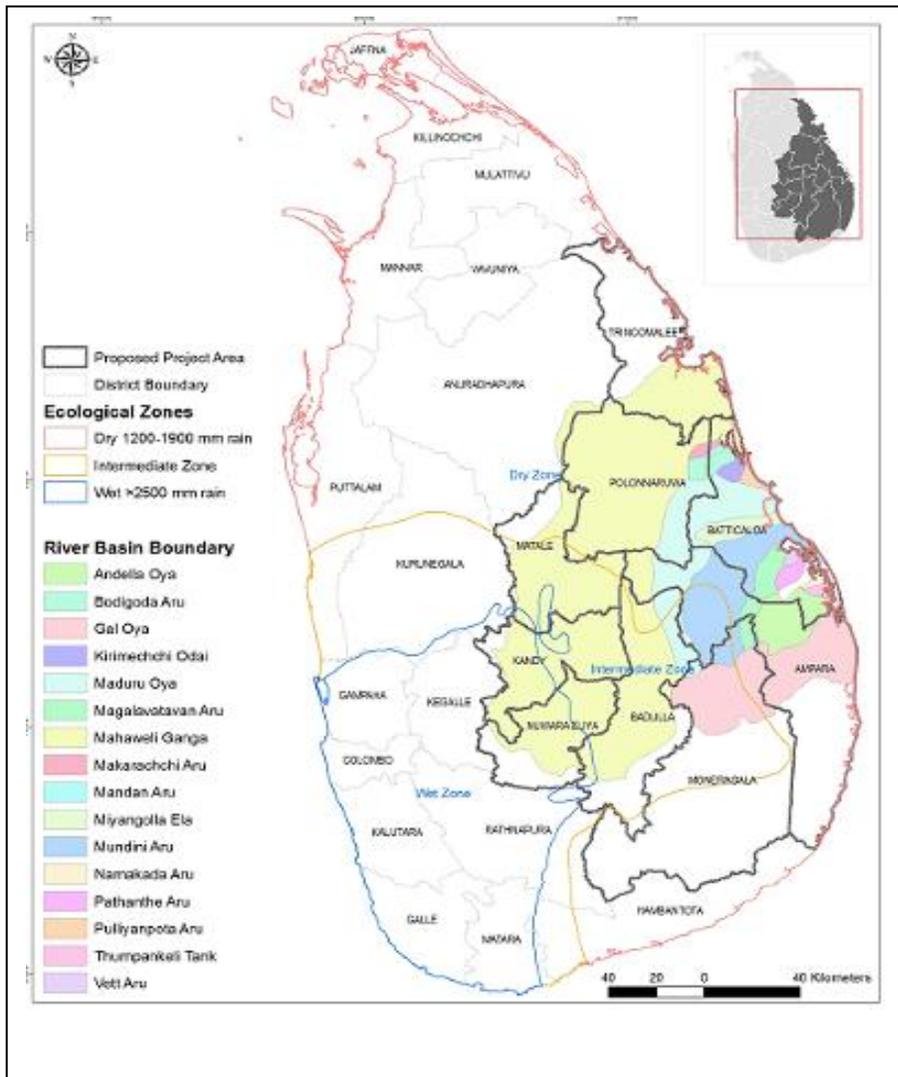
Increased water requirements will need to be met from large and small tanks (dams) numbering some 10,000 (about half the number of tanks in the country) and another 40,000 diversion systems. The majority of tanks are not fully functional as a result of siltation, which is in large part due to soil erosion in the upper catchments. Soil transported through runoff ranges from 13,000 – 830,000 tons per annum in the Upper Mahaweli Catchment Area. In the Nuwera-Eliya district, which has the highest rainfall, erosion leads to a loss of nearly 75 tons per ha per annum. This situation will be aggravated by more severe and prolonged dry and wet spells. Both can be substantially mitigated by the restoration of tree cover and improvements in soil management practices.

The Project and Target Locations

The proposed project aims to reduce the vulnerability of communities and ecosystems to the adverse impacts of climate change in the most susceptible and sensitive river basins in Sri Lanka. It will focus on protecting and sustaining water provision services and strengthening community resilience through reforestation and soil conservation, sustainable energy services, agro-forestry and soil-water management, and awareness and skills building.

The project will be implemented in two major basins and a number of smaller basins that occupy the central and eastern which comprise the most sensitive part of the country to climate change impacts on food and water security (see Figure) The project covers a contiguous land area of 16,800 sq km comprising 9 administrative districts, namely, Nuwara-Eliya, Badulla, Kandy, Matale, Anuradhapura, Monaragala, Polonnaruwa, Trincomalee, Batticaloa, and Ampara. Socio-economic data and climate change vulnerability indices of these districts are given in Table 2.

Figure 4: Project Area – Showing the Location of Key River Basins



Within the project area, the poorest of the poor live in the catchment areas, and, compared to their downstream counterparts, they do not benefit equally from development projects and economic investments. At the same time, these people are called upon to sacrifice their access to natural resources (wood) in order to protect the upper watershed, the benefit of which is enjoyed by downstream farming and urban populations - and indeed, with regard to availability of food for the nation as a whole. Almost half of the paddy on which Sri Lankan food security depends is irrigated under major irrigation schemes and 24 percent under minor irrigation schemes, with the largest irrigated areas located in the Dry and Intermediate Zones which comprise the project area.

Table 2: Characteristics of the Project Area

	Nuwara-Eliya	Badulla	Kandy	Matale	Polonnaruwa	Trincomalee	Monaragala	Ampara	Batticaloa
Agro-climatic zone³	Wet Zone	Intermediate Zone	Wet Zone	Intermediate Zone	Dry zone	Dry zone	Dry zone	Dry zone	Dry zone
Land area (sq km)⁴	1741	2861	1940	1993	3293	2727	5739	4415	2854
Agriculture land (ha)⁵	70940	66600	59550	38540	66360	28180	53290	76108	50771
Forest lands (ha)	53740	54160	33225	84024	138840	131440	235180	116070	52850
Population⁶	749000	861000	1396000	483000	400000	361000	430000	624000	530000
Population engaged in agriculture in %	63.2	55.2	18.8	39.3	55.9	NA	63.2	NA	NA
Poverty Index⁷	23	37	25	30	24	NA	37	NA	NA
Vulnerability Index⁸	80 to 100	60 to 80	40 to 60	60 to 80	60 to 80	NA	40 to 60	40 to 60	40 to 60

³ Predominant agro-climatic zone

⁴ The value represents the total area of the district. The entire district area is not necessarily included in the project area due to non-matching of district and river basin boundaries

⁵ Includes only paddy, Tea, Coconut, Rubber and Field Crops

⁶ Estimated 2008 figure

⁷ Percentage population below poverty line

⁸ Vulnerability ranges: 100 to 80- highly vulnerable; 80 to 60 vulnerable; 60 to 40 medium vulnerability; 20-40 low vulnerability and 0-20 minimum vulnerability

■ PROJECT / PROGRAMME OBJECTIVES:

The **overall goal** of the proposed project is *to reduce the vulnerability of communities and ecosystems to the adverse impacts of climate change in critical river basins in Sri Lanka*

The Government has put in place relevant policies, strategies and regulations, such as a National Climate Change Adaptation Policy and Strategy and a set of complementary policies that deal with forest conservation, watershed management, water resources development and food security. *Having formulated these, the urgent need now is for concrete actions. The following four sets of interventions are proposed:*

1. Protecting and sustaining the natural resilience functions of critical ecosystems by reforestation and soil conservation;
2. Strengthening the resilience of communities through sustainable energy services
3. Strengthening community resilience through adaptive agro-forestry and soil-water management; and
4. Strengthening the awareness and skills of communities, government, and non-government organizations to effectively address climate change induced risks in local development planning

The **overall objective** of the project is *to enhance the resilience of vulnerable communities and ecosystems to climate change impacts through conservation, sustainable agro forestry, knowledge generation, and capacity building of communities and local service providers.*

The project components, and corresponding specific objectives, are presented below:

Component 1: Protecting and sustaining the natural resilience functions of critical ecosystems by reforestation and soil conservation.

Specific Objective 1: To conserve critical ecosystems within the project area through reforestation, soil conservation, and other complementary measures which restore ecosystem integrity, functions and services thereby increasing the resilience of the ecosystems to climate change impacts.

Component 2: Strengthening the resilience of communities through sustainable energy services.

Specific Objective 2: To strengthen the adaptive capacity of watershed communities within the project area to climate change impacts through energy services which maintain protective functions of their surrounding eco systems.

Component 3: Strengthening community resilience through adaptive agro-forestry and water management.

Specific Objective 3: To strengthen the adaptive capacity of watershed communities within the project area through sustainable agro forestry and conservation of fresh water resources.

Component 4: Strengthening the awareness and skills of communities, government, and non-government organizations to effectively address climate change induced risks in local development planning.

Specific Objective 4: To map vulnerability hotspots within the project area and increase knowledge and capacity of communities, CBOs, and local-level officers and NGOs to manage climate impacts on ecosystems and risks affecting the livelihoods and food security of communities.

■ PROJECT COMPONENTS AND FINANCING

The outcomes in the following framework have been formulated in alignment with the 'Project Level Results Framework and Baseline Guidance Document' of the Adaptation Fund Board, summarized in AFB/EFC.4/3 from March 10, 2011. **For an output-based budget, please refer to Annex 1.**

Table 3: Project Components, Expected Outputs, Outcomes and Financing

COMPONENTS	EXPECTED OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US\$)
1. Protecting and sustaining critical ecosystems by reforestation and soil conservation	<p>1.1. 1000 ha of degraded lands in high and medium elevations of upper watersheds reforested and protected as conservation areas.</p> <p>1.2. Soil conservation measures (physical, biological and engineering) implemented in 30,000 ha of lands in upper catchments.</p> <p>1.3. 300 km of river banks stabilized by planting trees together with low-cost engineering structures</p> <p>1.4. Communities engaged and educated, and forest fire belts developed, to protect 3,000 ha in areas with a history of frequent fire damage</p> <p>1.5. 800 km of natural forest boundaries surveyed, demarcated and declared as conservation areas.</p> <p>1.6. 300 ha of mangrove habitats rehabilitated and protected in sensitive coastal ecosystems.</p>	Increased ecosystem resilience in response to climate change and variability-induced stress	3,414,000

<p>2. Strengthening the resilience of communities through sustainable energy services</p>	<p>2.1. 750 ha of small timber farms established in mid and low altitude catchments to preserve natural resilience of surrounding forest ecosystems.</p> <p>2.2. 200 hectares of agro forestry fuel woodlots established</p> <p>2.3. Focusing on rural women, 20,000 individuals will receive fuel efficient wood stoves.</p>	<p>2. Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas</p>	<p>1,295,000</p>
<p>3. Strengthening community resilience through adaptive agro-forestry and soil-water management</p>	<p>3.1.1. Establishment of 12,000 climate resilient home gardens, covering an area of 2,400 ha.</p> <p>3.2. 50 village nurseries established to produce 750,000 plants for the diversification of livelihoods and improvement of soil quality in a changing climate</p> <p>3.3 Rehabilitation of 50 communal water reservoirs to improve water collection and storage capacities in 50 communities.</p>	<p>3. Improved food security, water security and nutritional status of vulnerable community groups</p>	<p>1,785,000</p>
<p>4. Strengthening the awareness and skills of communities, government, and non-government organizations to effectively address climate change induced risks in local development planning</p>	<p>4.1. Climate risk mapping conducted to identify climate change vulnerability hotspots in the project area.</p> <p>4.2 Water resource inventories and management plans developed for at least 100 vulnerable communities in climate change hot spots</p> <p>4.3 Awareness campaign for communities living in climate change hotspots conducted to increase understanding of climate change risks and enable access to adaptation practices and resources</p>	<p>4. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level</p>	<p>290,000</p>

	4.4 National, district and local government planners are trained to integrate climate change adaptation into local development planning		
Project execution cost (9.5 percent)			644,480
Total project cost			7,428,480
Project cycle management fee (7.5 percent)			554, 075
Amount of Financing Requested			7,982,555

■ PROJECTED CALENDAR:

Table 4: Milestones

MILESTONES	EXPECTED DATES
Start of project Implementation	November, 2011
Midterm review	May, 2013
Project closing	October, 2014
Terminal evaluation	January, 2015

■ PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Project Components

Basic Strategy of the project:

The project is anchored on the sound premise that the country's forests provide a critical buffer against climate change impacts. A permanent vegetation cover consisting of forests and trees constitute the best defense against climate change impacts in the Dry and Intermediate Zones¹¹. Forests in Sri Lanka play an important regulating role with regard to water on which the country depends for irrigation, power generation and drinking water. Forests and trees also provide for livelihoods of the poorest people.

The project adopts a three-pronged strategy in reducing the vulnerability of communities and ecosystems to climate change impacts: 1) a conservation based strategy whereby the ecosystem is protected by permanent vegetative cover by reforestation, tree planting and soil conservation measures; 2) an agro forestry based strategy whereby food and water security, livelihood and socio-economic welfare of the communities are strengthened, while concurrently protecting the catchments; and 3) a

¹¹ The Center for International Forestry Research (CIFOR) recommends that nations should include forests in climate change adaptation policies and programs for two reasons: (a) because they are vulnerable; and (b) because they play a key role in reducing the vulnerability of society to losses from climate change. Embedded in these principles are the twin goals of ensuring that forestry policy and practice adequately address the need to protect forest-dependent livelihoods from adverse climate change and that adaptation strategies adequately incorporate improved forest management

capacity building strategy which enhances the knowledge on adaptation to climate change and builds the capacity of communities and service providers to cope with the impacts of climate change.

The project will address socio-economic issues in the watershed areas, including access to common property resources, land tenure, gender, and equity. The project will empower communities to acquire ownership of resources, make decisions on how to manage natural resources in watersheds and encourage participation in project activities through incentives.

Community empowerment and ownership are key elements of the proposed project. Project implementation planning and execution will be done at the community level, often by the communities themselves. The primary beneficiaries of the project are the communities who live in the catchment areas. They will directly benefit from payments for planting trees on hill tops, catchment areas, canal banks and mangrove areas, and they will be provided a package of planting materials for home garden improvement and community woodlots. Community participation will be facilitated through mobilizing communities on a individual and household basis as well as through grouping them into self-help groups and community based organizations. Table 5 presents estimated direct beneficiaries of the project.

