

**CLIMATE CHANGE THEMATIC
REPORT ON THE NATIONAL
CAPACITY NEEDS SELF-ASSESSMENT
(NCSA) FOR KENYA**

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Executive Summary

Since the early 1970s, there have been growing concerns regarding the accelerated and sometimes irreversible degradation of the natural environment. By the late 1980s, concerns focused on atmospheric pollution and global warming/climate change, contamination of water bodies, harmful methods of solid waste disposal, destruction of biodiversity, land degradation and desertification. Thus, identification of the systemic, institutional and individual capacities that is required to support national environmental sustainability and development has become priority issues on the global agenda today.

The Global Environmental Facility (GEF) Council of the United Nations has therefore approved financing for the Capacity Development Initiative to propagate a better understanding of the scale and scope of capacity development needs in respect of the UN Conventions on Biodiversity (CBD), Climate Change (UNFCCC) and Desertification (CCD); to better equip GEF-eligible states to address their unique environmental concerns; and then to move forward strategically to respond comprehensively to their sustainable development needs. This led to the commencement of the National Capacity Self-needs Assessment (NCSA) program in Kenya. The objective of the NCSA in Kenya is therefore to assess capacity needs and priorities with respect to the global environment and within the context of sustainable development so that Kenya can meet the requirements of the Global Environmental Conventions in a coordinated and strategic manner.

Pertinent climate change issues were identified and prioritized according to their implications on the strategic planning needs in the country. Key national developmental strategy documents show that alleviation of poverty and hunger, human health, environmental sustainability and international concerns are given high priorities in all the national development plans. These were therefore objectively weighted and used as the criteria for the prioritization of the climate change issues. The prioritization process yielded the following ranking (in the order of their significance in the national development) of the climate change issues:

1. Vulnerability and Adaptation
2. Research, Systematic Observations and Data Management
3. Awareness and Understanding of Climate-Change Issues
4. Climate-Change Strategies and Policy Framework
5. Transfer of Environmentally Sound Technologies
6. Climate-Change Convention Negotiating Capacity
7. GHG Inventories, Abatement, Sinks & Sequestration
8. Clean Development Mechanism
9. Synergies in the Multilateral Environmental Conventions

This report gives an assessment of the capacity needs in each of these prioritized climate change issues at the systemic, institutional and individual levels. The report also gives a National Action Plan that describes in practical terms the activities that should be implemented to address the capacity constraints identified in the assessment.

1 Introduction

Kenya ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 30th August 1994 thereby signifying her determination to join the international community in combating the problem of climate change. The ultimate objective of the Convention is"Stabilization of the greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"

1.1 The UNFCCC

The UNFCCC includes commitments for all signatory Parties and additional commitments for Annex I countries (industrialized countries plus countries with economies in transition mainly Central and Eastern Europe) and Annex II countries (only industrialized countries) Annex II countries include support to non-Annex I countries to meet their obligations under the Convention.

1.2 UNFCCC Commitments

Parties to the Convention commit themselves to undertake a number of activities to respond to climate change. The main activity of the Non-Annex I countries is to communicate to the Conference of the Parties information on: -

- National inventories.
- A general description of steps envisaged to implement the Convention and other relevant information to achieve the objectives of the Convention. These activities are linked to the fulfillment of Articles 4,5,6 and 12 of the Convention and among the most important elements include: -
 - i. Preparation and implementation of abatement plans on climate change.
 - ii. Integration of climate change consideration into the development of environmental, social and economic policies, that is, in development policies.
 - iii. Promoting the sustainable management of sinks and GHG reservoirs.
 - iv. Promoting research and cooperation in information exchange.
 - v. Development of education, training and public awareness raising programs.
 - vi. Promoting and developing research and systematic observation.

These activities are related to seeking and processing of information, building long-term scenarios, identification and evaluation of abatement options and strategies, climate change vulnerability evaluation of the most likely scenarios, policy design for the implementation of abatement and / or adaptation activities, evaluating the social and economic impacts of activities that are to be implemented and integrating them into the global and sector objectives, evaluating the viability of the scenarios foreseen.

The execution of these obligations implies that Kenya should have the human, organizational, institutional and scientific resources for developing the tasks and functions on a permanent basis.

Additionally, Parties included in Annex I have to: -

- Adopt national policies and take corresponding measures to limit the anthropogenic emission of GHGs and protecting and enhancing its GHG sinks and reservoirs.
- Submit a first communication with six months of the entry into force of the UNFCCC and every three years thereafter. They do have to submit GHG inventories every year through.

- Include a detailed description of policies and measures and specific estimates of the effects of those policies and measures to the national communications.

Annex II Parties are obliged to provide new and additional financial resources: -

- To meet the agreed full costs incurred by developing country Parties in complying with their commitments in submitting their national communication.
- To meet the costs of implement climate change protection measures by the developing country Parties.

1.3 Additional Commitments of the Kyoto Protocol

Annex I Parties have the following commitments toward climate change protection and sustainable development: -

- The implementation of energy efficiency measures.
- Promotion of renewable of energy sources.
- The enhancement of sinks and reservoirs.
- The reduction of market imperfections.

Each of the Annex I Parties shall include in their national communications: -

- An annual inventory of anthropogenic emission by sources and removals by sinks by GHGs.
- Information to demonstrate the compliance with its commitments under the protocol.

Article 3 of the Kyoto Protocol commits Annex I Parties to decrease their aggregate emission of GHGs by at least 5% below 1990 levels in the commitment period 2008 to 2012. This reduction will be based on the net changes of GHG emissions by sources and removals by sinks. Emission reduction or limitation targets are based on the sum of six GHGs (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆).

Countries with economies in transition have the option of choosing another base year, which has to be indicated in their first national communication.

The Kyoto Protocol introduces some mechanism to facilitate Annex I Parties achieve their commitments. The most important are the Joint Implementation (JI) and the Clean Development Mechanism (CDM).

The principle of Joint Implementation is defined as follows: -

- Gives Annex I Parties the option of acquiring from each other emission reductions units resulting from projects aimed at reducing GHG emission by sources or enhancing anthropogenic removals of GHG by sinks.
- Joint Implementation will make it possible to reach GHG emission reductions in those countries where the lowest abatement costs exist.

The purpose of the CDM is defined as follows: -

- To assist Non-Annex I countries in achieving sustainable development and in contributing to the ultimate objective of the UNFCCC.
- To assist Annex I countries in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.

2 General Issues for Addressing Global Environmental Convention Obligations

National issues and priorities are closely related to different situations. Commitments under the Convention and the Kyoto Protocol require an understanding of the expected vulnerability to climate change under different socio-economic conditions.

Many communication issues can be seen to run across Non-Annex I Parties, Kenya included. These include: -

- The expected potential adverse effects of climate change.
- Priority issues being economic and social dimension of sustainable development.
- Making profound transformations in economic system.
- Creation of environmental structures at a time when there are reforms going on including the downsizing of the governmental capacity.

On potential impacts of climate change, countries are generally divided into four groups, namely:

- **Small Island Developing States (SIDS)**
- **Semi-Tropical Areas**
- **Tropical Areas**
- **Arid Lands**

SIDS are countries or islands with important low coastal zones, the major climate change issues is the exposure to the adverse impacts of sea level use and other geophysical climate-related hazards such as shifting rainfall patterns and typhoons.

It is projected that in the **Semi-Tropical Areas**, under a globally warming world, there will be shifts in forest cover and grasslands, reduction in livestock production, vanishing mountain glaciers and threats to water supply. One of the crucial determinants is the impact of a warming earth and the El Nino – Southern Oscillation (ENSO). The ENSO is increasingly becoming important to Kenya for its adverse impact.

In the **Tropical Areas**, climate change stands to threaten food security and human health due to stresses on water availability, shifts in forest cover, losses in crop yield and coastal flooding. High population densities and intensity of use of coastal plains compound the impacts of sea level use such as coastal erosion, saline intrusion, and land loss. Additionally, as a consequence of the increase in the sea level, heavy losses of coastal lands and biodiversity are foreseen (including coral reefs, mangrove swamps, estuaries, wetlands, marine mammals and birdlife) as well as damage to the infrastructure and intrusion of seawater in aquifers.

In the **Arid Lands**, water is a critical limiting factor. Shifts in the hydrological cycle due to climate change may exacerbate the scarcity of this resource.

In all the four areas mentioned above, climate variability (changes in precipitation patterns and in distribution of moisture, as well as regional warming) could have negative impacts for hydroelectricity production and contribute to geographic distribution of vectors and endemic areas of infectious diseases.

Kenya has issues falling mainly in the last three areas. The climate change issues must be further interpreted in the context of socio-economic issues such as:-

- Poverty alleviation.
- Enhanced economic growth.

- Improved equity.

It can therefore, be summarized that socio-economic objectives and vulnerability to climate change are driving issues for Kenya. In order to understand these issues, a brief discussion of the socio-economic circumstances is given in the following section.

3 National Circumstances

3.1 History and Geography:

Kenya became independent on 12th December 1963. There are 42 ethnic groups each with its own culture and traditions, some of which are influenced by climate conditions. For example, some communities are predominantly farmers, while others are pastoralists, fishermen, traders, etc. These ethnic groups have, over many years, developed coping mechanisms for climatic variations.

Kenya covers an area of about 592000 km². It lies approximately between latitudes 5° north and 5° south and between longitudes 34° and 42° east on the eastern coast of Africa. The equator bisects the country into almost two equal parts. The altitude varies widely from sea level to about 5000 meters above sea level on the central highlands. Lakes occupy about 2% of total area, 18% is occupied by agriculturally high potential areas, while arid and semi-arid lands occupy the rest of the country.

3.2 Climate

The country's climate is influenced mainly by its position relative to the equator, its nearness to the Indian Ocean and Lake Victoria, and varied topography. The Inter-Tropical Convergence Zone (ITCZ) is also a major synoptic feature which also influences the climate over the country. The influence of the ITCZ is modified by the altitudinal differences, giving rise to varied climatic regimes. Annual rainfall in Kenya follows a strong bimodal seasonal pattern. Generally, the long rains occur in March to May, while the short rains occur in October to December.

3.3 Population

Kenya had a population of 28.7 million people in 1999, of which about 80% live in rural areas. The population distribution is uneven from an average of 230 persons per km² in high potential areas to an average of 3 persons per km² in arid areas. Over 50% of the population is below 15 years. However, inter-census population growth rate has declined significantly from 3.9% per annum during the period 1969 - 1979 to about 2.9% during the period 1989-1998.

3.4 Ecosystems

Kenya is endowed with a variety of habitats and ecological systems, including wildlife, forests, lakes and rivers, wetlands, farmlands, vegetation, marine life forms and micro-organisms. Tourism mainly depends on wildlife, the beach and other scenic features. The tourism sector is second to tea in foreign exchange earnings and a major employer in Kenya. Biological diversity is crucial for ecological stability including regulation of climate, economic development, recreation, medicinal use, socio cultural use and scientific advancement. Protection of ecosystems and plant diversity has the potential of enhancing climate change mitigation capacity.

3.5 Land-use

About 18% of total land area is of high to medium agricultural potential and supports about 80% of the country's population. The remaining 20% of the population live in the remaining 80% of the total land area which is arid and semi-arid (ASAL). If climate change results in reduced precipitation in Kenya, then it is anticipated that the area of ASAL will increase, while the high potential ones would diminish in size.

3.6 Social Economic

3.6.1 Health

The overall health policy in Kenya is to promote and improve the health status of all Kenyans by making all health services more effective, accessible and affordable. The strategy for achieving this has been to increase the budget to the health sector and also to create an enabling environment for increased private sector, NGOs and community involvement in the provision of health services. The Government continues to improve the health-facility based services by expanding the facilities and training the personnel working at health facilities and those based at the community level. The government and other health service providers are putting more emphasis on the preventive than curative approaches. The government has therefore intensified the monitoring programs and initiatives on most of the preventable diseases which have been very successful in curbing epidemics of malaria and water borne diseases. However, malaria and water borne-disease outbreaks continue to be a major concern to the government. Malaria is spreading further into highland areas which never used to experience any cases of the malaria outbreaks, perhaps due to increasing temperatures. On the other, cases of water-borne disease outbreaks seem to be increasing with the increasing frequency of rainfall extremes in most parts of the country.

The HIV/AIDS scourge in Kenya can no longer be underrated. The country faces high rate of HIV infections. However, the Government aims at slowing down and eventually halting the progression of the AIDS epidemic in the country. It is hoped that this will be achieved through information, communication and education of the people on measures to control and prevent HIV/AIDS infections. The HIV prevalence rate rose by 4.0 percentage points from 9.9% in 1994 to 13.9% in 1998. Urban areas recorded the highest HIV prevalence rate of 18.1% in 1998 compared to 13.0% recorded in rural areas. However, the rate of growth of HIV infections in rural areas is higher than that of the urban areas. It grew by 4.3% from 8.7% in 1994 to 13.0% in 1998 in rural areas as opposed to the growth of 3.6% recorded in urban areas in the same period.

3.6.2 Education

The current economic conditions have adversely affected education in terms of access, enrolment and completion rates. This has caused deterioration in human resource development hindering adequate contribution of education sector to overall information dissemination and growth in the economy. The government policy in the education sector has therefore been to strengthen literacy in the country through the reduction in costs of education borne by parents and to increase bursary fund to cater for the girl-child and other disadvantaged groups. Grants in aid to secondary schools in Arid and Semi Arid regions and pockets of poverty in high potential areas have been increased. It is hoped that the increased level of literacy will ease many of the problems faced in disseminating important information and in awareness creation.

3.6.3 Energy

Demand for energy in Kenya outstrips supply. This poses major challenges to the government. This is mainly attributed to the heavy reliance on wood fuel, imported petroleum and inadequate power generation capacity. Frequent droughts cause shortage in power supply which in turn results in low capacity utilization. In order to improve the situation, the government has instituted measures to shift the pattern of energy consumption towards modern forms of energy without adverse effects on environment. With the implementation of new plants for hydropower, geothermal and thermal electricity generators, the capacity is expected be boosted by 373 MW by the year 2003/4. This will boost power supply in industries, and consequently improve productivity and increase employment.

3.6.4 Poverty

Real growth of GDP has been fluctuating over the years showing a downward trend since early 1990s reaching about -0.3 % in the year 2002. Consequently, poverty has been increasing. The underlying causes for poverty are many, the main ones being poor state of infrastructure, depressed investments, declining tourism activities, slump in industrial production, deteriorating terms of trade and increasing climatic variations.

Poverty contributes to unsustainable use of resources and environmental degradation, such as poor farming practices, overgrazing and reliance on wood as the main source of energy. This is because the immediate survival needs of people often take precedence over the long-term needs for preserving and maintaining the viability and integrity of the environment. Furthermore, public debt which has been increasing is an enormous economic burden.

Kenya's Human Development Index (HDI) estimates show that the socio economic development progress of the nation is about 0.539 with variations across provinces and districts.

Such disparities are reflected in differences in regional resource base, infrastructure development and life opportunities. The components of HDI vary widely across the regions with large parts of the country falling in the low human development category and compare with LDCs. Comparing the indices for Nairobi and the rest of the country; it is evident that measures to enhance growth in income should be integrated with other national efforts promoting human development.

Provision of education and life-prolonging services such as good health care are crucial in human development in the country. On the other hand, Kenya's Human Poverty Index (HPI) value has steadily risen from 26.1% in 1997 to 34.5% in 2001. This reflects in part a fall in life expectancy in the country. When looked at in absolute numbers, poverty is a serious national development challenge. The Human Poverty Index shows that the level of deprivation in the country is high.

3.7 Services

The service sector which includes public transport, informal sector, building and construction, banking and finance, storage, trade, communications, tourism, distribution and other services contribute to over half of Kenya's GDP and provides over two-thirds of total employment. The potential contribution of the service sector to GHG emissions is through transportation, waste management and deforestation.

3.8 Informal Sector

The informal sector, also referred to as *Jua Kali* includes all semi-organized and unregulated small-scale activities largely undertaken by self-employed or those employing only a few workers, but excluding all farming and pastoralist activities. It has grown considerably over the last 20 years, employed about 2,987,000 people in 1997 and 3,353,000 in 1998. It represents about 8% of GDP. It is the second largest source of employment after small-scale agriculture.

3.9 Financial Resources

About 91% of total expenditure for research and development funding in 1998/99 was from the public sector, which was equivalent to 0.6% of GDP. The funds were divided amongst many of the public research institutions in the country. Public research expenditure is heavily biased against industrial research. The industrial sector is anticipated to grow to be a major source of carbon dioxide.

3.10 Policy and Institutional Arrangements

Policies for sound environmental management and sustainable use of resources and appropriate responses to climate change are articulated in a number of official documents. The sector specific policies relevant to adaptation and mitigation of climate change include those for agriculture, forestry population, energy, water and industrialization. The Environmental Management and Co-ordination Act (EMCA) of 1999 is a framework for environmental legislation with provisions for economic incentives, enforcement mechanisms, protection and conservation of the environment, environmental quality standards including issues relating to emissions, impact assessment and modalities for implementing international treaties, conventions and agreements.

3.11 Climate Change Indicators in Kenya

Indicators of climate change include climatic extremes such as floods and droughts, large diurnal temperature variations and increased greenhouse gas emissions among many others. Extreme climate events are associated with disasters and increases in the incidences of diseases. Incidences of vector and water-borne diseases increase during periods of heavy rains and flooding, while droughts and high temperatures cause famine and malnutrition thereby weakening resistance to diseases. All these can give indicators which provide opportunities for sensitizing government decision-makers, business and industry entrepreneurs, research and civil society organizations and global community to prioritize climate change issues and to guide policy formulation as well as to foster common understanding in initiating actions in mitigating adverse impacts of climate change. Indicators are also useful in determining the capacity required to deal with climate change issues.

4 Climate Change Issues in Kenya

The challenge for Kenya is to develop strategies, which would promote sustainable development, without compromising in increased emission of GHGs. It is necessary therefore to develop appropriate policies and response strategies to manage GHG emissions. Policies and strategies must be based on reliable inventory of GHG emissions and sinks. The *First National Communication of Kenya* is the main output of the enabling activity project. The Ministry of Environment and Natural Resources through the National Environment Secretariat executed the Climate Change Enabling Activity. In this document, four thematic areas were identified in accordance with the UNFCCC guidelines for the preparation of Non-Annex 1 national communication, these were namely:

- i. National GHG Inventory, Abatement, Sinks and Sequestration
- ii. Vulnerability and Adaptation to Climate Change
- iii. Research and Systematic Observation
- iv. Awareness and understanding of climate change issues

Other broad climate-change issues in Kenya are:

- i. Clean Development Mechanism
- ii. Transfer of Environmentally Sound Technologies
- iii. Synergy with other MEAs
- iv. Climate Change Mitigation Strategies and Policy Frameworks
- v. Convention Negotiation Capacity including issues of Equity

The issue of negotiation capacity has always been an expressed need from the days of the International Negotiation Committee on a framework Convention on Climate Change upto now that the Kyoto Protocol has entered into force with talks on Post-Kyoto period the need is now even more urgent.

The following sections present a brief discussion of each of these eight priority issues.

4.1 GHG Inventories, Abatement, Sinks and Sequestration

Available information in the developed countries shows positive correlation between increased carbon emissions and increased incomes under existing technologies. High economic growth is associated with increased carbon emissions, while reduced carbon emission would (given current technological, managerial, demographic and social arrangements) generally be associated with low rates of economic growth.

Paragraph 1 of Article 4 of the UNFCCC requires parties to develop, update periodically, and submit to the COPs, national inventory of all anthropogenic greenhouse gases emissions not controlled by the Montreal Protocol, to the extent their capacities permit, using comparable methodologies agreed upon by the COPs. Kenya being a signatory to the UNFCCC has already undertaken two studies on climate change.

The study under UNDP/GEF capacity Building in Sub-Saharan Africa to respond to UNFCCC had 1992 as the reference year. This was updated for the year 1994 as required by the UNFCCC guidelines. The *Initial national Communication of Kenya* was based on findings of studies conducted by the National Technical Working Groups under the Enabling Activities Project. The studies developed the inventory of GHG from five sectors namely, energy, land use change and forestry, agriculture, industrial processes and waste management using the revised IPCC guidelines (1996) for national gases inventories.

The gases covered were carbon dioxide (CO₂) with 4522.8 Gg, methane (750 Gg) for which the highest emissions are from the agricultural sector (576 Gg) followed by energy sector (148 Gg). The second largest source of carbon dioxide emission is the industrial sector, mainly cement production. Other important gases emitted include carbon monoxide, methane, oxides of nitrogen (NO_x) and nitrous oxide (N₂O). The agricultural sector (including livestock production) is the major emitter of methane (over 70%) followed by the energy sector. The largest source of methane in the agricultural sector is enteric fermentation. Although synthetic fertilizers are a source of nitrous oxide, their total emission is low due to limited use of fertilizers in the country

However, Kenya is a net carbon dioxide sink, absorbing about 22,751 Gg of CO₂ per annum. This is due to regeneration of forest and non-forest trees. The contribution of the waste sector is highly reduced due to the open nature of the waste disposal methods. However, although Kenya is currently a net sink, with increase in socio economic development and more specifically as the country works to attain its goal of industrialization by the year 2020, GHG emissions will increase. On the other hand, the sink capacity of the country is decreasing, as the reforestation programs have not kept pace with deforestation. On the global scale, Kenya's contribution is negligible but the country is concerned about the protection of local and global environment more especially as the country is extremely vulnerable to the impacts of climate change.

In order to improve the timeliness and quality of future national communications it is essential that the process should ensure continuity and sustainability of inventory preparation. Emphasis therefore should be placed on capacity building as well as funds made available for developing emission factors, collecting appropriate activity data, employing good practices in data management reducing uncertainties and minimizing biases and strengthening institutional arrangements for the compilation of inventories.

5.1.1 Sectoral GHG inventories

Kenya used the Intergovernmental Panel of Climate Change (IPCC) methodology for preparing inventories and particularly used the Revised 1996 IPCC Guidelines. Activity data and emission factors in the energy sector is well documented for the fossil fuels, but data is lacking for firewood

and charcoal consumption and combustion, respectively, which are both very relevant for the country studies.