Table 5: Estimated Direct Beneficiaries of the Project

Components/Outputs	Project Intervention	Direct Beneficiaries
Component 1		
Outputs 1 to 6	Payment of 100 percent labor cost to participating community members for tree planting in conservation areas	More than 45,000 individuals from the project area
Component 2		
Output 1	Timber Farms	2,000 individuals
Output 2	Fuel woodlots	1,500 individuals
Output 3	Recipient of stoves	20,000 individuals
Component 3		
Output 1	12,000 climate resilient home gardens	12,000 households
Output 2	Village nurseries and livelihoods in 50 communities	2,000 individuals
Output 3	Rehabilitation of 50 communal reservoirs	3,000 individuals
Component 4		
Output 1	Climate risk hotspots identification	50 communities and planning agencies at district level
Output 2	Water resource inventories and management plans	50 communities
Output 3	Mainstreaming CCA by local Govt., NGO and community leaders	600 stakeholders

Indirect beneficiaries will include the farming population downstream of the watersheds where project interventions are to be implemented (nine districts in the

central and eastern region of the country) an estimated 1.5 million people. The project will further indirectly benefit a population of over 2.5 million who are susceptible to flooding in the low-lying and flood susceptible areas of the nine districts. In terms of overall improved food and water security and reliable and affordable power supply, the entire population of the country will benefit.

The project design ensures the continuity of activities initiated by the project beyond the project period. This will be achieved by integrating successful activities of the project into work plans and regular programs of key ministries such as the Ministry of Environment, Ministry of Agriculture, Ministry of Agrarian Services and Wildlife and other central government institutions and into local government's plans, programs and projects. District Forest Offices will play a key role in this regard at the local level (see below). In addition the project will build the capacity and produce knowledge products to support community leaders in non-project communities who are vulnerable so that they can adopt the models developed by the project.

An important mode of implementation in the project will be through the provision of food, cash or vouchers to targeted communities, designed to provide communities with incentives to carry out physical work and to support livelihoods. The choice of food, cash or vouchers will be made by the communities themselves and informed by such factors as the availability of financial institutions, markets and security considerations. Considerations of sustainability, social benefits to be derived, and the level of community vulnerability will also be factored into decision making about the use of food and cash or vouchers as an incentive for work and training

Project Components:

The project will be implemented through four key components. The first three components focus on targeted, on-the-ground interventions that strengthen the resilience of ecosystems and communities to climate change impacts. The fourth component focuses on building knowledge on climate change by mapping vulnerable catchments and communities within the project area and developing the capacity of communities and service providers to adapt to a changing climate.

The following sections outline the basic deliverables proposed under each project outcome; Indicative activities for each output will be defined over the course of the project preparation phase,

Component 1: Protecting and sustaining critical ecosystems by reforestation and soil conservation

Specific Objective 1: To conserve critical ecosystems within the project area through reforestation, soil conservation, and other complementary measures which restore ecosystem integrity, functions and services thereby increasing the resilience of the ecosystems to climate change impacts

This component covers three sub-ecosystems and ecological niches such the hill tops of high to medium elevation watersheds, fragile upper catchments which are the major sources of perennial water supply to important streams and rivers in the project area, and the mangrove habitat. The bulk of the activities will take place on public lands, managed by the Forest Department. The natural ecological niches that would be protected under the project

include river banks, areas prone to forest fire hazards, and local pockets of denuded lands which have not been demarcated and hence are subject to unintentional encroachment by communities. The component's six outputs and outcomes constitute an integrated package of interventions aimed at reducing the vulnerability of upland communities and ecosystems to the impacts of climate change.

Output 1.1: 1000 ha of degraded lands in the high and medium elevations of upper watershed will be reforested and protected as conservation areas

A total of 1000 ha of hill tops [comprising 200 ha of hill tops in the high elevation (above 1500 m msl) and 800 ha of hilltops in the medium elevation (ranging from 1500 m msl to 450 m msl)] will be reforested and designated conservation areas. These are barren and denuded hill tops scattered among the dense and lush forest cover, as well as well-maintained tea plantations, permanent cropping systems and livestock farms in the upper parts of medium to small sub-watersheds. Some of these areas are already known to the local forest officers and the communities of the area, but other areas will need to be identified, surveyed and demarcated by the project. Much of the planting and restoration work will be carried out by communities. The composition of tree species planted will replicate the existing natural vegetation cover.

This output will serve to increase infiltration of rain water in hill tops, thereby enriching aquifers, reducing rill and gully erosion, and reducing sediment load in streams and rivers.

Output 1.2: Soil conservation measures (physical, biological and engineering) will be implemented in 30,000 ha of lands in upper catchments.

Rehabilitation and stabilization of these catchment areas will be carried out by biological and mechanical means, including tree planting along contours.

This output will serve to reduce the amount of suspended sediments in streams and rivers and also reduce the incidence of flash floods.

Output 1.3: Riverbanks will be stabilized by planting trees together with structures (low cost wooden structures and rocks)

Tree planting and the installation of simple wooden structures and stone pavement (riprap) along river banks will be undertaken in order to conserve some 300 km of river banks.

This output will reduce collapsing and eroding river banks by 50 percent. Encroachment of riverbanks by communities will also be significantly reduced.

Output 1.4: Communities will be engaged and educated, and forest fire belts will be developed, to protect 3,000 ha in area with a history of frequent fire damages.

Forest fire belts will be established covering an area of 3000 ha. Forest fires in Sri Lanka are largely of human origin. Often burning is done to obtain fresh grass for cattle, for shifting cultivation and for hunting. The consequences are to render the ecosystem more vulnerable to climate change impacts. Arresting forest fire is a top priority of the Forest Department. This is mainly done by creating firebreaks around forests. Fire protection targets will be achieved by mobilizing communities to establish 10m wide strips planted with *Hana*, a fire resistant plant, and maintaining weeding of the strip.

This output will ensure that natural vegetation remains in a healthy and protective state.

Output 1.5: 800 km of natural forest boundaries will be surveyed and demarcated and declared conservation areas.

Forest Department forest land will be surveyed and stakes placed in the ground. This will be followed by fixing boundaries with concrete posts and planting of tree species along the boundaries.

This output is aimed at protecting forest land managed by the Forest Department (FD) and preventing encroachment by communities. The collateral benefit of this intervention is that nearby communities will also have their lands surveyed and demarcated (in order to segregate the FD land from community land) and deeds will be issued to legalize ownership. (Note that most land is provided to individuals and families on long term lease agreements).

Output 1.6: 200 ha of mangrove habitat will be rehabilitated and protected in sensitive coastal ecosystems.

Mangroves are covered as part of the project for two reasons. First, mangroves constitute an important resource at the end of the river basin which must be protected so communities do not move upstream to exploit other natural assets (namely trees) in an unsustainable way. Second, mangroves are effective barriers against tropical storms and strong wave action and the inundation of sea water into agricultural lands. Effectiveness depends on a number of factors, such as, the density, width, height, and complexity of the mangrove population and oceanographic factors. The project will replant and rehabilitate the mangrove belts along the eastern coastal systems involving communities. Awareness creation among communities on the importance of stable mangrove vegetation will be an integral part of the project. In selecting mangrove seedlings for planting, appropriate care will be given to species that are adapted to local climatic and oceanographic conditions.

This output will protect mangroves, promote livelihoods from mangroves, halt inundation of sea water into agricultural lands and prevent over-exploitation of upstream forests by mangrove dependent communities.

Component 2: Strengthening the resilience of communities through sustainable energy services

Specific Objective 2: To strengthen the adaptive capacity of watershed communities within the project area to climate change impacts through energy services which maintain protective functions of their surrounding ecosystem.

This component is expected to provide sustainable energy services to watershed communities through the establishment of community timber farms. This will help to prevent degradation of surrounding ecosystems by reducing the extraction of fuel wood by the communities.

Output 2.1: 750 ha of small timber farms will be established in mid and low altitude upland catchment areas.

Small timber farms (also called farmers' woodlots) will be established on state lands leased to interested communities on a long-term basis (25 years). The average size of the timber farms will be 0.2 ha per farm household. All materials, including a range of forest tree species will be provided by the project. The range of species selected will depend on agro-climatic conditions and socio-economic and cultural factors. Soil and water conservation measures, including the establishment of vetiver grass and Gliricidia hedges, will be incorporated in the farms.

The output will enable communities to produce timber for their own needs and derive additional income, resulting in significant reduction in illegal forest cutting.

Output 2.2: 250 hectares of agro-forestry fuel wood lots will be established.

Forest vegetation in low elevation catchments are subject to cutting by communities for meeting their fuel wood needs. This weakens the ecosystem and aggravates the susceptibility of communities to climate change impacts. Meeting community needs for fuel wood through dedicated agro forestry wood lots, in combination with the introduction of efficient wood stoves (see below), will aim to address this problem. Awareness creation of the importance of permanent forest vegetation in catchment areas will further add to successful use of dedicated fuel woodlots by communities. The average size of individual fuel woodlots will be 0.2 ha per farm household. All materials, including a range of fuel wood tree species will be provided by the project.

Based on this output, communities will be able to meet their own fuel wood needs from their plots, derive additional income by selling fire wood to nearby downstream populations, and prevent forest degradation through the reduction in cutting trees for fuel wood. The resulting economic benefits will greatly reduce pressures to illegally cut forest for timber.

Output 2.3: Focusing on rural women, 20,000 households, will be provided with fuel efficient wood stoves..

The traditional 3-stone hearth in widespread use in Sri Lanka is highly inefficient. The *anagi* stove, which will be used in this project, and which in Sinhala means "precious" or "excellent", is a single-piece clay stove designed to meet the cooking needs of a family of six. It is an estimated 30 percent more fuel-efficient than cooking over an open fire.

This output will promote the use of the anagi stoves among participating communities and thereby reduce illegal fuel wood cutting from forest areas. It will also conserve labor among women and improve health.

Component 3: Strengthening community resilience through agro forestry and soil-water management

Specific Objective 3: To strengthen the adaptive capacity of communities through sustainable agro forestry and conservation of fresh water resources.

Watershed communities share resources differently depending on their location in the watershed. Oftentimes downstream communities benefit from having better access to stream water, ground water and irrigation water. However, unless rainwater is sufficiently captured, upper watershed communities find access to water a serious problem, thereby making them more vulnerable to climate change impacts. In the uplands, watershed

communities mainly depend on rainfall for agriculture and rely only on perennial crops to meet their food and nutritional needs and income. Invariably, most upland communities have home gardens either within the premises of their homesteads or nearby. Damage to water quality due to siltation and addition of agrochemicals in upper catchments poses a problem for all watershed communities. The project aims to strengthen the home gardens of vulnerable communities, mostly upland, by assisting individual home garden owners to plant combinations of trees including forest trees, fruit trees, medicinal plants and multi-purpose trees and intercropping of annual crops, concurrently adopting soil and water conservation practices. This intervention is expected to enhance food security, nutritional levels, soil quality, water quality and the economic well-being of vulnerable populations. Village nurseries will be promoted as a source of cash income.

Output 3.1: Establishment of 12,000 climate resilient home gardens, covering an area of 2,400 ha.

Home gardens are a proven unit to strengthen livelihoods and introduce community level resilience with a view on water and soil conservation. Based on the identification of climate change hotspots (Component 4), the project will prioritize the establishment of home gardens on the basis of climate-related exposure and sensitivity benefitting about 36,000 community members. Project communities will benefit from the sharing of knowledge about water and soil conservation, flood- and drought-resilient crops, and access to markets. Traditional knowledge will provide essential input to the design of home gardens.

This output will enhance food security, livelihood and cash income and improve the nutritional status of the most vulnerable groups, most notably children and women. Improved home gardens will also result in increased infiltration, improved soil quality, ability to maintain high level of soil moisture and increased surface and ground water availability.

Output 3.2: 50 village nurseries will be established to produce 750,000 plants for the diversification of livelihoods and improvement of soil quality.

Village nurseries will be established in 50 communities in mid and low altitudes to produce 750,000 trees and plants (species to be determined). This will generate income for participating communities in the project area and diversify the seedlings available for climate-resilient management of agricultural, horticultural and forestry plots. Plant nurseries will be managed by individuals in the community, community Self Help Groups (SHGs) and CBOs. The nurseries will produce seedlings of different species that are needed for replanting activities of the project as well as to meet demand from the communities. The project will promote public – community partnerships to provide land for establishing such nurseries, as required, as well seeds, root stocks, and cuttings of appropriate species. The project will purchase seedlings from the community nurseries at prevailing market prices.

This output will improve access of communities to seedlings for planting material in the project area, and increase the density and variety of perennial plants. Nursery owners will receive an additional income that they are able to invest in livelihood resilience activities.

Output 3.3 - 50 communal water reservoirs will be rehabilitated to improve water collection and storage capacities in 50 communities.

Rehabilitation of silted and damaged communal water reservoirs will be undertaken in 50 vulnerable communities to ensure and sustain sustainable water supply in a changing

climate. This will include de-siltation wherever appropriate and also community-based management of drainage and irrigation systems to prevent soil erosion and siltation. In addition, a number of community based rainwater harvesting approaches such as multi-use surface ponds will be constructed based on previous UNDP experience.

This output will improve access of communities to surface and ground water resources throughout the year, and enable greater and more consistent food security in vulnerable areas.

Component 4: Strengthening the awareness and skills of communities, government, and non-government organizations to effectively address climate change induced risks in local development planning

Specific Objective 4: To map vulnerability hotspots within the project area and increase knowledge and capacity of communities, CBOs, and local-level officers and NGOs to manage climate impacts on ecosystems and risks affecting the livelihoods and food security of communities.

Based on the work undertaken by global and local researchers, with support from UNDP, in downscaling climate scenarios, hazard and risk profiles for droughts, cyclones, landslides, coastal hazards and floods, as well as the Strategic Environment Assessments underway for UVA and Central Provinces, the project will identify climate hazard and vulnerability hot spots in the target area.

Component 4 will include training and awareness creation among individuals, communities and government officials on climate impacts and adaptation strategies. The aim is to develop awareness, knowledge, and commitment among key stakeholders to recognize and respond to climate change-related threats.

The component will help address challenges related to integrating adaptation to climate change into local development planning, in particular as it relates to improving water conservation, food security, and protection of natural resources. The project will apply participatory methodologies, tools and planning approaches, with the aim of broader application in other watersheds of Sri Lanka. The activities proposed under this component are cross-cutting and will be timed to contribute to the implementation of other components under the project.

Output 4.1: Climate risk mapping will be conducted to identify climate change vulnerability hotspots in the project area.

A detailed climate risk and food security vulnerability mapping will be carried out, identifying hotspots within the project area covering 16 800 sq km. The study will be based on the Meteorological Department's downscaled climate change scenarios, the Department of Agriculture's drought risk profile, and the flood, landslide and coastal hazards profiles developed by the Irrigation Department, National Building Research Organization (NBRO) and Coast Conservation Department (CCD). The scale of the maps produced is important in order to identify locations and target communities with a certain degree of accuracy within the project area so that interventions can be most cost effective.

Through this output, communal authorities and development planners in the project area will be made aware of critical climate risk hot spots, and are enabled to use this information for village and district level planning tasks.

Output 4.2: Water resource inventories and management plans will be developed for at least 100 vulnerable communities in climate change hot spots.

Based on the analysis of hotspots for climate change impacts, the 100 most vulnerable communities in the project area will be selected and their water resource inventories, projected water usage, and competing water demands will be evaluated. Based on this information, resilient communal water management strategies will be developed which integrate climatic as well as social and economic pressures into an integrated water resources management plan.

This output will allow an articulation of the costs, benefits and suitable practices for adaptation investments in the community context.

Output 4.3: Awareness campaign for communities living in climate change hotspots will be conducted to increase understanding of climate change risks and enable access to adaptation practices and resources

The use of television, radio and print media envisaged under this output will help to educate communities about the impacts of climate change on local food and water security, and highlight examples of community-based adaptation measures which can reduce risk. Resource personnel and materials will be sourced through universities, the Department of Agriculture and other key stakeholder agencies. This component will tie in closely with ongoing efforts by the Disaster Management Centre, Natural Resource Management Centre of the Dept. of Agriculture and Sri Lanka Red Cross to disseminate risk and vulnerability information among vulnerable populations. Enhanced awareness and improved access to information are targeted, as well as the creation of a culture of preparedness and safety, to enable robust decision making and resilient development planning.

This output will increase awareness of communities about the type and nature of climate change risks, support local ownership of adaptation measures in targeted areas, and increase knowledge on how to access technical know-how and investment for practical adaptation measures.

Output 4.4: National, district and local government planners will be trained to integrate climate change adaptation into local development planning.

Regional seminars and workshops will help integrate climate change concerns into local development planning processes and promote public-private partnerships. Corporate social responsibility efforts will be connected with adaptation planning in project villages, using schemes such as “adopt a village.” The project will promote the development, implementation and monitoring of climate-resilient village development plans in line with the “Jana Sabha” or Village Development Unit system. Training and capacity building support will be provided to 500 District level officers including divisional forest officers, agricultural officers and divisional agrarian officers, NGOs and community leaders. Training will focus on community mobilization techniques, climate change and adaptation measures and methodologies to provide effective technical extension services to communities.

This output will enable government and communities to participate in and internalize climate change adaptation measures.

B. Economic, Social and Environmental Benefits

In the absence of the proposed project, the country will experience a deterioration of ecosystem functions and integrity and a decline in the quality of life of vulnerable communities. Climate change vulnerabilities in Sri Lanka, and the project area, cut across many sectors of the economy, and threaten the significant socio-economic progress that the country has achieved during last 20 years. The impacts can be especially large in the Dry Zone, and in particular in the Northeast and the East, where some of the most agriculturally intensive areas are located and are already experiencing water stress.

The expected impacts on water resources and the agriculture sector are likely to have serious consequences for the country's food security, livelihoods and the economy as a whole.. Some studies indicate that nationally, the annual impact on agriculture will result in economic losses in the range of Sri Lankan Rupees 11 billion (US\$ 96 million) to 39 billion (US\$ 342 million). Climate change impacts may also exacerbate inequalities between the developed metropolitan communities and relatively less developed rural communities.

Improved access to quality water supplies is the main anticipated economic benefit that will support livelihood and food security objectives. The core of the project strategy is that the country's forests and the forests in the Dry and Intermediate Zones in particular, provide a critical buffer against climate impacts and that forests play a critical regulating role with regard to water resources which, in the project area, contribute to much of the country's food production and power generation. They are also an important source of livelihood for the poorest people who live in upland areas. Through re-vegetation of hilltops, conservation of catchments, and protection of river banks the project seeks to regulate river flows, avoid flash floods, reduce silt load in river discharges, and ensure a steady supply of good quality water to downstream water users, principally farmers (both large and small) involved in irrigation. Overall improved soil maintenance as a result of enhanced vegetative cover will also enhance agricultural productivity. Improved home gardens, and establishment of nurseries and woodlots will also increase infiltration of rainfall, thereby recharging aquifers, and reducing erosion and sedimentation of downstream streams, all of which are important for livelihoods. Furthermore, such gardens will directly support livelihoods and provide an important source of supplemental income for upper watershed communities.

Specific environmental benefits include:

- Reduction of erosion, sedimentation , flooding and flash floods;;
- Stabilization of river flow and improved water quantity, flow rate and water quality;
- Improved vegetation cover in the watershed areas;
- Restoration of ecosystem integrity, goods, and services;
- Preservation of biodiversity;
- Healthy mangrove ecosystems in the coastal areas; and
- Reduction in carbon foot print

The project will deliver important social benefits in community mobilization and asset building. The project proposes an integrated set of community based interventions that aim to reduce vulnerability and strengthen resilience, recognizing that incentives will motivate

community participation and ownership. Payment for the implementation of project activities through labour and services will encourage the participation of community members who have limited cash income. With cash in hand communities are likely to invest in productive asset-building activities which will strengthen long-term resilience.

Finally, the project will deliver important social benefits in terms of social cohesion.

The direct beneficiaries of the project will be the participating communities of over 500,000 people in nine districts in the Central and Eastern region of Sri Lanka. The project will give priority to the most vulnerable community groups, especially women. In line with the Government's policy to reduce inequalities between urban and rural and between various population groups, the project will focus on benefits to food insecure and vulnerable rural communities. The Government also considers that the project will provide particular lessons for social harmony between the diverse ethnic communities living in the area.

C. Cost-Effectiveness

The Government estimates that the future impact of climate change on agriculture will result in annual economic loss of upwards of SRL Rs. 50 billion, or more than 1 percent of GDP, depending on the climate scenarios. The Government estimated the cost alone of the floods that occurred from December 2010 to January 2011 at SRL R. 50 billion. While the actual extent of damage is still uncertain, the Government estimated that 50 percent of agricultural land was affected by the floods, amounting to about 400,000 hectares.

The proposed measures in this project do not have justifiable alternatives in terms of actions that are low cost, effective and sustainable. Large scale dam-building or continued de-silting are not environmentally viable alternatives, and relocation and disaster relief are far more costly than the promotion of diversified, resilient livelihood options. By planting trees in the denuded hill tops, conserving water catchment areas, stabilizing catchments of village tanks and rehabilitating mangroves, will build long-term resiliency of communities and ecosystems. The proposed interventions will reduce the food security vulnerability in the country as a whole and reduce the vulnerability of project area communities to climate change impacts by improving their livelihoods and socio-economic well being..

Social reinforcement through community groups and the close supervision by District Forest Officers are low cost options which will provide an important source of cohesion and sustainability. Community driven action will build knowledge and a package of awareness, tools and local capacities to address the threats of climate change. Such involvement of the direct beneficiaries result is good quality outputs and greater degree of accountability of all stakeholders. As communities participate in the planning and implementation of project activities, there will be a sense of ownership of the project among the local population resulting in the sustainable project outcomes beyond the project period.

The emphasis on catchment level interventions, and an integrated basin and watershed- focused approach, will reduce fragmentation and lead to greater impact at scale.

Vulnerability mapping carried out in the project area will also ensure that interventions are only carried out where they are most cost effective. The right

beneficiaries will be targeted as will the appropriate catchments and micro watersheds for maximum results.

To improve cost effectiveness, the project will adapt the application of proven local solutions and small scale adaptation efforts, in including choices of appropriate tree species and methods of planting and maintenance. In this regard, WFP and the Government will draw from its shared experience and lessons learned in similar interventions in other parts of the country.

Cost effectiveness, and low transaction costs in particular, will also be ensured by utilizing existing national institutions, at the central and local levels for project execution which have a long history in the project area. The Forest Department of the Ministry of Environment has a long time presence on the ground in the project area and has extensive experience in reforestation through community mobilization. The appropriate role of the Forest Department in this project will be strongly reinforced, not replaced.

Cost effectiveness will also be enhanced through an emphasis on learning and dissemination of results through the project area as well as to others areas through the project management and reporting structure. In this way, the project will hope to spread results beyond the project area and beyond its time frame.

Finally, detailed cost effectiveness analysis will be made for each output by WFP during project inception. This will include comparing measurable outcomes with all feasible options and risk analysis in order to ensure that least cost options are selected for implementation.

D. Alignment with National Development Strategies and Plans

The proposed project aims squarely to support the Government's comprehensive National Climate Change Adaptation Strategy (NCCAS). The Strategy which lays out a prioritized framework for action and investment for the 2011-2016 period aimed at systematically moving Sri Lanka towards a climate change resilient future. The NCCAS mirrors and supports Sri Lanka's national development articulated in the "Mahinda Chintana" vision and "Haritha Lanka (Green Sri Lanka)" strategy aimed at ensuring long-term sustainable development. . Key findings of NCCAS sector-based analysis have been synthesized into an integrated framework, and structured into five Strategic Thrusts, namely:

1. Mainstream Climate Change Adaptation into National Planning and Development
2. Enable Climate Resilient and Healthy Human Settlements
3. Minimize Climate Change Impacts on Food Security
4. Improve Climate Resilience of Key Economic Drivers
5. Safeguard Natural Resources and Biodiversity from Climate Change Impacts

Under each of the Strategic Thrusts, thematic areas for action, along with priority adaptation measures, have been identified. An estimated 47.7 billion rupees in incremental additional financing, beyond current and ongoing expenditure, will be required to implement the NCCAS over 6 years. The vast majority of these financial resources are expected to be channeled directly to the broad base of agencies and stakeholders (both within Government and beyond) to finance and implement climate change adaptation interventions of varied scale. The Ministry of Environment will play a facilitation and coordination role in the

process. Hundreds of stakeholders representing a cross section of government institutions, national NGOs, professionals, and academia covering a wide range of sectors were involved in developing the strategy. A pipeline of projects related to each Strategic Thrust has also been developed as an integral part of the NCCAS development process, to expedite investment (See Annex 2 for further details). The proposed project is consistent with the proposed investments.

The proposed project has also been developed on the basis of Sector Vulnerability Profiles (SVPs) developed under the NCCAS. The profiles cover the following key sectors, where climate vulnerabilities are expected to be critical: Agriculture and Fisheries; Water; Health; Urban Development, Human Settlements & Economic Infrastructure; and Biodiversity and Ecosystem Services.¹²

The project is consistent with the Second National Communication, which the Government will finalize in 2011 (which drew on the recent scientific assessments of predicted climate trends and impacts illustrated in this proposal). Sri Lanka ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 16 March 1993, and has submitted its Initial National Communication (INC) to the UNFCCC on 27 October 2000. The country ratified the Kyoto Protocol 3 September 2002. Following the preparation of the INC, Sri Lanka initiated efforts to create an institutional set-up that seeks to mainstream climate change issues into the national legal framework. The responsibility of preparing the 2nd National Communication, and overall responsibility for climate change policy and implementation in the country, lies with the National Advisory Council on Climate Change in the Ministry of Environment, which is supported by the Climate Change Secretariat.

The project is designed to support the National Environment Action Plan (NEAP), which focused on 12 priority areas, including the areas addressed by this project, as well as other national plans. Sri Lanka's PRSP in March 2003 was considered to be successful by the World Bank Environment Department in mainstreaming key environmental and climate change considerations. One important factor influencing this is that the kind of community-driven development which will be promoted through the proposed project has played a major role in the implementation of the poverty reduction strategy. The project is also consistent with the National Action Plan for Haritha Lanka (2009, which, covering climate change and land resources, identifies short, medium and long-term environmental targets), the 2010-2014 Investment Programme for the Forestry Sector, the Ministry of Environment and Natural Resources Caring for the Environment II Plan (2008-2012), and Sri Lanka's National Watershed Management Policy (2004), which prioritizes protective activities above 300 meters and recognizes the need for a basin-wide, inter-sectoral approach

The project is designed to support a new focus in forest sector governance in Sri Lanka on a) the devolution of authority and the empowerment of communities to have greater access to forestlands and b) developing supportive policy reforms in this regard. The proposed project is designed to directly support the Government's Forest Policy

¹² The SVPs are concise background documents which support the NCCAS and were developed as a means to document the current status of each key sector and identify the key climate change related issues that need to be addressed. The set of SVPs provides a summary snapshot of each sector grouping, highlighting their positioning in the national development trajectory, and summarizing information on the nature, scale, and geographic distribution of vulnerability to climate change impacts across key sectors. The document also provides insight to the background that exists to position adaptation activities/interventions

and Forestry Sector Master Plan (1995), which emphasizes community forestry and outlines legal mechanisms for benefit sharing. The focus of planning is now squarely based on sustainable forest management for multiple benefits. This marks a significant change from forest planning and management of the past, which focused on ensuring sustained timber flows, and it aims to achieve much broader socio-economic, environmental and ecological benefits. The Forest Policy and Master Plans strongly promote home gardens, village nurseries, agro-forestry and woodlots, and the rehabilitation and protection of tank catchments and canal banks through community forestry. They also recognize the need to strengthen enforcement of forest regulations and demarcation boundaries, and that effective enforcement must rely on broadening the institutional framework for forest management, with clearly defined roles for farmers, community organizations, NGOs, and small and medium sized commercial enterprises, including through offers of leases and other tenure arrangements that are transferable, inheritable and bankable, and through education and awareness campaigns. The proposed project aims to undertake all of these activities..