In the Land Use Change and Forestry (LUCF) sector, activity data is lacking or not accessible in most cases. Large differences between international activity data and national activity data for forests are common. The use of international data is also difficult because of inconsistencies between international databases, e.g. between FAO forest data and data from World Resource Institute. The 1996 IPCC Guidelines are not clear enough for consistent reporting across Parties, e.g. the estimation of emissions or sequestration in managed natural forests. Emission factors for charcoal production are lacking in the LUCF sector and for the accounting of CO₂ emissions or sequestration country-specific conversion factors for forests are not available. In addition, there are problems in distinguishing fractions of biomass burnt on-site, burnt off-site or left for decay.

In the agricultural sector also activity data is lacking or not accessible. The section on enteric fermentation and manure management in 1996 IPCC Guidelines are not appropriate for the country, e.g. the classification of animals, the animals included, the values for animal weights and data on animal production. In addition, classification of agricultural soils is different in the country, and categories provided in guidelines are not appropriate. For savannah burning the ratios burnt on-site and off-site require clarification.

In the waste sector national circumstances differ considerably from the situations for which guidance is provided by IPCC. Common practices are burning of waste and open dumps, thus CH₄ emissions from waste are not quite relevant due to lack of anaerobic conditions. The use of IPCC default emission factors for CH₄ from domestic wastewater would overestimate considerably the CH₄ emissions as aerobic conditions are more frequent.

Relatively large degree of uncertainty associated with activity data related to the LUCF sector calls for further work to improve this situation due to the importance of this sector to the overall emissions. The work on emission factors should address the most relevant sources and sectors of the country. Inventories on a continuous basis by a stable national team is the most important element to overcome identified methodological problems, such as inappropriate use of activity data, or application of methods or selection of emission factors.

Networks between national communications teams for sharing information on emission factors and AD should be created for exchange of information related to national inventories. This may facilitate the use of more appropriate emission factors, methods and activity data.

Currently continuity for inventory updating is not assured due to changes in the technical staff and institutions involved in the process. In some cases, the process has been interrupted either because of lack of funding or because of other changes that lead to the movement of technical staff. For these reasons, experts involved in inventory updating a few years later, have to “reinvent the wheel” and repeat the same process of training, identification of available data, etc. as their colleagues did in previous years, which resulted in an expensive process. The group acknowledged that in many cases the funds provided for the preparation of the national communications did not allow the Parties to address some important components (gases and sectors) of GHG inventories included in the IPCC Guidelines, as well as to elaborate national emission factors in some key sectors.

4.2 Vulnerability and Adaptation

The key sectoral vulnerability and adaptation issues from the previous studies are highlighted in this section.

4.2.1 Agriculture

Agriculture has been the mainstay of the Kenyan economy, but its contribution to GDP declined from 37% in 1964 to 24.5% in 1999. It is the basis for food security, for economic growth, employment creation and foreign exchange generation. Most Kenyan industrial and manufacturing firms are agro-based. The development strategy depends on agriculture and industry for faster economic growth. Most of the agricultural production in Kenya comprises mixed farming:- raising of crops and livestock. It accounts for 60% of foreign exchange earnings and provides raw materials for industries. Agricultural production systems in the high potential areas are more intensive as compared to the semi-arid areas. Maize is the staple food crop, while the dry bean is the most important legume crop. Coffee, tea, and sugarcane are the major commercial crops.

Livestock production falls under two systems: dairy, predominantly in the high potential areas and pastoral in the semi-arid areas.

Climate change projections to the year 2030 indicate increasing temperature changes with doubling of CO₂ levels from baseline scenarios resulting into a decline in precipitation in the semi-arid areas. This will lead to reduction in maize yields. The impact of climate change on livestock would be shortage of forage, increased disease incidences and breakdown of marketing infrastructure.

Adaptation options in the agriculture sector include: development of early maturing and high yielding crop varieties and adaptation of agricultural technologies from analogue environments,

4.2.2 Water

Kenya is fairly endowed with water in the form of rainfall, ground water, river flows, lakes and oceans. The country is divided into five main drainage basins. Hydrological models have been used to estimate the impact of climate change in several water sub-sectors, namely, soil moisture, ground water recharge, river runoff, lakes and wetlands, water quality and mountain glaciers. Projections indicate that the region from Lake Victoria to the central highlands east of the Rift Valley will experience mild increase in rainfall. Other parts of the country are expected to receive reduced annual rainfall. The highest increments of annual rainfall are estimated to be in the areas in the vicinity of Mt. Elgon. Increasing human population will exert pressure on Kenya's hydrological systems and water resources. This will be further compounded by climate change impacts. The ability to adapt to variability and change will be affected by a range of institutional, technological and cultural factors at national, regional and local levels.

4.2.3 Aquatic and Marine Resources

The coastal environment and habitats support some of the most diverse ecological resources in the country. These include mangrove forests, coral reefs, sea grass beds, and rocky and sandy shores. Fisheries activities are pivotal to the household economies of riparian communities. The bulk of the country's fisheries resources come from Lake Victoria, while the aesthetic value of coastal resources contributes significantly to the national economy, mainly through tourism.

Climate change is expected to alter the physical, biophysical and biochemical characteristics of marine eco-systems in Kenya. The Kenyan coast is regarded as one of the most vulnerable to sea level rise.

4.2.4 Energy

In Kenya, energy is harvested from a variety of renewable and non-removable resources. These include, hydropower, biomass, solar, wind, petroleum and geothermal. Petroleum fuel is the major source of energy used by commercial and industrial establishments. Electricity is the third most used source of energy in Kenya after fuel-wood and petroleum products, but is second to petroleum fuel as a source of commercial energy. About 80% of Kenya's population depend on wood-fuel for its domestic energy needs and by the rural informal industries such as brick making, pottery, jaggery, manufacturing and food processing. The scarcity of fuel-wood and the impact of its escalating prices is acute at the household level because of poverty and limited alternatives.

The most significant impact of climate change on energy is deemed to be by extreme weather events such as those caused by the El Nino/La Nina phenomenon. Vulnerability in this sector will be manifest in changes in river flows and increased rates of depletion of biomass.

4.2.5 Health

Climate and weather variability affect natural processes which in turn affect human health. One of the major impacts will be increased incidences of vector and water borne diseases and poor nutrition.

Development of preventive mechanisms for vector and water borne diseases, surveillance for epidemics that follow episodic weather events and improvement of infrastructure in the health sector are among key policy issues to be pursued.

4.3 Research and Systematic Observations

The Framework Convention on Climate Change and the Kyoto Protocol include Articles referring to the need for research and systematic observations. Scientific activity over the past few years has increased confidence in our ability to understand the functioning of the climate system and to make useful predictions. Recently many meteorological agencies and scientific institutions have begun to issue regular climate predictions. Improved monitoring and global models enabled scientists to predict the onset and development of the recent El Niño, thus protecting lives and livelihoods. CLIVAR is at the forefront of these important considerations.

The climate of the Earth exhibits natural variability on all time scales. We need to understand, and to the extent possible, predict this variability and quantify long-term climate change. Thus, the overall scientific objectives of research and systematic observations should be to:

- Describe and understand the physical processes responsible for climate variability and predictability on seasonal, inter-annual, decadal and centennial time scales, through the collection and analysis of observations and the development and application of models of the climate system;
- Extend the record of climate variability over the time scales of interest, through the assembly of quality-controlled paleo-climate and instrumental data;
- Extend the range and accuracy of seasonal to inter-annual climate prediction through the improvement of global and regional climate models; and
- Understand and project the response of the climate system to increases of greenhouse gases and aerosols and to compare these projections with the observed climate record in order to detect any anthropogenic modification of the natural climate signal.

To achieve these objectives it is essential that there must be:

- continuation of the collaboration of scientists around the world that led to the successful implementation of WCRP programmes and projects;

- full and open exchange of data (in keeping with World Meteorological Organisation Cg-XII Resolution 40) as well as of research results;
- long-term systematic climate observations, both space-based and in-situ, such as the Global Climate, Ocean and Terrestrial Observing Systems (GCOS/GOOS/GTOS), as are being advocated by the agencies collaborating in the Climate Agenda, complemented by the observing activities and assembly of research data sets as fostered by the WCRP;
- experimental extension of existing observing networks;
- regional and global-scale experiments including modeling, statistical studies and observations in order to understand key climate processes;
- comprehensive analysis of observations and empirical/diagnostic studies as well as expanded efforts to rehabilitate climate data sets and to document past climate variability through paleo-studies;
- the development of improved regional and global-scale models and of computers with the power to run them;
- continuing links with programmes on the application of climate knowledge, such as the WMO Climate Information and Prediction Service (CLIPS), for government, business and public policy and decision-making;
- expanded collaboration with other international activities including relevant core projects (e.g. on Past Global Changes, PAGES) of the International Geosphere-Biosphere Programme (IGBP), and the International Human Dimensions Programme (IHDP);
- continuing links between CLIVAR and programmes for infrastructure and capacity building in developing countries, such as the Global Change System for Analysis, Research and Training (START) , so that all nations can benefit.

Systematic observations in Kenya are undertaken by a number of meteorological and hydrological stations including, private observing stations in various parts of the country: The Kenya Meteorological Department through its network of observatories and stations carries out systematic observations of a number of meteorological parameters. The department maintains a large climatological data bank dating from 1896 which provides information for monitoring and detecting trends in climatic parameters. However, the number of these stations has reduced in the past decades due to economic constraints limited funds for operation and personnel.

However, Kenya has had some studies related to Climate Change Enabling Activities and the project on national communications built on them. These studies include:

- a) The United States Country Studies Programme (USCSP) in 1994.
- b) The UNDP/GEF Capacity Building in Sub Sahara Africa to Respond to UNFCCC in 1996.
- c) UNEP/GEF study of IPCC GHG Inventory Methodology Applied to land Use Change in Africa.
- d) UNEP study on the implications of climate change, sea level rise and vulnerability assessment of selected coastlines.

Other climate change related projects which have been or are being carried out in Kenya are shown in the table below.