Lastly, the proposed project has been designed mindful of gaps in policy and strategy and with the intention of working with partners who are addressing these gaps. For example, while the Climate Change Secretariat (CCS) has the mandate to coordinate climate change related activities across the country, there is still a need for technical capacity to effectively deal with climate change across key sector agencies. There is also a need for a focal unit to ensure that climate resilience criteria are considered in national level planning, local training institutions and programs which are targeted at building the required technical skill base for effective long term management of climate change risks. Finally, there is a need to nurture a pool of experts and future leaders in climate change adaptation. An on-going UNDP supported project is aimed at addressing these constraints¹³.

E. Alignment With Relevant National Technical Standards

Project components and outputs will meet technical standards prescribed in the forestry, agriculture and water resources management technical guidelines and norms. The necessary safeguards will be followed and incorporated during project implementation. In addition, the proposed interventions will adhere to technical standards prescribed by the Forestry Department with regard to tree planting, boundary demarcation, establishment of fire protection zones and development of woodlots. Community mobilization will follow the methodology prescribed in the Forest Department guidelines on community forest management.

The project will also identify gaps in appropriate sector technologies aligned with adaptation needs. It will identify possible solutions including sources of technical assistance and transfer modalities.

Over the course of the project preparation phase, the applicable technical standards that will be applied by the project will be outlined in greater detail.

¹³ Enabling activities for the preparation of Sri Lanka's second national communication to the UNFCCC (UNDP – on going)

F. Duplication and Complementarity

During the design process, key stakeholders in donor funded projects were consulted in order to avoid any potential duplication of efforts, resources or geographical coverage, and to ensure synergy between ongoing initiatives and the proposed project. Table 6 presents a summary of recently concluded, on-going, and pipeline projects that deal with forest management.

Table 6: Complementary Projects, Recently Concluded, Present and Pipeline Projects

Project	Objectives	Complementarities	Geographical coverage/Agency
Natural Resources Management Project funded by AusAid (completed-2003 to 2008)	Conservation and management of forests, improvement of livelihood of communities and improvement of information and knowledge on forest management.	This project in many ways sets the stage for the proposed Adaption Project, having sensitized the Forest Department and communities to the need for participatory forest management.	Districts of Kuuunagala, Puttalam, Anuradhapura, Matale, Polonnaruwa and Monaragala. Forest Department
Forest Resources Management Project funded by ADB (completed 2001 to 2009)	Objective of the project was to establish participatory sustainable management of the permanent forest areas and increase its production and protection, with a focus on the private sector. It also focused on improving forest governance and strengthening the capacity of the Forest Department..	The project contributed to forest conservation thought he development of integrated forest management plans which will serve as a foundation for the proposed Adaptation Fund project..	All forested areas except in the Northern Province. And parts of Eastern Province. Forest Department.
Ecosystem conservation and management project (World Bank - Pipeline)	Conservation and scientific management of designated protected areas and resolving human elephant conflict. Reduction in deforestation and forest degradation by lowering the dependency on extractive forest resources.	It is not yet certain the degree to which this project may fall outside the boundaries of the proposed project. More detail will be provided in the preparation of the full project document.	South Eastern region; Central and North Central Region; and North Western Region. Ministry of Environment.
Enabling activities for the preparation	To strengthen the technical and	Mainstreaming climate change concerns into the country's	Ministry of Environment

of Sri Lanka's second national communication to the UNFCCC (UNDP – on going)	institutional capacity of Sri Lanka in mainstreaming climate change concerns into the country's sectoral and national development planning processes.	sectoral and national development planning processes will complement the proposed Adaptation Project in terms of collaboration with relevant agencies and seeking continuation of project activities beyond the project period.	
Strengthening capacity to manage and control Alien Invasive Species in Sri Lanka (UNDP) – On going.	To build capacity and communications among the multiple stakeholders on the introduction and spread of IAS; foster an enabling policy, institutional and planning environment; generate and share knowledge	Invasive species affect forest ecosystems and thereby may increase the vulnerability of forests to climate change impacts. The proposed project will be sensitive to this issue, in particular in the selection of planting areas and choice of species for planting.	Ministry of Environment
Promoting Sustainable Biomass Energy Production and Modern Bio-Energy Technologies (UNDP-Preparatory Phase)	To provide policy support; develop commercially viable fuel wood supply; and create a viable investment environment	Developing the mechanisms for a commercially viable fuel wood supply will impact the commercial value of forest plantations, and the findings of this project will inform the proposed Adaptation Fund intervention.	Sri Lanka Sustainable Energy Authority and Forest Department
Operationalizing the Road Map Towards Safer Sri Lanka by UNDP (2010-12)	To develop climate scenarios, risk and vulnerability profiles for droughts, floods, landslides, coastal hazards and cyclones, support climate change adaptation platform development, provision of guidelines on disaster resilient land use planning and building designs and field trials on paddy and other food crops.	Information from this project will directly contribute to the identification of target areas for the proposed project and feed into Agriculture and Forest Department as well as community adaptation planning.	Disaster Management Centre of the Ministry of Disaster Management covering all 25 districts
Global Environment Facility Small Grants (GEF/SGP) Programme (Managed by UNDP 1994-2015)	Mobilizing and supporting communities through NGO based small grants in the areas of land degradation, climate change, biodiversity and persistent organic pollutants	The proposed project will draw on the GEF/SGP supported community models on home gardening and best practices emerging from the project.	Island-wide. Ministry of Environment.

A review of on-going projects shows that there is no duplication of the proposed project with other projects financed by bilateral or multilateral organizations. There are no existing projects in the country that focus on the country's forests as a critical buffer against climate impacts and none which focus explicitly on improving the resilience of communities and ecosystems as a climate change adaptation strategy

The project will build on and complement long- running efforts of the Asian Development Bank and AusAid, in particular, to promote community reforestation. The first of these projects began in 1993 and has since covered some 500,000 households and 2 million ha (mostly in other areas of the country). The last ADB intervention closed in 2009. These interventions, totalling some \$50 million, demonstrated that forest development and management involving local communities works. Importantly, these projects also laid the regulatory and institutional framework for the proposed project, including the development and implementation of forestry regulation, development and implementation of community forestry management plans, capacity building for the Forest Department, and the development of M&E frameworks for community forestry. These projects also pointed up a number of lessons, two of the most important of which were the need to 1) substantially improve the capacity of the Forest Department to interact effectively with communities, and 2) recognize that effective participatory planning, management and awareness building is a long-term process that must also involve NGOs, the private sector and community groups

The project will complement on-going government programs that are being implemented to improve watershed management, conservation of bio diversity and de-silting of village tanks and improving water management in the command areas of small tanks. These programs have included small projects over the years in which WFP has assisted the Forest Department in the Districts of Ampara, Batticaloa, Trincomalee and Vavuniya. These projects have helped to increase tree cover and retain water in watersheds, and they have gone a long way to build trust with the local communities who are benefitting. However, they were not carried out on a river basin scale, nor were they designed with the kind of integrated planning that will provide sustainability and robust resilience to climate change impacts envisioned in the proposed project.

The project will draw squarely on lessons emerging from other WFP interventions in tree planting and the provision of wood stoves in many parts of the country, as well as on on-going UNDP initiatives. WFP has a long history of working with communities in Sri Lanka, especially in former conflict affected areas, and it has undertaken small-scale watershed pilots in the project area.. UNDP has supported the Government in a number of climate change initiatives over the years, including the first and second national communications to the UNFCCC; development of risk and vulnerability profiles for coastal hazards, cyclones, droughts, floods, and landslides; support to the Meteorological Department on downscaling climate change scenarios; and support to communities in drought areas to improve water retention and ground water recharge . UNDP is involved in management of two related Global Environment Facility funded Full-Size projects and is helping the Forest Department to design a strategy on REDD+. UNDP is also providing management support to the GEF Small Grant Program where a number of community projects on biodiversity, climate change and land degradation have been implemented. Finally, a UNDP Disaster Risk Reduction Program initiated two Strategic Environment Assessments covering Central and UVA provinces, and the outputs and information generated will be of use to the project.

G. Learning and Knowledge Management

The project will serve as a learning model that will allow national and local governments the opportunity to review context specific approaches, establish best practice and scale up successful activities to build resilience in communities and ecosystems to climate impacts. The project will result in a number of training modules, extension bulletins and pamphlets produced for the training of communities, service providers and trainers. The emphasis on learning and knowledge management in the project means that there will be much greater awareness of communities and local government on climate change risks, secured ownership of adaptation measures in targeted areas, and increased knowledge to manage climate change and risks through integrating adaptation planning into community development planning processes

H. The Consultative Process

To develop the proposed concept, consultations were held with relevant stakeholders (provided in Table 7) at all levels, though more extensive consultations, in particular at the field level, will be carried out during the development of a full project document. (Those consultations will aim to develop full-fledged results management and implementation plans and a disbursement schedule.). National Level institutions were consulted individually as well as through a National Level Stakeholder Consultation Meeting. With regard to local consultations, the project concept formulation team visited key districts where consultations were held with government agents, the Chief Secretary of each province, District Forest Officers, District Agricultural Officers, and communities. Important in these discussions were the agreement to develop a community based approach and the identification of districts based on WFP vulnerability assessment and local level climate threat information. A number of other meetings were held with national stakeholders to review this document and views were incorporated accordingly.

Table 7: Key Stakeholders Consulted

Stakeholder	Roles
Ministry of Environment	The Ministry of Environment has overall responsibility for conservation and natural resources management. It will serve as the executing agency of the project and will provide policy and management guidance..
Ministry of Agriculture	The Ministry of Agriculture is responsible for agricultural policy and legislation and sustainable development of the agriculture sector. In collaboration with MoE, it will provide policy and management guidance to the project.
Ministry of Agrarian Services and Wildlife	The Ministry of Agrarian Services and Wildlife is in charge of agrarian reform, agrarian services and wildlife conservation. In collaboration with the MoE, it will provide policy and management guidance to the project.
Ministry of Disaster Management and the Disaster Management Centre(DMC)	Overall coordination of disaster risk management in Sri Lanka. The DMC is involved in supporting the development of multi-hazard risk profiles of Sri Lanka,

	including droughts, floods, cyclones, landslides and coastal hazards plus development of policies and promoting investments in disaster risk reduction. DMC also train district level stakeholders in preparedness, response and risk reduction. It will execute part of Component 4.
Forest Department	The Forest Department has the mandate for conservation and management of forests and is responsible for maintaining, developing and protecting forest cover. The Department, which is housed within the Ministry of Environment, is the principal executing entity of the project.
Department of Agriculture	The Department of Agriculture is responsible for agricultural research, development and extension, including soil conservation. The Department will serve as an executing partner of the project.
Department of Agrarian Services	The Department of Agrarian Services is in charge of providing agricultural inputs and services to farming communities and management and rehabilitation of minor tanks. The Department will serve as an executing partner of the project.
Provincial and District Authorities	Provincial District and Authorities provide implementation support at the local level and ensure mainstreaming of local level policies.
Local Councils and Community Groups	Local Councils and community groups will have ultimate authority for how overall implementation is carried out in the field.
Mahaweli Authority of Sri Lanka (MASL)	The Mahaweli Authority oversees water management and conservation activities in the main Mahaweli Basin.
Meteorology Department	The Meteorology Department collects disseminate all weather related data of the country.
WFP	WFP will provide technical and management support to the Government for implementation of components 1 and 2 and will have overall responsibility for project monitoring, reporting and evaluation
UNDP	Will provide technical and management support to the Government for implementation of component 3 and 4

I. Added Adaptation Value:

Component 1: Protecting and sustaining critical eco systems by reforestation and soil conservation

Baseline. While the Government has established a solid policy framework to address climate change threats, culminating in the National Climate Change Adaptation Strategy for Sri Lanka 2011 to 2016, most measures to address sustainable forest and water management have been at the institutional level and concrete actions have been ad hoc and not at large scale. Moreover, for many years the forest management system in Sri Lanka has been based on a command and control approach, where most forests were owned and managed by the state. Recent Forest Department experience, with support from

AUSAID and ADB, and participation by WFP, has promoted integrated resource management plans and piloted successful community forest management. Component 1 of the project seeks, in part, to replicate this success in new geographic areas and in a more comprehensive manner.

The Forest Department has the mandate to conserve forests and protect watersheds, but it is still short on the capacity to carry out community forestry activities due to the limited number of ground level officers available and lack of adequate skills and experience in coordinating and mobilizing communities. This component will help fill critical gaps. Moreover, the Forest Department's activities are not now geared to combat climate change impacts, and other relevant Government departments representing the agriculture and water sectors at the provincial and district levels also have not integrated climate change and variability risk factors into their planning processes.

In the absence of the project, denuded and barren hill tops, vulnerable catchments in the watershed areas, eroding river banks, and depleted mangrove vegetation in the coastal areas will be subject to further deterioration and will aggravate the impacts of more erratic and severe weather. Frequency, intensity and magnitude of erosion, earth slips, sedimentation of rivers, and intrusion of sea water into coastal fertile lands are likely to increase under anticipated climate change scenarios.

Adaptation Alternative. The project will arrest the deterioration of watersheds and sensitive ecosystems within these watersheds from climate-related shocks and stresses. Six distinct, but reinforcing activities will be undertaken under this component to protect the watersheds so that ecosystems can regain their health and integrity and provide essential services.

Barren hill tops will be protected by reforestation and appropriate conservation practices, including forest demarcation by the communities themselves. Reforestation and soil conservation activities will be undertaken by communities for which they will be compensated for their labor.

Moving downstream, AF resources will be used to protect sensitive pockets of degraded catchments within watersheds. Such degraded catchments can render the stabilization of hill tops redundant, as much of the rainfall is caught within the catchments and transmitted to streams and rivers via natural drainage channels (sometimes constructed drainage ditches) stabilized by planting grass and small bushes. The proposed project will address the problem of sheet and gully erosion, which are all too common in unprotected watersheds.

AF resources will address erosion of unprotected river banks and river banks encroached by communities where the protective tree cover and surface vegetation is poor or destroyed. This also poses a serious threat to water security and exposes communities to erratic and severe weather. Tree planting in these areas will address the problem.

The last ecosystems within the drainage basins of Sri Lanka are mangroves, and these have been very much undervalued and neglected. Mangroves play a crucial function in regulating the outflow of water from the river to the ocean and inflow of sea water inland. They are rich in biodiversity and provide valuable goods and services. Along the 240 km coastal strip that borders the project area, there is need to rehabilitate mangroves in order to enhance the resilience of coastal communities and local habitats. With rehabilitation,

communities will continue to benefit from mangroves for their livelihoods and not be forced to go upstream to cut forests.

Component 2: Strengthening the resilience of communities through sustainable energy services

Baseline . Communities require timber to build, maintain and repair their homesteads in the upper and middle catchments, and they need fuel wood for cooking and heating. Currently, measures to provide a sustainable supply of timber for communities and improve timber protection are ad hoc. Communities lack incentives to regulate tree cutting, and communities and District Forest Officers lack adaptation plans to prevent degradation.

Adaptation Alternative. The proposed project will provide an integrated package of interventions based on agro forestry and provision of alternate livelihoods that generate additional income and satisfy the socio-economic aspirations of upland communities. Only with such a comprehensive set of interventions will these communities be able to continue to be good custodians of the forests in which they live.

The adaptation response under component 2, include the establishment of dedicated timber farms and fire wood lots and the introduction of efficient wood stoves. These will allow . communities to produce timber for their own needs, conserve on their timber use, and derive additional income. Forest degradation would be prevented. An important co-benefit will be enhanced protection for rural women using fuel efficient wood stoves. With stoves, women in particular will be saved the requirement to travel for timber cutting. Air quality in homes will also be significantly improved.

Component 3: Strengthening community resilience through agro forestry and soil-water management

Baseline. At present, the agro-forestry, soil and water management practices of most communities in the project area do not integrate an appropriate mix of diversified, climate-resilient crops. Without adaptation support, agriculture can be expected to deteriorate in the face of more severe and erratic weather, food security and incomes will suffer, and this would pose a threat to the stewardship capacities communities for the entire river-basin ecosystem.

With regards to climate-resilient water management, a cascading system of tanks in Dry Zone catchments once provided the much needed water to successive downstream communities. This ancient system of water harvesting and water recycling has badly deteriorated due to population pressures and competition over resources, particularly wood. Unless a comprehensive approach is adopted to rejuvenate the cascade system of tanks through reforestation and soil conservation, village tanks will cease to provide their essential functions.

Adaptation Alternative. The project will work with the Rice Research Development Institute (RRDI) of the Ministry of Agriculture to conduct crop field trials in flood- and salinity-prone lands, and - in partnership with Eastern University and the Agrarian Services Department, enabling the systematic establishment of seed banks for drought tolerant vegetables and food crops. Together with leading scientists in the fields of Agriculture,

Water, Weed and Pest Management, the project will promote climate-resilient farming practices to meet the challenges of droughts and floods. These support activities are considered a critical starting point for the promotion of resilient agro-forestry.

Recognizing the need for anticipatory and forward-looking water resources planning, the Government, with support from UNDP, has established a number of field trials in Monaragala and other areas to harvest rainwater and improve rainwater infiltration into soils. These trials have been successful and are ready to be replicated in the drought-affected target areas of the proposed project. Also the Dept. of Agrarian Services has been supported on the rehabilitation of Ancient Tank Cascade Systems to improve communal livelihoods. Under Component 3, these experiences can be replicated in the target areas of the proposed project

The GEF Small Grant Programme has also helped to rehabilitate 20 community level water reservoirs to provide water for drinking and agriculture. These tanks not only provide water during droughts, but also act as buffer reservoirs during floods. In addition, a number of community based water infiltration, retention and rainwater harvesting models have been supported to promote soil-water conservation in drought prone areas. Component 3 will build on these experiences to bundle a comprehensive livelihood resilience program in the target areas that combines the adaptation benefits of flood- and drought-resilient agro-forestry and forward-looking soil-water management.

Component 3 will improve the productivity of home gardens by exploiting vertical space in an appropriate mix of tall, medium and short trees and annual crops intercropped among perennial trees. Composting, mulching, organic nutrient cycling and modern IPM practices will be integrated into an improved home garden model that is sufficiently diversified to buffer climate-related stresses and shocks. Shallow wells and natural springs will be utilized more sustainably with greater community ownership and participation. Village nurseries will be promoted as means of providing additional income. Catchments of small village tanks will be conserved by planting a variety of trees including forest, fruit and medicinal species of plants. Cascade drainage ways and flooding areas will be preserved, and 50 communal reservoirs will be rehabilitated to ensure sufficient freshwater supply during dry spells.

Component 4: Strengthening the awareness and skills of communities, government, and non-government organizations to effectively address climate change induced risks in local development planning

Baseline. At present, there is still very little awareness in Sri Lanka about the concrete localized impacts of climate change on climate-sensitive natural resources. Particularly in remote rural communities, adaptation actions take place in an autonomous and experimental manner. Most vulnerability analysis remains restricted to the macroeconomic level and cannot yet be adopted for purposes of local development and natural resource management planning. In the absence more granular local climate risk and vulnerability information, local planning processes cannot take climate vulnerability into account, and the cost effectiveness of development investments will remain low. In addition, there is limited capacity at the district and community levels to devise targeted adaptation measures on the basis of a sound understanding of dynamic, evolving weather patterns and the pros and cons of different no-regrets adaptation measures. Without a more systematic involvement of communities in assessing climate change threats and developing suitable, participatory action plans, communities will not be able to reduce their exposure to climate-related hazards.

Adaptation Alternative. AF resources will enable the identification of climate risk hot spots in the project area and the targeting of appropriate adaptation measures to the most vulnerable communities and community groups. The project will address evident capacity gaps of communal planners, community development workers and service providers (such as the local level technical and extension staff of the Forest, Agriculture and Agrarian Development departments) in the assessment of climate-related risks and enable them to engage meaningfully in the development of hazard early warning systems and local adaptation plans. The project will incorporate recognized indigenous knowledge to address climate change risks and involve vulnerable community members, especially women, in the planning and design of local adaptation solutions. Through a participatory planning process, local people will become empowered to drive and promote local solutions to respond to climate threats. Finally, lessons learned will be passed to other communities, district and national government authorities in order to replicate and scale up ‘what works’ at the local level.

PART III: PROJECT MANAGEMENT MECHANISMS

A. Implementation Arrangements

The project will be executed by the Ministry of Environment (MoE) in collaboration with the Ministry of Agriculture (MoA) and the Ministry of Agrarian Services and Wildlife (MoASW).

The Forestry Department (FD) of the MoE will be the primary focal point responsible for execution of the project. The FD will work with the Department of Agriculture (DoA) and the Department of Agrarian Development (DoAD) and other stakeholders. At the local level, activities will be implemented through respective district-level officers, involving local communities and community based organizations. The coordination and integration of these activities within each district will be undertaken through the District Agricultural Committees (DACs) under the leadership of the District Secretary/Government Agent.

Due to the cross cutting nature of climate change adaptation, the FD project team will work closely with a number of other relevant stakeholders. The Project Management Office will be located within the FD and project implementation will be guided by the Conservator General of Forestry under the overall policy guidance of the MoE and other related stakeholder agencies. Successful activities will be integrated into regular development activities ensuring the continuity of implementing proven technologies and practices beyond the project period. In order to integrate project activities within Provincial and District level government planning, project implementation at the local level will be guided by the District Project Coordination Committee composed of Provincial, and District level officers and chaired by the Government Agent/District Secretary

As the responsible Multilateral Implementing entity (MIE), the World Food Programme (WFP) will supervise project implementation, oversee monitoring and evaluation, provide technical support, and report to the Adaptation Fund while providing technical support to the government for implementing components 1 and 2. In its overall monitoring role, WFP will appoint a Project Coordinator. His/her main function would be monitoring and verification of the implementation of activities in accordance with the

approved work plan. The WFP coordinator will also be responsible for overseeing procurement and financial management.

UNDP will provide technical support to the Government for the implementation of Component 3 and 4. Among other areas of expertise (also see Sections A and F, Part II), UNDP has been involved in the development of national risk and vulnerability profiles covering coastal hazards (sea level rise, waves, tsunamis etc.), cyclones, droughts, floods and landslides. These hazard and risk profiles, to be completed at the end of 2011, can provide a basis for integrating climate-related risks at a more localized scale. UNDP has promoted the use of such risk maps for resilient land use planning, infrastructure development and land use approval processes

Performance monitoring will be undertaken by the Policy and Planning Division (PPD) of MoE.

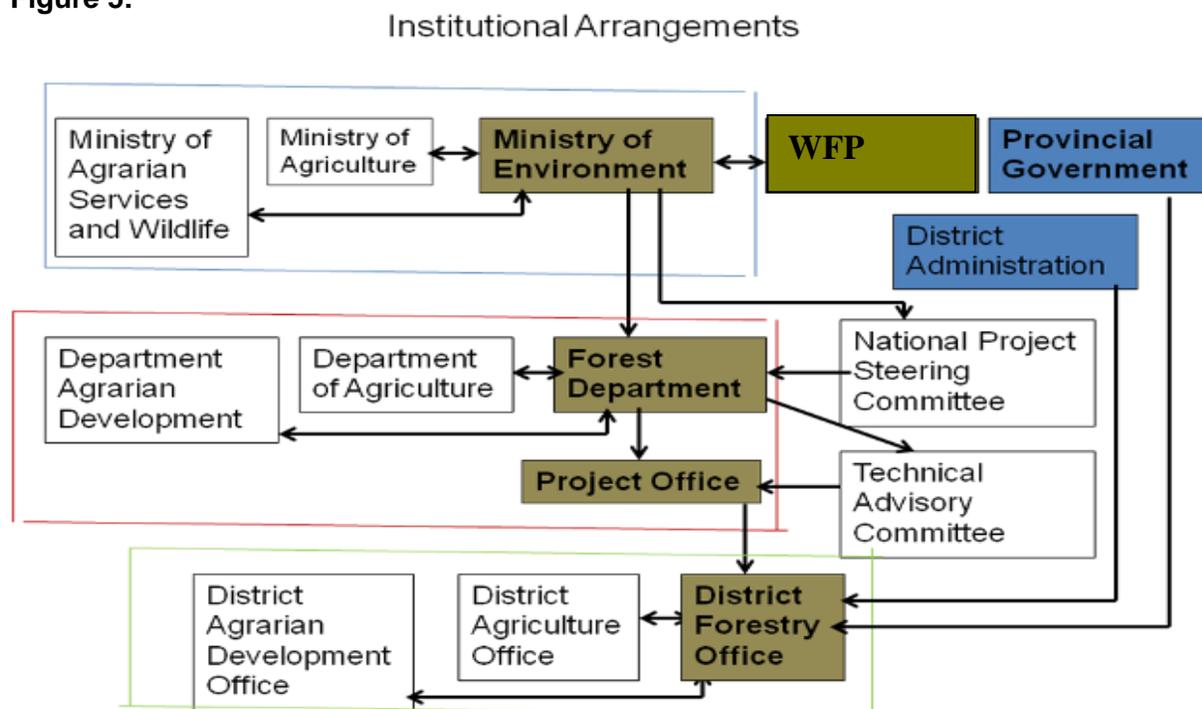
Policy guidance will be provided by a National Project Steering Committee (NPSC) headed by the Secretary, Ministry of Environment. The membership of NPSC will consist of Secretary, MoE; Secretary, MoA; Secretary, MoASW; Secretary, Ministry of Disaster Management and Human Rights; the Conservator General of Forests; Director, Climate Change Secretariat; and representatives from the Ministry of Finance and Planning, National Planning Department, Department of External Resources and Central Environmental Authority. It will also include a representative from WFP and UNDP. The Director, PPD will be an ex-officio member of the NPSC and will serve as the Secretary of the NPSC. The NPSC would meet every 3 months in the first year and every 6 months thereafter. The Program Manager will be an observer to the NPSC.

Technical advice will be provided by Technical Advisory Committee (TAC), headed by the Conservator General of Forests. Membership of the TAC shall include the Conservator General of Forests, Director PPD, Commissioner General of Agrarian Services, Director General of Agriculture, the Project Manager, and representatives of WFP and UNDP. The Project Manager will serve as the Secretary of the TAC. The TAC will meet quarterly and be responsible for monitoring the outputs, activities and methodologies employed and will clear all technical reports produced by the project. The Forest Department, Department of Agrarian Services and the Department of Agriculture will establish their own Project Progress Review Committees that will meet monthly to review their respective activities

At the field level, a Project Field Office will be established at the District Forest Office of each participating district. A Project Field Officer will be appointed to implement project activities under the direct supervision of the District Forest Officer (DFO). DFOs will be directly accountable to the Project Manager for the implementation of activities to be carried out at the district level and the management of funds allocated in the district. A District Project Coordination Committee will be established to provide operational guidance and coordination among various government agencies. The Government Agent / District Secretary will Chair meetings of the District Project Coordination Committee. The composition of the District Project Coordination Committee will be determined at the project inception workshop.

Implementation arrangements will be finalized during preparation of the full project document. In the meantime, Figure 5 presents a schematic representation of indicative arrangements.

Figure 5:



B. Financial and Risk Management

Financial and project risk management measures will be assessed as an ongoing process throughout the project as described in Table 8

Table 8: Risks and Responses

Risk		Response Measure
Lack of awareness by participating communities on CC and potential impacts leading to poor or slow implementation	Medium	The project will sensitize communities through dedicated awareness programs focusing on CC threats, and physical adaptation actions will be undertaken only after, and on the basis of, adequate local adaptation planning.
Provincial and local authorities fail to incorporate climate change policies in their strategies and plans.	Low	Climate change and its consequences have been the subject of much discussion at local levels since the early 1990s. Provincial and local staff working on environmental and CC issues will be strongly networked into the project through strengthened District Offices of the Forest Department..
The Forest Department, as	Low	The Forest Department has played a strong

the key executing agency, fails to adequately work with other Ministries and departments in a cross-cutting manner to ensure robust and integrated implementation of the project.		coordinating role within the Ministry of Environment on issues of climate risk in the key river basins and project implementing structures will ensure strong cross-cutting action.
Policy makers prioritize economic benefits over sustainable and resilient ecosystems.	Low	The project will build capacity of stakeholders at central and local levels in order to raise awareness about sustainable resource utilization.
In selected project areas there is potential for conflict among communities.	Low	The Forest Department has a long history of partnership with village communities. Generally communities living closer to forests are aware of the need for sustainable environment management and this awareness will be strengthened through capacity building and training.
Scientific and technical information in relation to climate change in Sri Lanka is insufficient and incomplete, and uncertain	Low	As evidenced in this document, the understanding of climate change scenarios and risks are relatively good in Sri Lanka, both in the research community and in the Government. The project will proactively engage researchers to update information and ensure that it is utilized systematically in all participating Ministries and at community levels.