Table 1. Climate Projects Implemented including those already forward to the GEF (in Kenya)

Project Name	I_Agency	Focal area	Status	Executing Agency	Scope	Total cost
GEF-KAM Industrial Energy Efficiency Project	UNDP	Climate Change	Ongoing	Kenya Association of Manufacturers	National	
African Rift Geothermal Development Facility (ARGeo)	UNEP	Climate Change	Ongoing	Kreditanstalt für Wiederaufbau (kfw) and UNEP in collaboration with a network of national agencies	Regional	237.700 US\$m
Monitoring of Greenhouse Gases including Ozone	UNDP	Climate Change	Complete	World Meteorological Organization	Global	6.000 US\$m
Solar and Wind Energy Resource Assessment	UNEP	Climate Change	Complete	UNEP/DITE	Global	9.320 us\$m
Photovoltaic Market Transformation Initiative (IFC)	IBRD	Climate Change	Ongoing	IFC	Global	120.375 US\$M
Expedited Financing of Climate Change Enabling Activities Part II: Expedited Financing for (interim) Measures for Capacity Building in Priority Areas	UNEP	Climate Change	Ongoing	Ministry of environment and Natural Resources	National	0.248
Ormat Olkaria III Geothermal Power Development	IBRD	Climate Change	Ongoing	IFC	National	185.025 us\$m
Removal of Barriers to Energy Conservation and Energy Efficiency in Small and Medium Scale Enterprises	UNDP	Climate Change	Ongoing	KAM	National	120.375 us\$m
Joint Geophysical Imaging (JGI) Methodology for Geothermal Reservoir Assessment	UNEP	Climate Change	Ongoing	Kenya Electricity Generating Company (KenGen) as Executing Agent for Geothermal Exploration and Development for the Ministry of Energy	Regional	2.733 US\$m
Enabling Activities for the Preparation of Initial National Communications	UNEP	Climate Change	Complete	National Environment Management Authority	Regional	0.248 US\$m

Project Name	I_Agency	Focal area	Status	Executing Agency	Scope	Total cost
Related to the UNFCCC						
Capacity Building on Policies and Regulatory Mechanisms Promoting Renewable Energy in Electricity Market Reforms in Kenya	UNEP	Climate Change	NFP Endorsed	Ministry of Energy	National	GEF: US\$387000
Building Sustainable Commercial Dissemination Networks for Household PV Systems in Eastern Africa	UNEP	Climate Change	NFP Endorsed	Kenya, Tanzania, Uganda, Ethiopia, Eritrea	Regional	1,257,630
Building capacity in sub-Saharan Africa to respond to the UN Framework Convention on Climate Change	UNDP	Climate Change	Complete	National Environment Management Authority	Regional	
Alternative to Slash and Burn Agriculture Climate Change	UNDP	Climate Change	Complete		Regional	
Integrated Strategy for Promoting Sustainable Response to Climate Change	UNDP	Climate Change	NFP Endorsed		National	
Mitigation of Climate Change	IBRD	Climate Change	NFP Endorsed	Total Kenya	National	
Anaerobic Biodigester for Nairobi City Council	UNDP	Climate Change	NFP Endorsed	Timmark Ltd	National	
Strengthening the Ministry of Energy's Capacity in Renewable Energy Activities	UNDP	Climate Change	NFP Endorsed	Ministry of Energy	National	
Climate Change Capacity Building	UNDP	Climate Change	Complete	Ministry of Environment and Natural Resources	National	
Energy Conservation	UNDP	Climate Change	NFP Endorsed		National	

Project Name	I_Agency	Focal area	Status	Executing Agency	Scope	Total cost
Centre for Promotion and Education of Solar Energy Utilisation	IBRD	Climate Change	NFP Endorsed		National	
Small Scale Wind Power Pilot Project for Rural Areas	IBRD	Climate Change	NFP Endorsed	Environmentalistes Sans Frontieres (ESF)	National	
Energy Production Through Solid Waste Management In Kenya-Taka Nguvu (TN)	UNDP	Climate Change	NFP Endorsed	Taka Nguvu Ltd.	National	Total USD 106'300
Climate Awareness Programme	UNEP	Climate Change	NFP Endorsed	Ministry of Environment and Natural Resources	National	
Soil-Carbon Stock and Change at National Level	UNEP	Climate Change	NFP Endorsed	Kenya Soil Survey	National	
Climate, Water and Agriculture: Impacts on and Adaptation of Agro-Ecological Systems in Africa	IBRD	Multi-Focal	Ongoing	Government	Regional	1.240 US\$m
Coping with Drought and Climate Change: Best use of climate Information for Reducing Land Degradation and conserving Biodiversity.	UNDP	Multi-Focal	Pipeline	UNOPS/Government	Regional	14.426 US\$m
Assessment of Soil Organic carbon stocks and change at National scales	UNEP	Multi-Focal	Ongoing	International Development Centre of the University of Reading, UK,	Global	2.002 US\$m
Mount Kenya Pilot Project for Land and water Management	UNDP	Multi-Focal	Ongoing	IFAD	Regional	25.046 US\$m
National Capacity Needs self-Assessment for Global Environmental Management (NCSA)	UNEP	Multi-Focal	Ongoing	National environmental secretariat Ministry of Environment and Natural Resources	National	0.161 us\$m
Western Kenya Intergrated Ecosystem Management Project	IBRD	Multi-Focal	Ongoing	Kenya Agricultural Research Institute (KARI/KEFRI)	National	Project Cost 9.550 US\$m
Capacity Building for Watershed	UNDP	Multi-	NFP Endorsed	Organization for Development	National	

Project Name	I_Agency	Focal area	Status	Executing Agency	Scope	Total cost
Management		Focal		Management		
Finalization of the Action Plan on the Environment Component of the New Partnership for Africa's Development	UNEP	Multi-Focal	NFP Endorsed	Govts	Regional	

The above table shows that the climate change projects implemented in Kenya were small technical assistance projects. The reasons for this could be attributed to lack of skills in developing climate projects. It is difficult for national experts to understand the criteria and requirements for climate change projects, how to differentiate the local interest and global benefit. The capacity need is in having a well trained group of experts across relevant sectors.

4.4 Clean Development Mechanism (CDM)

Kenya's participation in this mechanism is hampered by a lack of information and awareness of the institutional and legal framework, technical infrastructure, enforcement capacity, and human resources needed to implement the mechanism. The country sees the CDM as a medium to develop and facilitate new projects and investments and give a high priority to the implementation of CDM. This is demonstrated by the fact that the country developed CDM guidelines as early as 2002. The long drawn out negotiations on the operationalization of the mechanism itself and the conditions for its implementation are significant in increasing the need for capacity building. An important share of its complexity is related to the lack of knowledge on the multiple implications and effects related with the design and implementation of the mechanism.

The development plan of the government of Kenya calls for the country to become a Newly Industrialized Country by the year 2020 in order to create employment and reduce poverty. This ambition is driven by realization that other than agriculture industrial development is the major sector that has great potential for generating employment for the large number of skilled man power that is being produced in the country.

In this respect there is realization that industrial development will inevitably be accompanied by environmental degradation unless environmental protection is taken into account. The national plan therefore emphasizes environmentally sound industrial development. Under the Kyoto Protocol of the UNFCCC Clean Development Mechanism (CDM) was created as one of the ways to assist developing countries to achieve sustainable development. One of the expectations is that developing countries will benefit from investments and technology transfer leading to enhanced industrial production. The participating developed countries on the other hand would get credits from the accrued reduction of greenhouse gas emissions towards compliance with the Kyoto Protocol. It is expected that through implementation of the CDM projects Kenya can make significant progress towards rapid industrialization to reduce poverty and at the same time advance the objective of environmentally sound development. CDM is therefore a priority issue within the UNFCCC. In this regard Kenya has developed national guidelines for implementation of CDM project in the country and therefore there is need for institutional and technical capacity determine appropriate CDM projects assess and evaluate them and to monitor their implementation.

4.5 Transfer of Environmentally Sound Technologies

Kenya recognizes that the extent to which it will be able to implement adaptation and abatement measures largely depends on how well it achieves capital accumulation and economic growth.

Identifying needs, selecting the appropriate and environmentally sound technologies for adoption and adaptation, and expediting the process of their effective transfer has also been noted as an important common objective across the sectors.

The process of technology transfer is a very complex and includes many stakeholders, such as government, private sector entities, financial institutions, NGO's and research/education institutions.

Technology transfer discussions include not only technology transfer between developing countries and developed but also amongst developing countries and comprise the ‘process of learning by doing and utilization of the technology, including the capacity to identify and adapt to local conditions and integrate with local technology’.

4.6 National Climate Change Strategy and Policy framework

There is a need to develop from the basic national programs and modernize institutional structures. This includes the development of comprehensive long-term, consensus-based strategies, programs and action plans for climate change, as well as integration of respective concerns into policies of sectors in charge of the exploitation of natural resources.

4.7 Cross-Convention Synergies

There is need for better understanding of the synergies between possible activities in response to the mandates and commitments of the different Conventions (in particular those relating to conservation biodiversity, addressing climate change, and preventing land degradation).

4.8 Comprehensive awareness and understanding of the Climate Change

Most development activities impact on the environment to varying degrees either negatively or positively. In order to minimize or mitigate the negative impacts, laws have been enacted to regulate development activities. In particular, the Environmental Management and Co-ordination Act of 1999 has provisions for environmental standards, impact assessment, environmental management, including issues relating to climate and climate change. However, regulations work well if they are complemented by a pro-active, and persistent environmental education, training and public awareness programme.

Various stakeholders have developed and are implementing a variety of environmental education, training and public awareness programmes. In particular, formal and non-formal education and training activities are being conducted by schools, colleges, technical training institutions, tertiary institutions and civil society organizations. With the operationalization of Article 6 of the UNFCCC, it is expected that many activities will be carried out by the government in partnership with development partners, multi lateral development agencies and civil society organizations to raise the level of awareness on climate change issues at all levels.

This high priority seems to underpin many of the concerns and current capacity constraints identified across all the regions of the world. Capacity for identifying phenomena and impacts attributable to climate change and their separation from impacts caused by other events (climatic variability, socio-economic conditions) is required. The challenge to assess and understand the nature of impacts and their severity is a major issue and so is raising awareness about the climate change risks.

4.9 Convention Negotiation Capacity

The UNFCCC is a process of negotiation closely tied to how to meet obligations at least cost, i.e. costs related to the reduction of greenhouse concentration in the atmosphere. A full understanding of the consequences of any decision of the convention, commitments, and obligations, is a necessary condition to participate actively and positively in the search for an adequate and equitable solution. Strengthening capacity to increase the action in international negotiation processes to attain equitable and fair solutions requires implementation of specific training programs for negotiators.

5 Prioritization of the identified climate change issues in Kenya

Prioritization of the identified climate change issues in Kenya was achieved through the use of an identified set of criteria which were selected from the key developmental strategy documents among them the PRSP, ERS, and the EMCA. Coincidentally, the main issues in these documents correlate

significantly with those of the Millennium Development Goals (MDGs). The whole set of the MDGs is given below:

MDG_1: Eradicate Extreme Poverty and Hunger

The main aims of this goal are to:

- Reduce by half the proportion of people living on less than a dollar a day
- Reduce by half the proportion of people who suffer from hunger

MDG_2: Achieve Universal Primary Education

The main aim of this goal is to ensure that all boys and girls complete a full course of primary schooling

MDG_3: Promote Gender Equality and Empower Women

The main aim of this goal is to eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015

MDG_4: Reduce Child Mortality

The main aim of this goal is to reduce by two thirds the mortality rate among children under five

MDG_5: Improve Maternal Health

The main aim of this goal is to reduce by three quarters the maternal mortality ratio

MDG_6: Combat HIV/AIDS, Malaria and other Diseases

The main aims of this goal are to:

- Halt and begin to reverse the spread of HIV/AIDS
- Halt and begin to reverse the incidence of malaria and other major diseases

MDG_7: Ensure Environmental Sustainability

The main aims of this goal are to:

- Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources
- Reduce by half the proportion of people without sustainable access to safe drinking water
- Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020

MDG_8: Develop a Global Partnership for Development

The main aims of this goal are to:

- Develop further and open trading and financial system that is rule-based, predictable and non-discriminatory. Includes a commitment to good governance, development and poverty reduction—nationally and internationally
- Address the least developed countries' special needs. This includes tariff- and quota-free access for their exports; enhanced debt relief for heavily indebted poor countries; cancellation of official bilateral debt; and more generous official development assistance for countries committed to poverty reduction
- Address the special needs of landlocked and small island developing States
- Deal comprehensively with developing countries' debt problems through national and international measures to make debt sustainable in the long term In cooperation with the developing countries, develop decent and productive work for youth In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries
- In cooperation with the private sector, make available the benefits of new technologies—especially information and communications technologies

The MDG 1, 4,5,6,7 and 8 are related to climate change issues and are also of high priority in all the national development strategies. However, the MDG 4, 5, and 6 address issues of human health concern, which are interlinked with climate change hence have been, for purposes of this work, combined into one. The table below, therefore, gives the set of criteria which were most relevant to climate change issues in the country and their relative importance (weight in %) in the national sustainable development.