C. Monitoring and Evaluation

Overall responsibility for Monitoring and Evaluation (M&E) will rest with the Ministry of Environment’s Policy and Planning Division, supported by WFP. A monitoring matrix to track inputs, outputs and outcomes, with intermediate and key performance indicators, will be developed. Outcomes and outputs will be monitored during project implementation using data compiled by PPD and generated by the project as well as other sources to evaluate progress. Likewise, PPD will keep track of agreed indicators on a regular basis as specified in the monitoring matrix. A monitoring and evaluation plan is provided in Table 9. M&E will be carried out concurrently with project execution. PPD will form a small team under the overall supervision of the Director. Information, data and reports will be provided by the executing agencies. Additionally, PPD will be responsible for preparing quarterly M&E reports that will be submitted to NPSC. The reports will contain adequate information to enable NPSC to discuss project performance and fulfillment of benchmarks and to propose and adopt adjustments to the project design.

The following key M&E activities will be undertaken:

Project Inception Workshop (IW) will be held within the first 3 months of project start up with all stakeholders. The IW is crucial to building ownership for the project results and to plan the first year annual work plan.

Annual Progress Report: An Annual Progress Report (APR) shall be prepared by the Project Manager, and shared with all stakeholders. The APR will include progress against set goals, objectives and targets, lessons learned, risk management and detailed financial disbursements.

Mid-term of the project cycle: The project will undergo an independent Mid-Term Evaluation (MTE) at the mid-point of project implementation. The MTE will determine progress made toward the achievement of outcomes and will identify corrective actions if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. The findings of this review will be incorporated in a midterm report.

Table 9: Monitoring and Evaluation Plan

Type of M&E activity	Responsible Parties	Budget US\$* (does not include staff time)	Time frame
Project Inception workshop (IW)	Project Manager WFP-CO	2000	Within first three months of project start up
Inception Report (workshop)	Project Manager WFP-CO	None	Immediately following IW
Quarterly Technical reports	Project Manager	8000	At the end of each Quarter. The report will be discussed at the TAC
Semi-Annual Progress Reports (SAPR)	Project Manager WFP-COordinator	4,000	At the end of every 6 months. The report will be presented to the NPSC.
Annual Progress Reports (APR)	Project Manager WFP Coordinator	2,000	At the end of each year
Meetings of the Project Steering Committee	Director PPD, Project Manager WFP Coordinator	4,000	Every 6 months
Meetings of the Technical Advisory Committee	Project Coordinator WFP Coordinator	7,000	After the inception workshop and thereafter at every six months.
Technical reports	Project Manager External consultants	None	As required
Mid-term Evaluation MTE	WFP Coordinator External consultants	25,000	At the mid-point of project implementation
Final Evaluation (FE)	WFP Coordinator External consultants	30,000	At the end of project Implementation
Final Report	Director, PPD Project Manager WFP Coordinator	None	At least two months before the end of the project
Financial information Audit	WFP	28,000	Yearly

TOTAL COST		110,000	

The data for M&E will consist of financial, procurement and physical progress reports, information on compliance with environmental and social assessments, management frameworks, and financial audit reports. The issues to be reviewed by NPSC on M&E would include the efficacy, efficiency, sustainability, and acceptance by stakeholders of project actions. Quantitative targets will be supplemented with narrative reports. These reports will be made available in time for NPSC to review and discussed during its quarterly meetings.

While the M&E system will be for project-specific activities, it will also provide parameters and indicators that can be used beyond the project period.

D. Results Framework, Milestones and Indicators

A complete results framework for the project proposal, including milestones, targets and indicators, will be prepared on the basis of community participation and presented as part of a full project document.

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT

The proposed project is in line with Government of Sri Lanka's policies and priorities. Hence, it has been endorsed by the Government of Sri Lanka. A copy of the endorsement letter is attached.

Dr. R. H. S. Samaratunga Secretary, Ministry of Environment and Focal Point, The Adaptation Fund	Date:
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B. IMPLEMENTING ENTITY CERTIFICATION

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, understand that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this Project.

Implementing Entity Coordinator Adnan Khan Country Director World Food Programme, Sri Lanka	
Date:	Tel:
Project Contact Person:	
Tel: E-mail:	

LIST OF ANNEXES:

Annex 1:	Output Budget
Annex 2:	National Climate Change Adaptation Strategy of Sri Lanka
Annex 3:	Climate Change Profile of Sri Lanka
Annex 4:	Vulnerability Maps
Annex 5	Letter of Endorsement by the Designated Authority

Annex 1: Output Budget

Project title: Reducing Vulnerability of Communities and Ecosystems to the Adverse Impacts of Climate Change in Critical River Basins of Sri Lanka				
Outcome Project/Activity	Responsible party Implement. agent	Donor Name	Budget Description	Total (USD)
Outcome 1: Protecting and sustaining critical ecosystems by reforestation and soil conservation				
Specific Objective 1: Protecting and sustaining critical ecosystems through reforestation, soil conservation, and other complementary measures which restore ecosystem integrity, functions and services thereby increasing the resilience of the ecosystems to climate change impacts				
1.1 1000 ha Barren and denuded hill tops in the high and medium elevation watersheds reforested and protected as conservation areas	DF/MoE	Adaptation Fund		740,000
1.2 30,000 ha Soil conservation measures (biological and mechanical) implemented in fragile upper catchments.				950,000
1.3 300 km Degraded river banks stabilized				450,000
1.4 Forest fire belts developed protecting 3000 ha				284,000
1.5 Natural forest boundaries surveyed, demarcated 800 km				550,000
1.6 300 ha mangrove habitats rehabilitated and protected				340,000
				Sub Total Component 1

Component 2 Strengthening the resilience of communities through sustainable energy services				
Specific Objective 2: To strengthen the resilience of watershed communities to climate change impacts through energy services which maintain the protective functions of their surrounding ecosystems				
2.1. Individual and community timber farms in 750 ha	DF/MoE	Adaptation Fund		900,000
2.2. 200 ha Agro forestry fuel woodlots in the dry zone catchment and coastal areas				195,000
2.3 20,000 Fuel efficient wood stoves				200,000
Sub Total Component 2			1,295,000	
Component 3 Strengthening the resilience of communities through adaptive agro forestry and water and soil management				
Specific Objective 3: To strengthen the resilience of watershed communities within the project area to climate change impacts through sustainable agro forestry and conservation of freshwater resources				
3.1 12000 Climate resilient home gardens (covering 2,400 ha) developed and improved.	DF/MoE Dept. of Agrarian Development	Adaptation Fund		440,000
3.2 Village nurseries in 50 communities established, producing 750,000 plants				412,500
3.3 Rehabilitation of 50 communal water reservoirs				932,500
Sub Total Component 3			1,785,000	
Component 4: Strengthening the awareness and skills of communities, government, and non-government organizations to effectively address climate change induced risks in local development planning				
Specific Objective 4: To map vulnerability hotspots within the project area and increase knowledge and capacity of communities, CBOs, and local-level officers and NGOs to manage climate impacts on ecosystems and risks affecting livelihoods and food security of communities.				
4.1. Climate change vulnerability hotspots identification.	DMC, DF/MoE and Dept. of Agriculture	Adaptation Fund		50,000
4.2. Water resource inventories and management plans for at least 100 communities in climate change hot spots				80,000
4.3. Increased awareness of target communities on climate change risks and impacts, and improved access to adaptation practices				110,000
4.4. National, district and local government planners, development agencies, NGOs and community leaders cooperate to incorporate climate change adaptation into local development planning				50,000
Sub Total Component 4			290,000	

Subtotal Components 1-4		6,784,000
Project Execution Costs		
	Project Coordinator	83,480
	Project Monitoring and Evaluation	110,000
	Project Operations and Management	451,000
	Total Project Execution Costs (9.5 percent)	644,480
Total Project Cost		7,428,480
Indirect Support Costs (7.5 percent)		554,075
Amount of Finance Requested		7,982,555

Annex 2: National Climate Change Adaptation Strategy for Sri Lanka 2011 to 2016 (A summary)

Sri Lanka is highly vulnerable to the impacts of climate change. The impacts include:

- ❖ increases in the frequency and intensity of disasters such as droughts, floods and
- ❖ landslides;
- ❖ variability and unpredictability of rainfall patterns;
- ❖ increase in temperature; and
- ❖ sea level rise, among others.

These vulnerabilities cut across many sectors in the economy, and threaten to compromise the significant achievements the country has recorded in the last 20 years in increasing incomes and reducing poverty.

The National Climate Change Adaptation Strategy (NCCAS) addresses climate change adaptation issues and presents a comprehensive strategy to ensure that the country's socio-economic development goals, objectives, and targets can be achieved without setbacks. The adaptation strategy aims to systematically move Sri Lanka and its people towards a climate-change resilient future.

The strategy development was based on five guiding principles, namely:

- ◇ *Pursuing pragmatic solutions, in line with the national development agenda – the NCCAS will support the successful implementation of the Mahinda Chintana, a national development framework that ensures sustainability for the long term. The NCCAS should also support the National Physical Planning Policy and Plan (NPPP), the National Environment Policy and associated action plan, as well as the National Action Plan for Haritha Lanka Programme (HLP).*
- ◇ *Initiating process to mobilize significant investments* - consistent efforts will have to be made to elevate thinking above a mere advocacy agenda, and to focus on rational means to safeguard Sri Lanka's national interests and mobilize resources to support and sustain development.
- ◇ *Mobilizing people/institutions to work towards integrated solutions* - focusing on stimulating stakeholder interest and initiative to identify climate change risks and adaptation measures across key sectors. Efforts should be made to capture synergies, and position Sri Lanka to take advantage of opportunities to mobilize resources to support climate change adaptation.

Harnessing the wealth of expertise and knowledge already available in Sri Lanka - The strategy development process acknowledges that a vast body of knowledge resides with a dispersed and diverse range of stakeholders and experts. All efforts should be made to consult a broad base of stakeholders.

- ◇ *Contributing towards developing the nation* - Adapting to climate change is a contribution towards developing the nation. As such, the process has to consistently adopt a proactive stance in engaging stakeholders across all sectors and seeking ways to ensure

that Sri Lanka's development trajectory can be supported and made more climate change resilient.

The strategy is structured into five Strategic Thrusts:

1. Mainstreaming Climate Change Adaptation into National Planning and Development

Includes cross cutting policy measures, capacity building, safeguards, monitoring programs, coordination mechanisms, etc

2. Enabling Climate Resilient and Healthy Human Settlements - Includes housing, urban development and planning, public health, drainage, drinking water, urban wetlands, waste management, pollution control, etc.

3. Minimizing Climate Change Impacts on Food Security - Includes agriculture, fisheries, irrigation, nutrition, etc.

4. Improving Climate Resilience of Key Economic Drivers - Includes tourism, transport, power, commercial agriculture, etc.

5. Safeguarding Natural Resources and Biodiversity from Climate Change Impacts - Includes water resources management, biodiversity conservation, etc.

Under each of the Strategic Thrusts, key Thematic Areas for action, along with priority Adaptation Measures, have been identified. A pipeline of projects related to each Strategic Thrust has also been developed as part of the NCCAS, to expedite investment.

The Following Table summarizes the priority actions under each of the above strategic thrusts.

Strategic Thrust Area 1. Mainstreaming Climate Change Adaptation into National Planning and Development.
<p><i>A. Strengthening national climate-adaptation planning and implementation capacity</i></p> <ul style="list-style-type: none"> i Strengthen and restructure CCS ii Develop of sector specific training programmes on CC adaptation measures iii Introduce climate change studies at university level <p><i>B. Ensure future investments/economic plans are climate resilient</i></p> <ul style="list-style-type: none"> i Incorporate CC concerns into SEA processes ii Increase knowledge and understanding of CC among planners and senior technical staff iii Quantify economic costs of CC on specific sectors <p><i>C. Systematically research climate change-adaptation options and disseminate knowledge</i></p> <ul style="list-style-type: none"> i Establish coordinated multidisciplinary research programme with widespread dissemination ii Model possible future climate scenarios iii Conduct regular national forums on climate impacts on various sectors iv Capture, evaluate and disseminate traditional knowledge on adaptive measures <p><i>D. Increase financing for CC adaptation</i></p> <ul style="list-style-type: none"> i Strengthen NPD/ERD to pursuit financing for climate change adaptation ii Establish CC adaptation small grant facility

- iii Establish a multi-sectoral climate negotiation team for Sri Lanka
- iv Support CC adaptation regulations with incentives, wherever possible

E. Inform and mobilize stakeholders at multiple levels in support of climate adaptation

- i Effectively engage education system, media and other information ‘multipliers’
- ii Make information about adaptation options available at community level
- iii Promote policy change for CC adaptation through small group engagement
- iv Engage existing institutional and community-based mechanisms for coordination of adaptation activities
- v Combat negative anthropogenic activity (such as sand mining)

Strategic Thrust Area 2. Enabling Climate Resilient and Healthy Human Settlements

A. Mobilize stakeholders for CC adaptation of settlements

- i Establish coordination body/mechanism for CC adaptation of settlements
- ii Promote improved climate resilient construction methods
- iii Support CC adaptation interventions with incentives

B. Improve planning to include CC considerations

- i Develop detailed local-level hazard maps for key settlements
- ii Upgrade drainage in key settlements
- ii Stimulate greening and increase of canopy cover in settlements and preserve natural ecosystems
- iii Promote land use planning and monitoring for both urban and rural areas
- iv Research CC impacts on human settlements and link to planning

C. Ensure adequate quality and quantity of water for settlements

- i Promote water saving technologies including rainwater harvesting
- ii Improve monitoring/surveillance and sharing of data across sectors
- iii Promote integrated water resources and watershed management
- iv Research climate impacts on water availability and develop scalable adaptation models

D. Combat climate change-related health concerns in settlements

- i Monitor and control vector borne diseases
- ii Facilitate data sharing and compatibility between Ministry of Health and other sectors
- iii Engage health sector experts in local level planning
- iv Research health impacts of CC in Sri Lankan context