Criterion	Weight
Criterion 1: Poverty reduction and alleviation of hunger - MDG 1	35%
Criterion 2: Health concerns including maternal and child health and life expectancy - MDGs 4,5 and 6	25%
Criterion 3: Sustainability of the environment - MDG 7	25%
Criterion 4: Response to International concerns - MDG 8	15%

The overall weighted score of each of the key issues on these criteria was then used to prioritize the identified climate change issues. The following table shows the calculations of prioritization process.

CRITERIA	Criterion 1 =MDG(1)	Criterion 2 =MDGs(4+5+6)	Criterion 3 =MDG(7)	Criterion 4 =MDG(8)		
Criterion Weighting (%)	35%	25%	25%	15%		
Climate-Change Issues (after sorting with total weighted score)	Ranking/Score (on a scale of 0 to 10) of the Climate Issues against each of the Selected Criteria				Total Weighted Score	Priority Ranking on the basis of the Total Score
Vulnerability and Adaptation	9	5	7	4	6.75	1
Research, Systematic Observations and Data Management	7	5	7	5	6.20	2
Awareness and Understanding of Climate-Change Issues	5	7	7	6	6.15	3
Climate-Change Strategies and Policy Framework	5	4	7	7	5.55	4
Transfer of Environmentally Sound Technologies	5	4	7	6	5.40	5
Climate-Change Convention Negotiating Capacity	5	3	7	4	4.85	6
GHG Inventories, Abatement, Sinks & Sequestration	4	3	7	6	4.80	7
Clean Development Mechanism	2	1	9	7	4.25	8
Synergies in the MEAs	3	3	6	5	4.05	9

This method of ranking of the climate change issues prioritized them in the following order of importance in the country

1. Vulnerability and Adaptation
2. Research, Systematic Observations and Data Management
3. Awareness and Understanding of Climate-Change Issues
4. Climate-Change Strategies and Policy Framework
5. Transfer of Environmentally Sound Technologies
6. Climate-Change Convention Negotiating Capacity
7. GHG Inventories, Abatement, Sinks & Sequestration
8. Clean Development Mechanism
9. Synergies in the Multilateral Environmental Conventions

Linkages with other Conventions

Capacity Building Issue	Relevance to other Conventions			
	UNCCD	UNCBD	POPs	MDGs
Vulnerability and Adaptation	Very Relevant	Very Relevant	Low Relevance	Very Relevant
Awareness & understanding of climate issues	Very Relevant	Very Relevant	Relevant	Very Relevant
Research & systematic observation	Very Relevant	Very Relevant	Very Relevant	Very Relevant
GHG inv., abatement, sinks & sequestration	Very Relevant	Very Relevant	Relevant	Very Relevant
CDM	Very Relevant	Very Relevant	Very Relevant	Very Relevant
Transfer of Env. Sound techs	Very Relevant	Very Relevant	Very Relevant	Very Relevant
Climate change strategies and Policy Framework	Very Relevant	Very Relevant	Relevant	Very Relevant
Climate-Change Convention Negotiating Capacity	Very Relevant	Very Relevant	Very Relevant	Very Relevant
Synergies in the MEAs	Very Relevant	Very Relevant	Very Relevant	Very Relevant

6 Capacity Needs in the prioritized climate change issues

6.1 Vulnerability and Adaptation

The main capacity needs in Vulnerability and Adaptation in Kenya are as follows:

Systemic capacity needs

- An overall policy framework to direct what is by necessity an integrated multi-sector, multi-disciplinary approach to V&A.

Institutional Capacity needs

- Clearly defined institutional mandates and responsibilities.
- Specialized institutions in V&A with special capacity to develop analysis in the economic impacts of climate change (economic vulnerability).
- Generally well-trained human resources to address global climate change.

The need for clearly defined and understood institutional mandates is echoed in Kenya's National Climate Change Activities Coordinating Committee constituted by various agencies from public, private sectors, research, academic and NGOs with NEMA as focal agency. With all the carefully laid out institutional arrangements, setting up of Technical Working Groups and this has not necessarily led to actual coordination and integration of climate change activities into the national development planning processes. Among the factors that make integration difficult to achieve in practice is the lack of understanding among those who participate in these teams and committee.

Capacity needs at individual level

- Easy access to data from climate measurement/monitoring systems.
- Specially trained individual with analytical skills to evaluate adaptation projects and identify abatement and adaptation options (in both energy and non-energy sectors), undertake vulnerability assessment and adaptation planning, evaluate barriers to specific policies, and introduce the economic dimension to V&A policy planning.

6.2 Research, Systematic Observations and Data Management

The capacity needs in Research and Systematic Observations are as follows:

Systemic capacity needs

- Capacity building to formulate appropriate adaptation strategies tailored to meet the specific sections of the economy. This should be done at three levels namely:
 - Short-term (contingency) strategies.
 - Medium term (tactical) strategies.
 - Long term (strategic) strategies.
- Clear policies that create and maintain climate change programmes.
- Financing to regularly address climate change.
- Clear policies that create and maintain climate change programmes.
- Financing to regularly address climate change.
- Recognize indigenous climate knowledge

Institutional Capacity needs

- Identification of adaptation options and the standardization of methodologies and models.
- Research to enhance national capacity to undertake inventories of GHG sources and sinks, and development of emission factors for Kenya and East African the region, especially those related to land-use change and agricultural and farming activities.
- Human capacity has to be developed in such areas as the systematic observations to climate change using the existing National and Global Networks. There is also a need to make improvements on the existing institutional capacity in Kenya in order to participate in climate change research and Systematic observation.
- Multi-disciplinary teams (of traditionally less engaged professionals such as lawyers, economists, social scientists, etc) in institutions that address climate change.
- Institutional staff technically trained in preparation of inventories and national communications.
- Build capacity of all professionals to participate in matters of climate change
- Data management and networking
- Specialized equipment
- Ensure continuity of preparedness activities
- Collaborate with indigenous climate knowledge

Capacity needs at individual level

- GAW and carbon cycle observations are more specialized and personnel need to be trained specifically to these activities. Therefore, capacity building by training for monitoring including sampling techniques, data analysis and data management is very necessary.
- There is also need for urban climate and air quality monitoring in major urban areas. Capacity is needed to develop urban emission inventories and carry out urban climate studies, air pollution modeling, monitoring and forecasting.
- There is need for specialized training in aspects such as: -
 - Climate variability and change studies.
 - Specialized training on climate change in areas such as impact assessment, scenario developments, vulnerability assessments, etc.
 - Climate change model development and operationalization.
 - Specialized equipment maintenance and any other relevant courses.
 - Ensuring the continuity of preparation activities and updating of inventories and communications.
- Know-how to access available regional and international information and to create specific databanks for particular issues.

6.3 Awareness and Understanding of Climate-Change Issues

The capacity constraints associated with this priority area cut across all levels of the systemic, institutional and individual and focus largely on the lack of a managed system of information, consequently the main capacity needs in this area are: -

Systemic capacity needs

- Environmental education for policy makers and the general public. The ability to assess and understand the nature of impacts and their severity is an essential capacity need.
- Prioritizing climate change in national scientific policy programs.

Institutional capacity needs

- National and regional scientific and technical institutions dedicated to the issue of climate change.
- A managed data information system (quantitative and qualitative) showing the multiples impacts of climate change.
- A managed data information system (quantitative and qualitative) showing the multiple impacts of climate change
- Outreach programmes to raise awareness in informal settings

Capacity needs at individual level

- Trained individuals that can identify phenomena and impacts attributable to climate change and separate those from impacts caused by other events (climatic variability, socio-economic conditions, etc.).

As an example, NEMA is currently carrying out a questionnaire survey on Article 6 of the Convention, many of the NGOs interviewed both national and international do not feel climate change is an issue and have very minimal understanding of the various aspects of global climate change, its implications and ramification at a local and national level.

6.4 National Climate Change Strategy and Policy Framework

Capacity needs in the National Climate-Change Strategy and Policy Framework are as follows:

Systemic capacity needs

- Continuous awareness-raising of environmental and sustainable development issues among political representatives, decision-makers and general public.
- Participation in climate change strategies by both government but particularly non-governmental stakeholders and civil society.
- A long term policy framework focused on a “no regret policy” of GHG reduction.
- An integrated planning and management framework with realistic links to social and economic priorities and cohesive and clear functions across sectors.
- Public awareness on the commitments made by the country as signatory of the convention, and the implications on national development policies and programs.
- A managed system for distribution and exchanging of information between governmental and non-governmental entities.
- Funding to sustain adequate participation in the convention (on line conference and conventions).

Institutional Capacity needs

- Strengthening the NCCACC so that it addresses effectively the diverse dimensions of climate change, defines institutional structures and functions, in support of international commitments and the implementation of internal policies.
- Institutional mechanisms of coordination, monitoring and exchange, and flow of information among the different public and private sectors most involved in climate change activities.
- Financial resources to include advisors from technical institutions with knowledge in particular issues under negotiation in the national delegations to the UNFCCC meetings.
- Strengthening of the NCCACC so as to be able to properly advice in the negotiations and to have in it active participation of the private sector.

Capacity needs at individual level

- National staff to prepare technical, financial and economic analyses to be used in the planning process.
- Human and financial resources at a district level to enable the communication and dissemination of information on national priorities to the local levels.
- A critical mass of skilled national negotiators in key institutions (continuous presence by the key persons), particularly prepared for negotiating positions and assessing options.
- Multi-disciplinary teams of qualified government officials, researchers and consultants with economic, financial and legal knowledge that can backstop the negotiation issues and implications.
- Skilled personnel in related sectors (agriculture, forest, energy, transport, industry, etc.).

6.5 Transfer of Environmentally Sound Technologies

The capacity needs in the transfer of environmentally sound technologies are as follows:

Capacity needs at systemic level

- An evaluation of the degree of adaptability of technology to local needs.
- A legal, regulatory and institutional framework that coordinates technology transfer, adaptation and enforcement.
- An information system that links Kenya to regional or international networks, information specialty firms, trade publications, electronic media, NGOs or community groups to collect data on availability, quality and flows of technologies.

Capacity needs at institutional level

- Assessment of existing local and traditional gaps in technology needs.

Capacity needs at individual level

- Professional expertise. In many cases there is a need for financial support of existing national and regional training institutions that can develop a wide range of technical, business management and regulatory skills.

6.6 Cross-Convention Synergies

The capacity needs for synergies between the MEAs are as follows:

Systemic capacity needs

- Programs, workshops, seminars that regularly promote interaction across conventions.
- Identification and evaluation of ancillary national benefits of joint approaches to convention objectives.
- Incorporation of an integrated climate change, biodiversity and land degradation objectives in the environment and development policy.