E. Increase awareness on vulnerabilities and adaptation of settlements

- i Improve the gathering, processing and dissemination of information related to human settlements
- ii Enhance awareness and demand for climate resilient construction
- iii Improve coordination/dissemination through existing institutional mechanisms
- iv Engage media more proactively with messaging tailored for stakeholders

Strategic Thrust Area 3. Minimizing Climate Change Impacts on Food Security

A. Ensure ability to meet food production and nutrition demand

- i Promote alternative options to meet nutrition requirements
- ii Improve weather forecasting and information dissemination

- iii Ensure easy access to seedstock alternatives/advice to counter rainfall variability
- iv Research climate impacts/adaptive measures for agriculture, livestock and fisheries sectors
- v Conserve genetic resources for future crop and livestock improvement

B. Ensure adequate water availability for agriculture

- i Promote water-efficient farming methods and crops
- ii Improve maintenance of existing tanks and reservoirs including their watersheds and catchments
- iii Adopt and promote the principles of IWRM
- iv Construct new reservoirs and trans-basin diversions to meet demand

C. Mitigate food security-related socioeconomic impacts

- i Encourage development of risk transfer methods
- ii Research climate impacts on long-term food security and agriculture value chains
- iii Identify and help vulnerable fishing communities to adapt or relocate

D. Increase awareness and mobilize communities for CC adaptation

- i Increase awareness on climate impacts on food security and on the potential adaptive measures.
- ii Pilot test and scale up community level agriculture/livestock/fisheries adaptation models
- iii Improve utilization of field level coordination mechanisms and civil society organizations
- iv Promote risk transfer initiatives

Strategic Thrust Area 4. Improving Climate Resilience of Key Economic Drivers

A Minimize impacts of CC on infrastructure

- i Identify CC risks on transport infrastructure, and invest in adaptive measures
- ii Update standards/guidelines for infrastructure design and development
- iii Include CC adaptations in tourism planning guidelines

B Minimize impacts of CC on plantation sector

- i Research climate impacts and adaptive measures in plantation sub-sectors
- ii Pilot test and scale-up sub-sector specific adaptation measures
- iii Evaluate and exploit potential productivity benefits due to CC

C Assist key industries in coping with CC impacts

- i Make sector-specific climate vulnerability information available to investors/regulator
- ii Encourage CC risk transfer options for key industries
- iii Research potential CC impacts/adaptive measures for key industries
- iv Offer incentives for industrial energy saving practices and renewable energy usage

D Raise awareness about climate vulnerability in key economic sectors

- i Increase CC awareness at all levels
- ii Build capacity for CC adaptation in key economic sectors
- iii Engage wider stakeholders in dialogue on climate adaptation

Strategic Thrust Area 5. Safeguarding Natural Resources and Biodiversity from Climate Change Impacts

A Ensure adequate quality and quantity of water for human wellbeing and ecosystem services

- i Promote efficient water resource use and development using IWRM
- ii Promote research partnerships on good practices for varied water uses
- iii Strengthen/establish an institution to coordinate management of water resources

B Enhance CC resilience of terrestrial ecosystems and their services

- i Link/restore/conserves, forests and other habitat refugia to increase resilience of ecosystems and species
- ii Convert monoculture forest plantations into mixed species plantations
- iii Promote land use planning for biodiversity conservation and limit inappropriate vegetation conversion
- iv Establish and/or effectively manage PAs and other important wildlife refuges in all climatic zones

C Enhance the resilience of coastal and marine ecosystems and associated vulnerable species

- i Promote integrated coastal resource management, particularly at SAM sites
- ii Restore and rehabilitate degraded coastal ecosystems and depleted coastal species

D Enhance CC resilience of natural inland wetlands and associated species

- i Protect marshes/flood retention areas in urban areas and limit land conversion.
- ii Prevent discharge of industrial effluents and solid waste into inland wetlands
- iii Control and manage salt water intrusion into coastal freshwater wetlands
- iv Strengthen coordination and streamline management of wetlands across relevant agencies

E Address socioeconomic concerns resulting from CC impacts on biodiversity

- i Identify and address CC impacts on biodiversity that affect local communities
- ii Help communities to adapt to changes in livelihoods or to relocate when necessary

F Research, monitor and address impacts of CC on biodiversity

- i Research and monitoring programs to strengthen knowledge base on CC and terrestrial biodiversity
- ii Research and monitoring programs to strengthen knowledge base on CC and aquatic biodiversity
- iii Minimize entry, establishment and spread of IAS

G Raise awareness & mobilize stakeholders for conservation of biodiversity and ecosystem services.

- i Focus on minimizing current stresses on ecosystems
- ii Promote training and awareness on use of the ecosystem approach for conservation
- iii Build capacity for climate adaptation research among students and staff of conservation agencies
- iv. Increase public awareness about the value of aquatic and marine ecosystems
- v Engage in dialogue with wider stakeholders

Financing requirements and implementation targets

The NCCAS lays out a framework for action for the 2011-2016 period, with the aim of moving Sri Lanka towards a climate change resilient future. Adaptation to climate change requires concerted action from many corners of Sri Lankan society including politicians and leaders, government agencies, NGOs, researchers, academia, the private sector, as well as

communities and households. The NCCAS is expected to lay a broad framework for coordinating and mobilizing this range of stakeholders around a prioritized framework of action.

An estimated 47.7 billion rupees in incremental additional financing, beyond current and ongoing expenditure, will be required to implement the NCCAS over its 6 year duration. This resource pool is expected to include investments from Government, international development partners, NGOs, as well as the private sector.

Estimated Financing Requirements (Rs. millions)

Strategic Thrust	2011	2012	2013	2014	2015	2016	Total
1: Mainstream CC Adaptation into National Planning & Development	50	554	669	637	820	820	3,550
2: Enable Climate Resilient & Healthy Human Settlements	91	496	2,768	2,434	2,398	2,098	10,285
3: Minimize Climate Change Impacts on Food Security	8	183	2,123	1,690	1,755	7,215	12,974
4: Improve Climate Resilience of Key Economic Drivers	160	375	3,785	3,610	3,875	3,375	15,160
5: Safeguard Nat. Resources & Biodiversity from CC Impacts	20	219	279	1,652	1,770	1,790	5,730
Total	329	1,837	9,604	10,023	10,618	15,298	47,699

The vast majority of these financial resources are expected to be channeled directly to the broad base of agencies and stakeholders (both within Government and beyond), to finance and implement climate change adaptation interventions of varied scale. Such interventions would range from discrete stand-alone projects aimed at climate change adaptation, to add-ons to ongoing projects to bolster their climate resilience. The Ministry of Environment will play a facilitation and coordination role in the process.

Annex 3: Climate change profile of Sri Lanka

Sri Lanka is an island located at the southern tip of India, between 5° 55' and 9° 50' North and 79° 42' and 81° 53' East. The land area of the island is 62,705 sq km; its July 2006 population estimate was 20,222,240 with a growth rate of 0.78%. Three topographic zones, namely the central highlands, the plains, and the coastal belt are distinguished by elevation.

The annual average rainfall varies from below 1000mm (39") over a small region in the arid parts of the north-west and south-east of the island to over 5000mm (197") in a few places on the south-western slopes of the central hills. There is little seasonal variation of temperature. The mean annual temperature in the coastal areas below 150 m in elevation ranges from 26.0°C to 28.0°C while in the hill country above 1500 m, it ranges from 15.0°C to 19.0°C.

On the basis of rainfall distribution, the country is classified into three climatic zones, namely, the Wet Zone, the Dry Zone and the Intermediate Zone. The Wet Zone covers the south-western region including the central hill country and receives relatively high mean annual rainfall over 2,500 mm without pronounced dry periods. The Dry Zone covers predominantly the northern and eastern part of the country, receives a mean annual rainfall of less than 1,750 mm with a distinct dry season from May to September. The Intermediate zone receives a mean annual rainfall between 1,750 to 2,500 mm with a short and less prominent dry season (Figure 1).



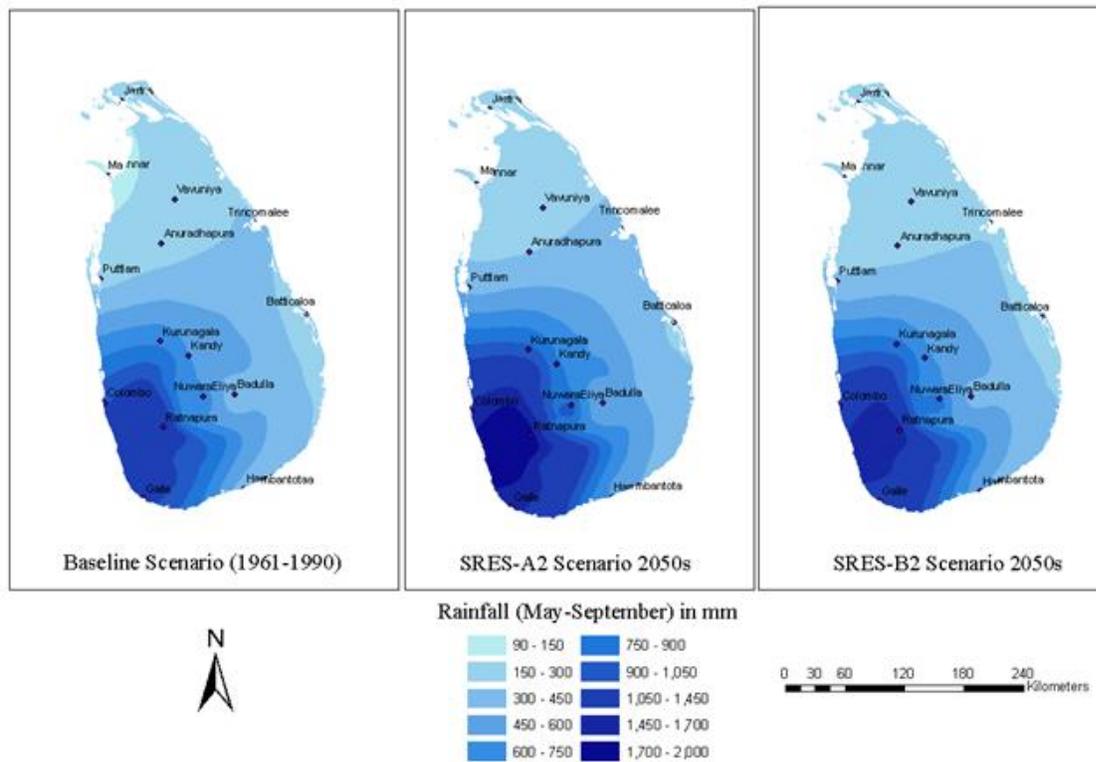
The rainfall distribution is influenced by convectional precipitation (inter-monsoonal) and two monsoons. These are (i) the northeast monsoon season (NEM) during December to February; (ii) the 1st inter-monsoon season (IM1) in March and April; (iii) the southwest monsoon season (SWM) during May to September; and (iv) the 2nd inter-monsoon season (IM2) in October and November. Monsoon rains accounts for nearly 55 percent of the annual precipitation in Sri Lanka.

There is evidence to suggest that Sri Lanka's climate has already changed. Some recent studies have estimated decrease in MAP by 144 mm (7%) during the period 1961-1990 compared to that estimated for the period 1931-1960, and higher variability is evident

There is wide disparity in the magnitude of changes that have taken place in different rainfall seasons and different spatial locations. Although no significant changes in rainfall amount have been observed during the SWM (mean 546 mm) and IM2 (mean 548 mm), rainfall in the NEM (the Maha season when the majority of agricultural areas in the country receive rainfall - mean 459 mm) and IM1 (mean 260 mm) has reduced, with NEM showing increased variability.

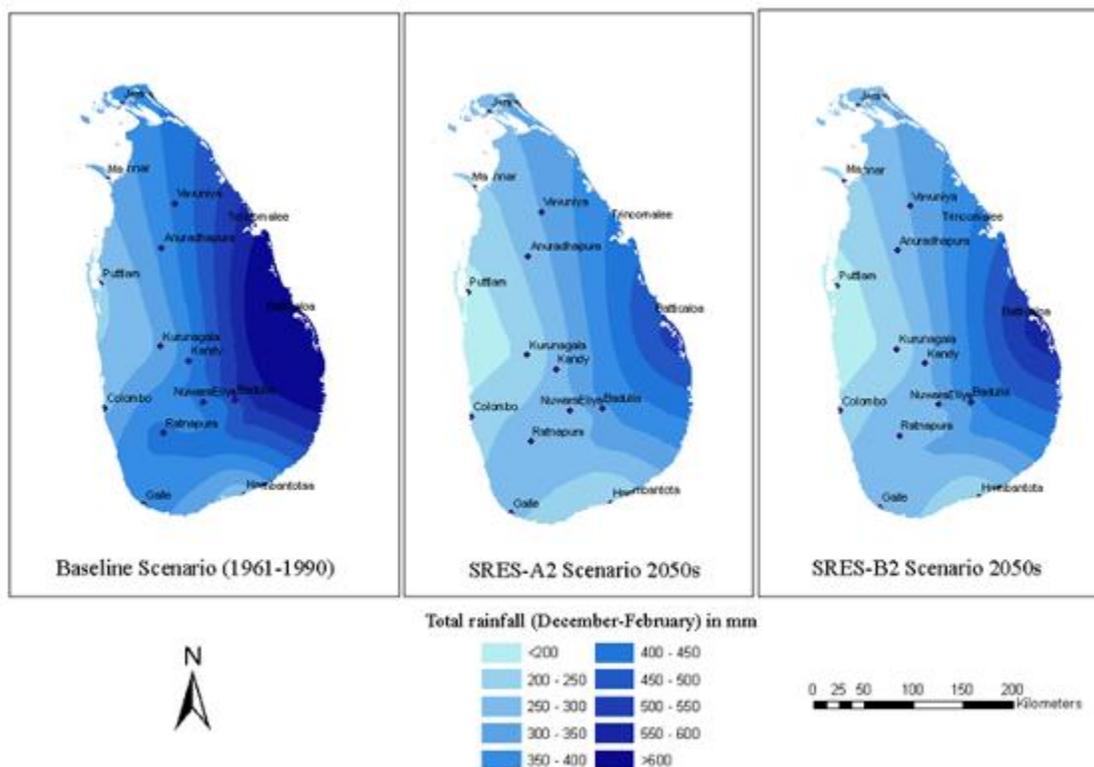
Predictions indicate a likely increase in precipitation during the SWM and IM2 seasons and decrease in precipitation during the NEM and IM1 seasons. By 2050, according to Shanthi De Silva, there could be 38% and 16% of increased wetness during SWM and IM2 seasons, shown in Figure 2.

Figure 2. Predicted rainfall during the SWM season.



The same author predicts precipitation during the North Eastern Monsoon (Dec. – February) will decrease by 34% and 26% as per A2 and B2 scenarios by 2050, as presented in Figure 3.

Figure 3 Predicted decrease in rainfall



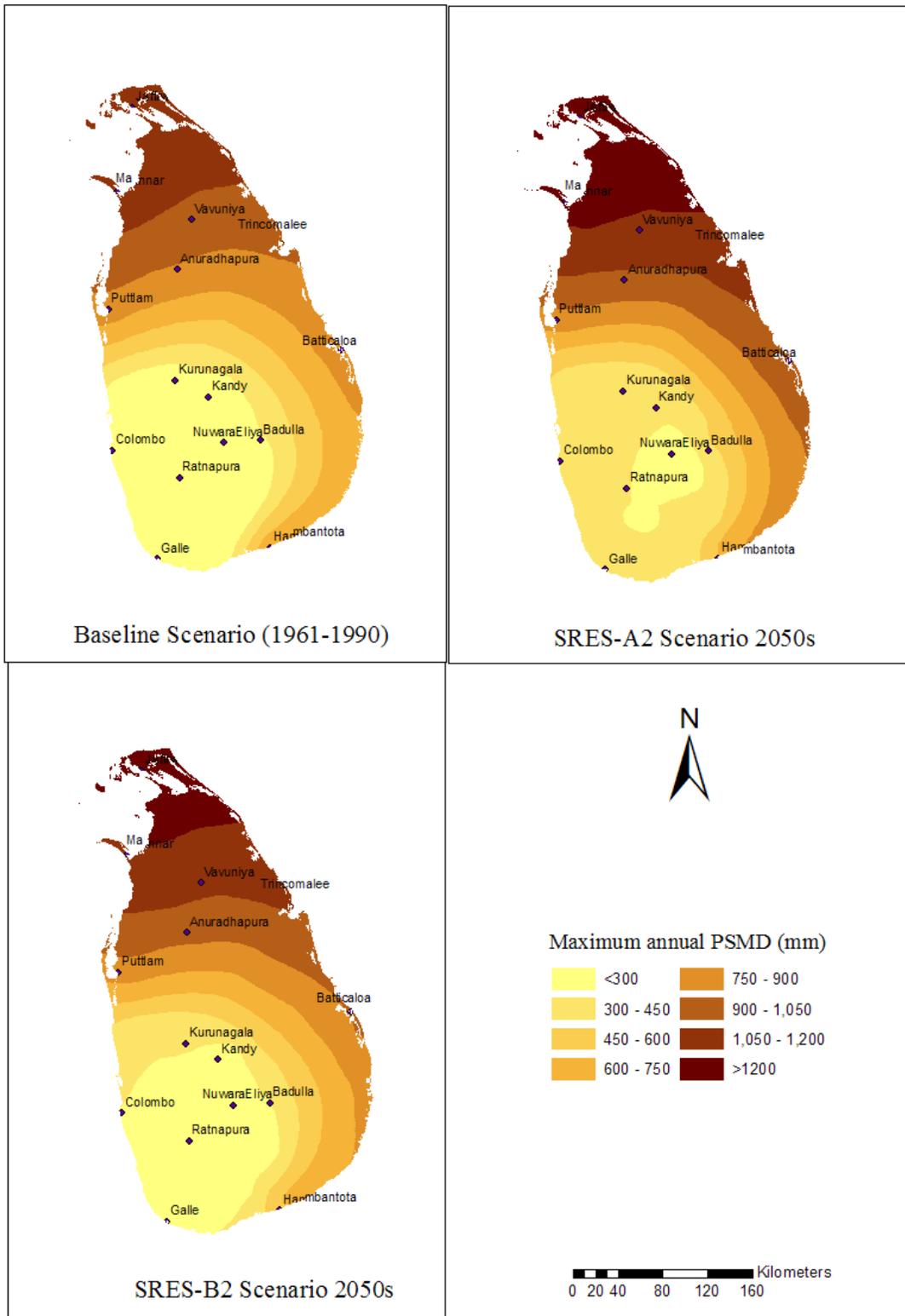
Time series of annual mean temperature anomalies from 1871-1990 show a significant warming trend at most places in the country during the latter half of this period. The rate of increase in temperature from 1961 to 1990 is 0.016 °C per year, while the global average for the period 1956-2005 is 0.013 °C per year. Table 1 below illustrates the predicted annual temperature changes under the A2 scenario.

Table 1 predicted annual temperature changes under the A2 scenario.

Increment over the baseline			
2025	2050	2075	2100
0.4 °C	0.9 °C	1.6 °C	2.4 °C

Reduced and erratic rainfall combined with raised temperature is likely to cause soil moisture deficit in the dry zone. Highest soil moisture deficit (SMDmax) is located in the northern and eastern parts where agricultural activities are intensive and availability of water resources are

under severe pressure. Figure 4 illustrates the likely soil moisture deficit by 2050 (Shanthi De Silva)



Impact of climate change in agriculture is generally predicted negative for the paddy sector resulting in significant losses in paddy production which depends on the NEM, rainfall (located in the dry zone) while predicted gains in the plantation sector. The Munasinghe Institute's prediction is presented in Table 2.

Table 2 National level impact on agriculture – revenue in 2050 impacted by climate change.

Crop	Temperature Effect	Rainfall Effect	Temp. Plus Rainfall Effect
Paddy (Rice) (dry zone – poorer)	-3.5%	-7.8%	-11.4%
Plantation Crops (wet zone – richer)	+1.5%	+2.0%	+3.5%

The predicted impact on agriculture by 2050 has far reaching policy, as summarized in the box below (Munasinghe Institute)

Box 1 Policy implications deriving from climate change impacts on agriculture.

Some Key Policy Implications

- 1. Moderate overall impact on agricultural output and national economy, but some effects will emerge within next two decades**
- 2. Significant potential risk to food security (rice)**
- 3. High poverty impact on small farmers**
- 4. Equity impact (small rice farms versus large tree crop plantations)**
- 5. Demographic impact (potential migration from dry to wet zone)**

Annex 4: Climate Vulnerability Maps

Vulnerability is defined as: “The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity” Therefore, vulnerability can be expressed as a function of exposure, sensitivity, and adaptive capacity.

The International Water Management Institute (IWMI) carried out a preliminary study on the impacts of climate on change on water resources and agriculture in Sri Lanka, including a review and preliminary vulnerability mapping. The study considered an index of climate change vulnerability, composed of three additional sub- indices representing exposure, sensitivity and adaptive capacity, namely, droughts, floods and cyclones and a combined hazard index, combining the frequency of droughts, floods and cyclones called multihazards.

The procedure of constructing the index is similar to that of the Human Development Index of UNDP in which the values of each component indicator is normalized to the range of values in the dataset. Each component indicator and the final CC Vulnerability Index will have a value of 0-100 with 100 implying maximum vulnerability.

In the following, the vulnerability maps for droughts, floods and cyclones and multihazards are presented.

Figure 1 Composite vulnerability index for drought exposure.

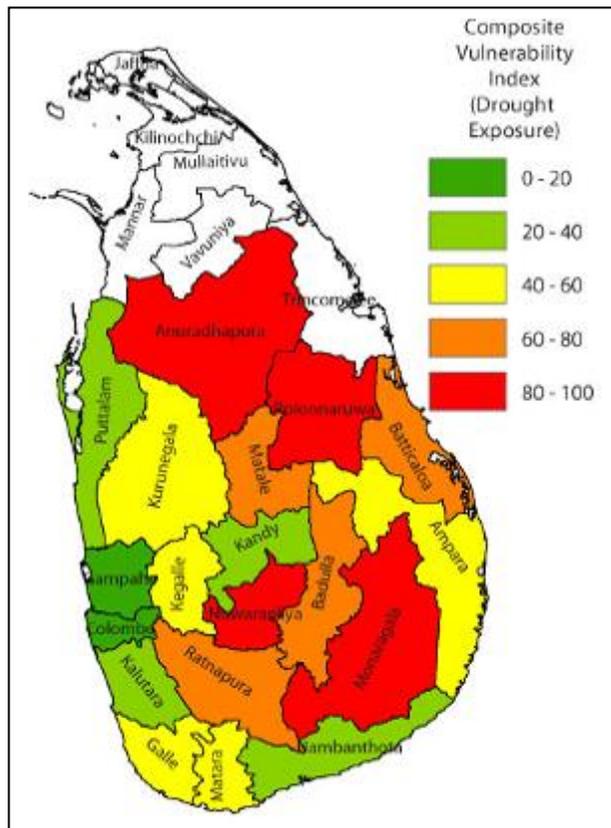


Figure 2 Composite vulnerability index for flood exposure.

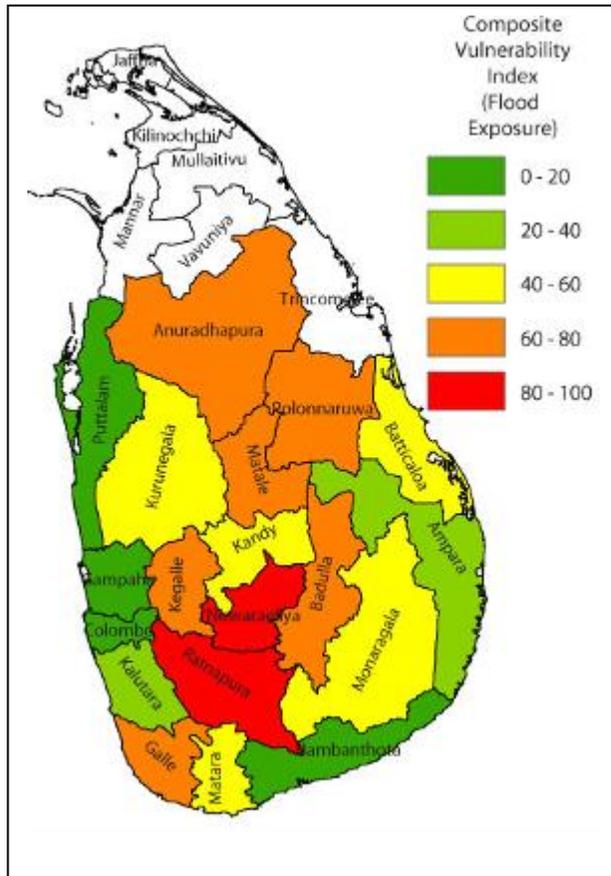


Figure 3 Composite vulnerability index for cyclone exposure.

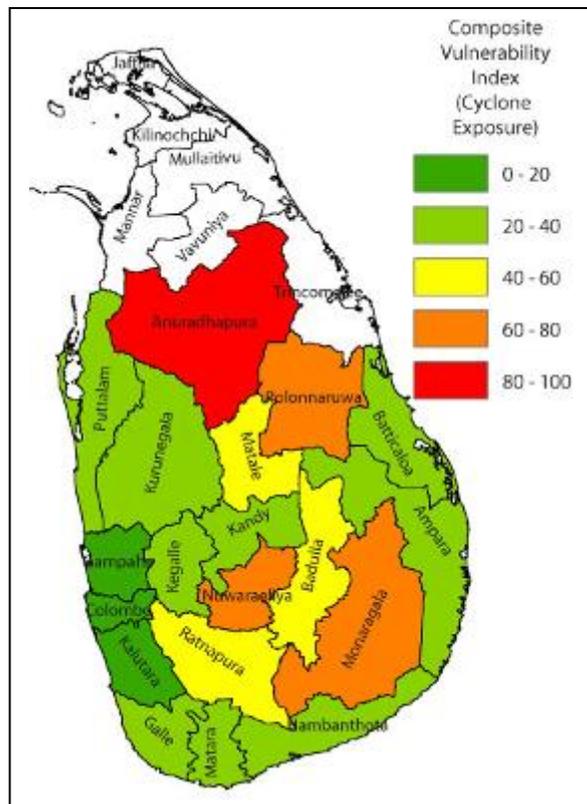
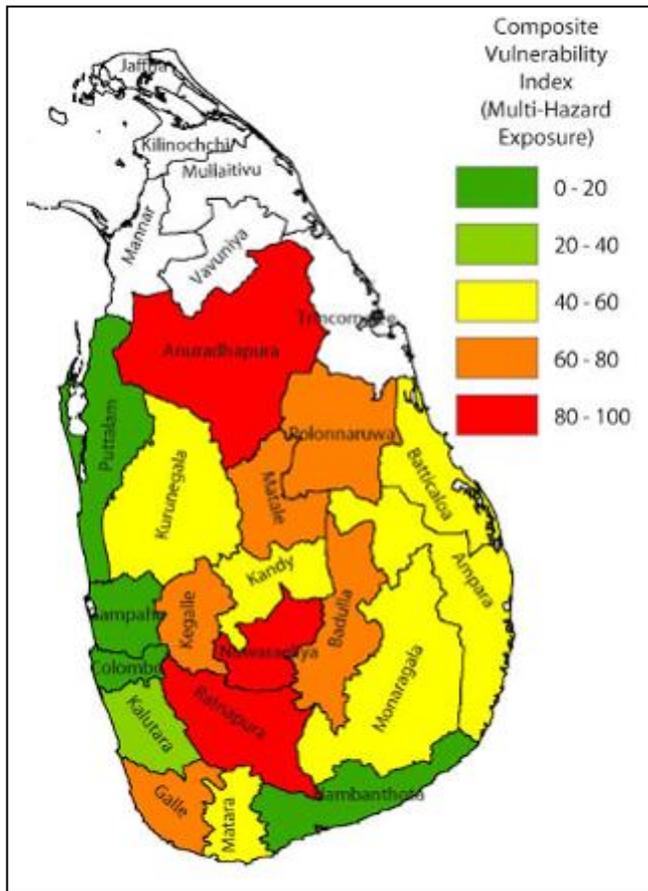


Figure 4 Composite vulnerability index for multi-hazard



Annex 5: Letter of Endorsement