Institutional capacity needs

- Adequate institutional structure that captures the crosscutting issues (through interactions between sector institutions dedicated to the issues).
- Strengthening of the Interministerial committees dealing with the three issues and having regular information exchange with academic and research institutions dedicated to the different issues.

Capacity needs at individual level

- Experts dedicated to analyzing the cross cutting issues, interface and synergies among the conventions.

6.7 GHG Inventories, Abatement, sinks and Sequestration

The main capacity needs in GHG Inventories, abatement, sinks and sequestration in Kenya are as follows:

Systemic capacity needs

- An overall short and long-term policy framework..
- A coherent legal and regulatory framework that addresses emission reduction.
- Public awareness of, and demand for environmentally friendly technologies and practices.
- Market strategies and economic incentives that promote sound environmental technologies.
- An integrated climate dimension in relevant sector policies (reflecting the interrelated processes between environmental effects and objectives of general and sector policies).

Institutional Capacity needs

- An institutional framework that effectively guides and coordinates abatement actions.
- Identification of current barriers to effective enforcement of legal framework.
- Institutional staff trained in policy design and indirect intervention, preparation of guidelines methodologies to evaluate policy actions, and use of the market as a tool of abatement options (instruments, tools and strategies to overcome market barriers).

Capacity needs at individual level

- Technical staff knowledgeable on theories and models to capture cross cutting issues, relationships and mutual influences of sector policies.

6.8 Clean Development Mechanism

The main capacity needs in the CDMs in Kenya are as follows: -

Capacity needs at systemic level

- Policy makers and technical staff knowledgeable on the multiple requirements is needed to strengthen the mechanism, particularly on the effect of different rules on the organization of the mechanism, and the consequences of including or excluding sectors and activities, and other options to be included such as additionality, supplementarity, etc. and their consequences.

Capacity needs at institutional level

- An adequate institutional framework that reflects the type of institutions, property rights (private or public), technical capacity, scopes, scale, responsibilities, and missions required.
- Private sector knowledgeable on packaging of CDM projects and keeping abreast with international discussion on climate change issues.

Capacity needs at individual level

- Policy makers and legal experts knowledgeable on the effects of different legal frameworks.
- Technical staff that define needs, institutions to be engaged, additional criteria, and evaluates future offset market conditions, structure, scope, property rights, and vertical and horizontal integration).
- Technical staff that defines project baselines, monitors, verifies and carries out audits and certification.

6.9 Convention Negotiating Capacity

The capacity needs for the Convention negotiations are as follows:

Systemic Capacity Needs

- Public awareness on the commitments made by the country as signatory of the convention, and the implications on national development policies and programs.
- A well-managed system for distribution and exchanging of information between governmental and non-governmental entities.
- Funding to sustain adequate participation in the convention (on line conference and conventions).

Institutional Capacity Needs

- Financial resources to include advisors from technical institutions with knowledge in particular issues under negotiation in the national delegations to the UNFCCC meetings.
- Strengthening of the NCCACC so as to be able to properly advice in the negotiations and to have in it active participation of the private sector.
- Multi-disciplinary teams of qualified government officials, researchers and consultants with economic, financial and legal knowledge that can backstop the negotiation issues and implications.

Capacity Needs at Individual level

- A critical mass of skilled national negotiators in key institutions (continuous presence by the key persons), particularly prepared for negotiating positions and assessing options.
- Skilled personnel in related sectors (agriculture, forest, energy, transport, industry, etc.).

The following tables summarize the capacity needs of all the Climate Change issues in systemic, institutional and individual levels.

1. Capacity needs in Vulnerability and Adaptation		
Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ An overall policy framework to direct what is by necessity an integrated multi-sector, multi-disciplinary approach to V&A. 	<ul style="list-style-type: none"> ▪ Clearly defined institutional mandates and responsibilities. ▪ Specialized institutions in V&A with special capacity to develop analysis in the economic impacts of climate change (economic vulnerability). ▪ Generally well-trained human resources to address global climate change. 	<ul style="list-style-type: none"> ▪ Easy access to data from climate measurement/monitoring systems. • Specially trained individual with analytical skills to evaluate adaptation projects and identify abatement and adaptation options (in both energy and non-energy sectors), undertake vulnerability assessment and adaptation planning, evaluate barriers to specific policies, and introduce the economic dimension to V&A policy planning.

2. Capacity Needs in Research, Systematic Observations and Data Management

Systemic	Institutional	Individual
<p>Capacity building to formulate appropriate adaptation strategies tailored to meet the specific sections of the economy. This should be done at three levels namely:</p> <ul style="list-style-type: none"> • Short-term (contingency) strategies. • Medium term (tactical) strategies. • Long term (strategic) strategies. • Clear policies that create and maintain climate change programmes. • Financing to regularly address climate change. • Recognize indigenous climate knowledge 	<ul style="list-style-type: none"> ➤ Identification of adaptation options and the standardization of methodologies and models. ➤ Research to enhance national capacity to undertake inventories of GHG sources and sinks, and development of emission factors for Kenya and East African the region, especially those related to land-use change and agricultural and farming activities. ➤ Human capacity has to be developed in such areas as the systematic observations to climate change using the existing National and Global Networks. There is also a need to make improvements on the existing institutional capacity in Kenya in order to participate in climate change research and Systematic observation. ➤ Multi-disciplinary teams (of traditionally less engaged professionals such as lawyers, economists, social scientists, etc) in institutions that address climate change. ➤ Institutional staff technically trained in preparation of inventories and national communications. ➤ Build capacity of all professionals to participate in matters of climate change ➤ Data management and networking ➤ Specialized equipment ➤ Ensure continuity of preparedness activities ➤ Collaborate with indigenous climate knowledge 	<ul style="list-style-type: none"> ➤ GAW and carbon cycle observations are more specialized and personnel need to be trained specifically to these activities. Therefore, capacity building by training for monitoring including sampling techniques, data analysis and data management is very necessary. ➤ There is also need for urban climate and air quality monitoring in major urban areas. Capacity is needed to develop urban emission inventories and carry out urban climate studies, air pollution modeling, monitoring and forecasting. ➤ There is need for specialized training in aspects such as: <ul style="list-style-type: none"> ▪ Climate variability and change studies. ▪ Specialized training on climate change in areas such as impact assessment, scenario developments, vulnerability assessments, etc. ▪ Climate change model development and operationalization. ▪ Specialized equipment maintenance and any other relevant courses. ▪ Ensuring the continuity of preparation activities and updating of inventories and communications. <p>Know-how to access available regional and international information and to create specific databanks for particular issues.</p>

3. Capacity Needs in Awareness and understanding of climate change issues

Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ Environmental education for policy makers and the general public. The ability to assess and understand the nature of impacts and their severity is an essential capacity need. ▪ Prioritizing climate change in national scientific policy programs. 	<ul style="list-style-type: none"> ▪ National and regional scientific and technical institutions dedicated to the issue of climate change. ▪ A managed data information system (quantitative and qualitative) showing the multiples impacts of climate change. 	<ul style="list-style-type: none"> ▪ Trained individuals that can identify phenomena and impacts attributable to climate change and separate those from impacts caused by other events (climatic variability, socio-economic conditions, etc.).

4. Capacity Needs in Climate Change Policy Framework and Strategies

Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ Continuous awareness-raising of environmental and sustainable development issues among political representatives, decision-makers and general public. ▪ Participation in climate change strategies by both government but particularly non-governmental stakeholders and civil society. ▪ A long term policy framework focused on a “no regret policy” of GHG reduction. ▪ An integrated planning and management framework with realistic links to social and economic priorities and cohesive and clear functions across sectors. ▪ Public awareness on the commitments made by the country as signatory of the convention, and the implications on national development policies and programs. ▪ A managed system for distribution and exchanging of information between governmental and non-governmental entities. ▪ Funding to sustain adequate participation in the convention (on line conference and conventions). 	<ul style="list-style-type: none"> ▪ Strengthening the NCCACC so that it addresses effectively the diverse dimensions of climate change, defines institutional structures and functions, in support of international commitments and the implementation of internal policies. ▪ Institutional mechanisms of coordination, monitoring and exchange, and flow of information among the different public and private sectors most involved in climate change activities. ▪ Financial resources to include advisors from technical institutions with knowledge in particular issues under negotiation in the national delegations to the UNFCCC meetings. ▪ Strengthening of the NCCACC so as to be able to properly advice in the negotiations and to have in it active participation of the private sector. 	<ul style="list-style-type: none"> ▪ National staff to prepare technical, financial and economic analyses to be used in the planning process. ▪ Human and financial resources at a district level to enable the communication and dissemination of information on national priorities to the local levels. ▪ A critical mass of skilled national negotiators in key institutions (continuous presence by the key persons), particularly prepared for negotiating positions and assessing options. ▪ Multi-disciplinary teams of qualified government officials, researchers and consultants with economic, financial and legal knowledge that can backstop the negotiation issues and implications. ▪ Skilled personnel in related sectors (agriculture, forest, energy, transport, industry, etc.).

5. Capacity Needs in Transfer of Environmentally Sound Technologies

Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ An evaluation of the degree of adaptability of technology to local needs. ▪ A legal, regulatory and institutional framework that coordinates technology transfer, adaptation and enforcement. ▪ An information system that links Kenya to regional or international networks, information specialty firms, trade publications, electronic media, NGOs or community groups to collect data on availability, quality and flows of technologies. 	<ul style="list-style-type: none"> ▪ Assessment of existing local and traditional gaps in technology needs. 	<ul style="list-style-type: none"> ▪ Professional expertise. In many cases there is a need for financial support of existing national and regional training institutions that can develop a wide range of technical, business management and regulatory skills.

6. Capacity Needs in Climate Change Convention Negotiating Capacity

Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ Public awareness on the commitments made by the country as signatory of the convention, and the implications on national development policies and programs. ▪ A well-managed system for distribution and exchanging of information between governmental and non-governmental entities. ▪ Funding to sustain adequate participation in the convention (on line conference and conventions). 	<ul style="list-style-type: none"> ▪ Financial resources to include advisors from technical institutions with knowledge in particular issues under negotiation in the national delegations to the UNFCCC meetings. ▪ Strengthening of the NCCACC so as to be able to properly advice in the negotiations and to have in it active participation of the private sector. ▪ Multi-disciplinary teams of qualified government officials, researchers and consultants with economic, financial and legal knowledge that can backstop the negotiation issues and implications. A managed data information system (quantitative and qualitative) showing the multiple impacts of climate change ▪ Outreach programmes to raise awareness in informal settings 	<ul style="list-style-type: none"> ▪ A critical mass of skilled national negotiators in key institutions (continuous presence by the key persons), particularly prepared for negotiating positions and assessing options. ▪ Skilled personnel in related sectors (agriculture, forest, energy, transport, industry, etc.).

7. Capacity Needs in GHG Inventories, Abatement, sinks and Sequestration

Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ An overall short and long-term policy framework.. ▪ A coherent legal and regulatory framework that addresses emission reduction. ▪ Public awareness of, and demand for environmentally friendly technologies and practices. ▪ Market strategies and economic incentives that promote sound environmental technologies. ▪ An integrated climate dimension in relevant sector policies (reflecting the interrelated processes between environmental effects and objectives of general and sector policies). 	<ul style="list-style-type: none"> ▪ An institutional framework that effectively guides and coordinates abatement actions. ▪ Identification of current barriers to effective enforcement of legal framework. ▪ Institutional staff trained in policy design and indirect intervention, preparation of guidelines methodologies to evaluate policy actions, and use of the market as a tool of abatement options (instruments, tools and strategies to overcome market barriers). 	<ul style="list-style-type: none"> ▪ Technical staff knowledgeable on theories and models to capture cross cutting issues, relationships and mutual influences of sector policies.

8. Capacity Needs in Clean Development Mechanism

Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ Policy makers and technical staff knowledgeable on the multiple requirements is needed to strengthen the mechanism, particularly on the effect of different rules on the organization of the mechanism, and the consequences of including or excluding sectors and activities, and other options to be included such as additionality, complementarity, etc. and their consequences. 	<ul style="list-style-type: none"> ▪ An adequate institutional framework that reflects the type of institutions, property rights (private or public), technical capacity, scopes, scale, responsibilities, and missions required. ▪ Private sector knowledgeable on packaging of CDM projects and keeping abreast with international discussion on climate change issues. 	<ul style="list-style-type: none"> ▪ Policy makers and legal experts knowledgeable on the effects of different legal frameworks. ▪ Technical staff that define needs, institutions to be engaged, additional criteria, and evaluates future offset market conditions, structure, scope, property rights, and vertical and horizontal integration). ▪ Technical staff that defines project baselines, monitors, verifies and carries out audits and certification.

9. Capacity Needs in Cross-Convention Synergies		
Systemic	Institutional	Individual
<ul style="list-style-type: none"> ▪ Programs, workshops, seminars that regularly promote interaction across conventions. ▪ Identification and evaluation of ancillary national benefits of joint approaches to convention objectives. ▪ Incorporation of an integrated climate change, biodiversity and land degradation objectives in the environment and development policy. 	<ul style="list-style-type: none"> ▪ Adequate institutional structure that captures the crosscutting issues (through interactions between sectors institutions dedicated to the issues). ▪ Strengthening of the Interministerial committees dealing with the three issues and having regular information exchange with academic and research institutions dedicated to the different issues. 	<ul style="list-style-type: none"> ▪ Experts dedicated to analyzing the cross cutting issues, interface and synergies among the conventions.

7. Action Plan on Building Capacity to Respond to the UNFCCC

The following tables show the action plan for addressing the capacity needs identified in the previous section.

7.1 Key Strategic Aim: To Build Capacity in Vulnerability and Adaptation						
SECTORS AFFECTED	TARGET	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COST (USD Mill)
Agriculture	<ul style="list-style-type: none"> • Farmers • MOA • KARI • MOL&F • MENR • MOW&I • MOF • NGO's • Private sector 	<ul style="list-style-type: none"> • Irrigation • Water harvesting (dams, pans, Bh) • Improved seed and varieties • Improve livestock breeds and varieties • Diversification • Improve storage facilities • Enhance conservation measures • Enhance extension services 	<ul style="list-style-type: none"> • MOA • MOL&F 	Continuous Annual reviews	<ul style="list-style-type: none"> • No of irrigation schemes established • No of dams • No of seed varieties improved • No of breeds improved • No of crop varieties introduced • No and type of storage facilities • Reduced siltation • Conservation systems in place • Level of awareness • No of extension officers 	10 PA
Water	As in agriculture Other water users	<ul style="list-style-type: none"> • Catchment protection • Pollution control • Water harvesting & storage • Introduction of new irrigation technologies • Conflict resolution 	MOW&I	Continuous Annual reviews	<ul style="list-style-type: none"> • No of catchment areas gazetted • No of conservation projects • Level of water quality • No of storage facilities in place • Types of irrigation systems • No of conflicts resolved 	8 PA

7.1 Key Strategic Aim: To Build Capacity in Vulnerability and Adaptation (continued)						
SECTORS AFFECTED	TARGET	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COST (USD Mill)
Aquatic and marine resources	<ul style="list-style-type: none"> • Fisher folks • MOL&F • KEMFRI • NGO • Private sector • MOW&I • MENR • MOA • MOE and Kengen • EAC 	<ul style="list-style-type: none"> • R&D • Conservation • Reforestation • Policing of EEZ • Aquaculture • Rehabilitation of inland water bodies • Enforcement of existing regulations • International cooperation • Harmonization of governance in the sector • Formulation of policy framework • Construction of cold storage facilities 	<ul style="list-style-type: none"> • MOL&F • KMA • KWS • MENR 	Continuous Annual reviews	<ul style="list-style-type: none"> • No of innovations • Improved data • No sp. And populations • No of catchments reforested • Level of siltation • Incidences of unauthorized exploitation of EEZ reduced • No of prosecutions • No of farmers and pods • Improved lake productivity • Level of water quality • Improved public awareness 	5 PA
Energy	<ul style="list-style-type: none"> • Consumers • MOE • KENGEN • Industries 	<ul style="list-style-type: none"> • Development of alternative energy sources • Development of woodlots • Improvement in production efficiency and efficiency in usage 	Min. of energy	Continuous and annual reviews	<ul style="list-style-type: none"> • No. of alternative technologies adopted • Acreage of woodlots established • Reduced cost of production and usage 	25 PA
Health	<ul style="list-style-type: none"> • MoH • Public 	<ul style="list-style-type: none"> • Improvement of the existing health facilities • Development of health facilities • Improvement of health infrastructure • Reduction of disease causing pests and vectors 	<ul style="list-style-type: none"> • MoH, • Private sector 	Continuous and annual reviews	<ul style="list-style-type: none"> • Reduced incidences of diseases • Improved ratio of medical practitioners to the population • improved number of healthcare facilities • improved retention of healthcare personnel 	25 PA

7.1 Key Strategic Aim: To Build Capacity in Vulnerability and Adaptation (continued)						
SECTORS AFFECTED	TARGET	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COST (USD Mill)
Industry and trade	<ul style="list-style-type: none"> Manufacturers -Business community Jua Kali Min. of Trade & Industry MENR - NEMA 	<ul style="list-style-type: none"> Adoption of cleaner production technologies promote energy efficiency in industries Improve service industries Encourage environmental friendly technologies and practices Improve waste management system Compliance enforcement of regulations and standards 	<ul style="list-style-type: none"> MoTI MENR/NEMA 		<ul style="list-style-type: none"> No. of industries adopting cleaner production technologies No. of industries adopting energy efficiency measures No. of service industries started No. of industries adopting environmental friendly technologies and practices No of sanitized landfills Level of compliance 	20 PA
Forestry and Tourism	<ul style="list-style-type: none"> MENR (FD) MOW&I KWS Civil society 	<ul style="list-style-type: none"> Afforestation Reforestation Protection Inventory Conservation Surveying delineation & gazetment Enhancement of farm forestry Enhancement of extension services R&D Management of existing forests Monitoring of forest cover Forest valuation 	<ul style="list-style-type: none"> FD KEFRI 	Continuous and annual review	<ul style="list-style-type: none"> No hectares reforested No of hectares afforested Incidences of poaching and encroachment Area surveyed No of forests and hills gazetted Area under farm forestry Awareness level No of innovations adopted Quality of forest products Documented trends of cover Documented forest value 	10 PA

7.2 Key Strategic Aim: To Build Capacity for Research, Systematic Observation and Data Management						
SECTORS AFFECTED	TARGET/ GOALS	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COSTS
<ul style="list-style-type: none"> • Agriculture • Forestry • Water • Energy • Health • industry, • tourism, • transport, • infrastructure, education 	Built capacity to collect, collate and disseminate climatic data	<ul style="list-style-type: none"> • National and international collaboration between scientists. • Create networks for scientific collaboration • Standardization of data infrastructure • Enhance Institutional capacity for long term participation in systematic climate observation • Down scale global models to national and regional situations • Data Rescue of existing information • Acquire relevant equipment • Continuing links with WMO CLIPS programs • Develop links with sources of indigenous knowledge regarding climate • Enhance the programme of voluntary observers • Establish a systematic land cover change monitoring programme 	KMD, NEMA, with relevant institutions	Continuous with annual reviews	<ul style="list-style-type: none"> • Number of collaborators • Number of collaborators • Climatic Database created • Data rescue and improved management systems 	100,000 PA

7.3 Key Strategic aim: To Develop Capacity in Awareness and Understanding of Climate-Change Issues					
Sectors Affected	Activity	Potential Lead Agency	Time Frame	Verifiable indicators	Estimated costs (USD)
Ministries: • Information • Education • Social services • Office of the President • Agriculture • Water resources • Energy • Environment • Planning • Finance • livestock NGOs Meteorological Services Tourism sector	<ul style="list-style-type: none"> • Conduct climate change awareness seminars to MPs during parliament • Facilitate participation of policy makers at national and world environment days, e.g. Ozone layer day, tree planting day, environment day etc. 	NEMA, Parliamentary Committee on Environment, KMD, UNEP, FD and Provincial administration	Continuous but with Annual schedules	<ul style="list-style-type: none"> • Website • Number of Seminars • Involvement of Mps in National Environment Days 	20,000 PA
	<ul style="list-style-type: none"> • Conduct climate change awareness workshops for Permanent Secretaries, directors and other top management personnel • Invite managers to participate at national and world environment days 	NEMA UNEP KMD	Continuous	<ul style="list-style-type: none"> • Number of workshops • Active participation of respective managers in national environment days 	20,000 PA
	<ul style="list-style-type: none"> • Encourage attendance at national workshops on climate change and related environment conventions • Organise national workshops on climate change • Supply professionals with simplified version of climate change convention • Supply posters, flyers, fact sheets, etc. to line ministries 	LSK IEK KUJ NEMA	Continuous	<ul style="list-style-type: none"> • Number of workshops • Number of professionals in attendance 	30,000 PA

7.3 Key Strategic aim: To Develop Capacity in Awareness and Understanding of Climate-Change Issues (continued)					
Sectors Affected	Activity	Potential Lead Agency	Time Frame	Verifiable indicators	Estimated costs (USD)
Ministries: <ul style="list-style-type: none"> • Information • Education • Social services • Office of the President • Agriculture • Water resources • Energy • Environment • Planning • Finance • livestock NGOs Meteorological Services Tourism sector	<ul style="list-style-type: none"> • Invite media to attend and cover organised national and international climate change public awareness campaigns • Organise special or targeted climate change public awareness workshops or briefings 	<ul style="list-style-type: none"> • NEMA • Specific Media Houses 	Continuous	<ul style="list-style-type: none"> • Coverage of matters of environment as news items • Eco-journal coverage 	10,000 PA
	Sensitize farmers, and general public involved with any resources on climate change issues	Line Ministries	Continuous	Number of Barazas	10,000 PA
	<ul style="list-style-type: none"> • Supply simplified versions of climate change convention, and other relevant materials • Invite participation in climate change awareness campaigns such as workshops • Develop a CRS Policy that would encourage private sector financing 	<ul style="list-style-type: none"> • KAM • KEPSA • NEMA 	Continuous	<ul style="list-style-type: none"> • A Policy document • Amount spend by corporate on Corporate Social Responsibility (CSR) programmes 	10,000 PA
	<ul style="list-style-type: none"> • Conduct in-service public awareness workshops • Organise short-courses on communicating environmental education 	Line Ministries	Continuous	<ul style="list-style-type: none"> • Attendance in workshops • Number of workshops 	20,000 PA
	<ul style="list-style-type: none"> • Supply simplified versions of climate change convention, preferably in vernacular • Write newspaper articles on climate change • Produce and air radio programmes on climate change • Use story-telling or drama to convey climate change messages to reach those who cannot read • Supply posters, flyers, fact sheets to local communities centres • Mainstream climate change messages in on-going relevant programmes • Support participation in environmental days including those relevant to climate change 	NEMA KMD NGOs	Continuous	<ul style="list-style-type: none"> • Attendance in workshops • Number of workshops 	20,000 PA

7.3 Key Strategic Aim: To Develop Capacity in Awareness and Understanding of Climate-Change Issues (continued)					
Target Group	Activity	Potential lead Agency	Time frame	Verifiable indicators	Estimated cost (USD)
Professionals Media	Translate climate convention into simpler and shorter a version	MENR, AG	One year	Documents	7,000
	Translate and circulate/distribute climate change information in vernacular	KIE, Min. of Info	One year	Pamphlets, list of distribution records	50,000
	Produce public awareness materials such as posters, flyers, booklets, brochures, drawings, maps, etc	NEMA, Min. of Info	Two years	posters, flyers, booklets, brochures, drawings, maps	25,000
	Produce dramas, stories and other visual materials to facilitate understanding of climate change messages.	Min. of Culture, Min. of Education	Two years	Video films produced, performances for drama	30,000
	Produce videos and songs on climate change	Min. of Info, KBC	One year	No. of Videos and songs	50,000
	Print public awareness materials in newspapers and magazines.	NEMA	One year	No. of articles printed	50,000
Private sector/ industry	Sensitisation of private sector and industry	NEMA, KEBS	Six months	No. of workshops, No of firms participated	15,000
	Fund production of public awareness materials	KAM, KPSA, KIRDI, Chamber of Commerce and Industry, KEBS	Two years	Amount of funds contributed	8,000 PA
Donors	Provide funds for development of public awareness materials on climate change	MENR, Min. of Finance	Six months	Record of consultation meetings, No. of donors, Commitments	15,000

7.3 Key Strategic Aim: To Develop Capacity in Awareness and Understanding of Climate-Change Issues (continued)					
Target Group	Activity	Potential lead Agency	Time-frame	Verifiable indicators	Estimated cost (USD)
Policy makers and managers	Distribute simplified versions of climate change convention	-NEMA	Six months	Record of distribution list	3,000
	Distribute fact sheets, flyers, posters on climate change to parliamentarians and other policy makers once every year	NEMA, MENR, Parliamentary committee on Environment	Once a year	Record of distribution list	3,000 PA
Professionals	Strengthen and expand existing networks on environmental issues such as INFOCOM housed in Kenya MET	NEMA	One year	Inventory of existing or new networks collaborators	20,000
	Supply professionals with simplified version of climate change convention	NEMA/Professional bodies	Six months	Distribution list	3,000
	Supply posters, flyers, fact sheets, etc. to line	NEMA/Professional bodies	Six months	Distribution list	3,000
	Ministries to make assessments on CC and Resource list available to professionals globally but also more in Kenya	NEMA, institutions involved in CC	One year	Resource list	20,000
Media	Air or communicate climate change and related messages through radio, TV and other forms of communication such as newspaper articles	NEMA, Min. of Info	One year	No of radio/video programmes aired and articles	35,000
Private sector/ industry	Increase availability of copyright-free materials in accordance with laws and standards related to protection of copyrighted materials	KIPI, AG, NEMA	Two year	Free materials available	20,000

7.3 Key Strategic Aim: To Develop Capacity in Awareness and Understanding of Climate-Change Issues (continued)					
Target Group	Activity	Potential lead Agency	Time-frame	Verifiable indicators	Estimated cost (USD)
Libraries, Ressource centres	Acquire climate change materials which stakeholders can access	-Kenya National Library, KEBS, Universities, Learning institutions	Two years	-No. of documents	10,000 PA
	Proactively provide climate change information to stakeholders, e.g. organise resource centre open days	NEMA, MENR, Universities, Min. of Info, Reg. Dev. Authorities	Two years	-No of open days	8,000 PA
	Proactively distribute materials to target groups, e.g. teachers, other libraries, community leaders, training institutions, etc.	NEMA, Min. of Education, Min. of Info	Two years	Record on No. of materials distributed	10,000 PA
	Provide enabling environment that enhances access to climate change information	NEMA	Continuous	Evaluation	5,000 PA
	Develop website on climate change and link it to other relevant & related networks e.g. SARCAN		Continuous	websites/updates	2,000 PA
Extension staff	increase availability of copyright-free materials in accordance with laws and standards related to protection of copyrighted materials	KIPI, AG, NEMA	Two year	-Free materials available	2,000 PA
general public	Translate and circulate/distribute climate change information in vernacular Increase availability of copyright-free materials in accordance with laws and standards related to protection of copy righted materials	NEMA	Continuous	-Free materials	2,000 PA
<ul style="list-style-type: none"> • general public • Extension staff 	Partner with organisations that rationalise / initiate economic and social activities that mitigate climate change	NEMA	Continuous	MoUs	2,000 PA

7.4 Key Strategic Aim: To Develop Capacity in Climate Change Policy Framework and Strategies						
SECTORS AFFECTED	TARGET	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COSTS (USD)
<ul style="list-style-type: none"> • Energy • Agriculture • Forestry • Health • Livestock • Wildlife • Food Security • Tourism • Water • Trade & Industry • Security • Transport • Settlement • Marine 	<ul style="list-style-type: none"> • CEOs of sub sectors and Civil Societies • Professionals from sub sectors and Civil Societies • Legislature and Ministers 	<ul style="list-style-type: none"> • Policy Formulation • Review the existing policies • Fill up the Gaps • Development of the policy • Stakeholders consultative Forum • Seek cabinet and Parliamentary Approval 	<ul style="list-style-type: none"> • MENR • NEMA • KMD 	Maximum 2 Years	<ul style="list-style-type: none"> • No. of Review Meetings • No. of Meetings Reports • Policy Documents 	50,000 PA

7.5 Key Strategic Aim: To Develop Capacity in Environmentally Sound Technologies						
SECTORS AFFECTED	TARGET	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COSTS (USD)
<ul style="list-style-type: none"> • Energy • Agriculture • Forestry • Health • Livestock • Wildlife • Food Security • Tourism • Water • Trade & Industry • Security • Transport • Settlement • Marine 	<ul style="list-style-type: none"> • Technical Institutions • Universities • Farmers • Engineers • Patenting Institutions • CEOs of sub sectors and Civil Societies • Legislature and Ministers 	<ul style="list-style-type: none"> • Policy Formulation • Review the existing policies • Fill up the Gaps • Development of the policy • Research proposals and Research • Soliciting for funding • Stakeholders consultative Forum • Seek cabinet and Parliamentary Approval 	<ul style="list-style-type: none"> • MENR • NEMA • KMD Ministries in charge of: <ul style="list-style-type: none"> • Research • Higher education • Technology 	Maximum 2 Years	<ul style="list-style-type: none"> • No. of proposals • No. of on-going research • No. of new technologies • No. of Review Meetings • No. of Meetings Reports • Policy Documents 	50,000 PA

7.6 Specific objective: Create capacity in Climate Change Convention Negotiating Capacity						
Sectors affected	Target Group	Activity	Potential lead Agency	Time-frame	Verifiable indicators	Estimated cost (USD)
<ul style="list-style-type: none"> • Industry • Agriculture • Energy • Land use & Forestry • Water • Health • Aquatic & marine resource 	Systemic level <ul style="list-style-type: none"> • Policy makers • Technical staff 	Expand convention negotiating capacity	MENR, NEMA	3 Months	Number of people trained	5,000
	Institutional level <ul style="list-style-type: none"> • Private sector • Public sector Individual level <ul style="list-style-type: none"> • Policy makers • Legal experts • Technical staff 	Build capacity in arbitration		continuous		

7.7 Key Strategic Aim: To Develop Capacity in GHG inventory, Abatement, Sinks and Sequestration						
SECTORS AFFECTED	TARGET	ACTIVITIES	POTENTIAL LEAD AGENCY	TIME FRAME	VERIFIABLE INDICATORS	ESTIMATED COSTS US Dollars
<ul style="list-style-type: none"> • Energy • Agriculture • Forestry • Health • Livestock • Wildlife • Food Security • Tourism • Water • Trade & Industry • Security • Transport • Settlement • Marine 	<ul style="list-style-type: none"> • Policy Makers and Professionals • Professionals in Civil Societies • Higher Learning Institutions • General Public 	<ul style="list-style-type: none"> • Inventory of GHGs • Research • Afforestation and Reforestation • Conservation • Establishment of Databases 	MENR, NEMA	Continuous with Annual Reviews	<ul style="list-style-type: none"> • Regular reports in the annual state of the environment • Data and report of GHG inventories • Research Reports and Publications • Areas/Acreage afforested and re-afforested or rehabilitated • Species Richness • Estimated amount of Carbon Sink 	20,000 PA

7.8 Specific Objective: To Create Capacity in CDM						
Sectors affected	Target Group	Activity	Potential lead Agency	Time-frame	Verifiable indicators	Estimated cost (USD \$)
<ul style="list-style-type: none"> • Industry • Agriculture • Energy • Land use & Forestry • Water • Health • Aquatic & marine resource 	Systemic level <ul style="list-style-type: none"> • Policy makers • Technical staff 	<ul style="list-style-type: none"> • Identify training team 	MENR, NEMA	Nuclear team -3 months	<ul style="list-style-type: none"> • Number of people trained in each sector • 6 core trainers in place 	20,000PA
	Institutional level <ul style="list-style-type: none"> • Private sector • Public sector 	<ul style="list-style-type: none"> • Develop training material 		18 months	number of CDM proposals received	
	Individual level <ul style="list-style-type: none"> • Policy makers • Legal experts • Technical staff 	<ul style="list-style-type: none"> • Undertake training at systemic, institutional and individual levels 		Continuous, review & upgrade	CDM training materials	

7.9 Specific Objective: Synergies amongst Environmental Conventions						
Sectors affected	Target Group	Activity	Potential lead Agency	Time-frame	Verifiable indicators	Estimated cost (USD)
<ul style="list-style-type: none"> • Industry • Agriculture • Energy • Land use & Forestry • Water • Health • Aquatic & marine resource • Wildlife & conservation 	<ul style="list-style-type: none"> • Systemic level • Policy makers • Technical staff • Institutional level • Private sector • Public sector • Individual level • Policy makers • Legal experts • Technical staff 	<ul style="list-style-type: none"> • Create awareness on the synergies amongst environmental conventions • Expand capacity to develop joint proposals 	MENR, NEMA	<ul style="list-style-type: none"> • One year and then on a continuous basis 	<ul style="list-style-type: none"> • Number of people trained • Number of workshops convened • Number of joint proposals developed 	5,000 PA