Slovak Hydrometeorological Institute & Kenya Meteorological Department

CAPACITY BUILDING FOR CLIMATE CHANGE MITIGATION AND ADAPTATION ACTIVITIES IN THE REPUBLIC OF KENYA

Bratislava, December 2011

SlovakAid

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A TECHNICAL REPORT OF THE PROJECT SAMRS/2010/15/01:
CAPACITY BUILDING SUPPORT FOR THE ACTIVITIES IN CLIMATE CHANGE AND ADAPTATION

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Funded by the Ministry of the Environment of the Slovak Republic and coordinated by the Slovak Aid Agency

Bratislava, December 2011

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EXECUTIVE SUMMARY

The objective of the project was to determine priority needs for capacity development in Kenya in order to meet its commitments under the UN Framework Convention on Climate Change (UNFCCC).

This Technical Report (TR) presents the results of a detailed assessment of existing capacity in Kenya in relation to new and wide-ranging set of requirements and commitments under the UNFCCC within the future regime. It also contains an assessment of capacity for commitments of the country under the Monitoring, Reporting and Verification (MRV) framework in Kenya based on requirements of Article 5 of the Copenhagen Accord for Parties not included in Annex I to the UNFCCC. The functioning of MRV systems in developing countries such as Kenya is a challenging task and at the same time a crucial precondition for a transparent regime of cooperation between developed and developing countries, including providing for financial and technological support for mitigation and adaptation measures after 2012. The Technical Report covers the following areas:

- Analysis of the current status of the national circumstances in Kenya.
- Project background, which includes the scope and the justification of the project.
- Available information on climate change activities and strategy of Kenya, including methodological approach.
- Description of available expert and institutional capacity in Kenya.
- Main elements of National Inventory System for calculation and reporting on anthropogenic Greenhouse Gas (GHG) emissions by sources and removals by sinks (according to the provisions of UNFCCC, Kyoto Protocol (KP) and relevant Conference of Parties (COP)/CMP decisions.
- Areas for improving in collection and availability of statistical data for dominant sectors (according to the share on GHG emissions) and across all components of the National Communications on Climate Change.
- Developing capacity for establishing a national greenhouse gases inventory system.

Strategic priorities of the country are changing continuously in relation to the economic, political but also environmental challenges. A Synergy of different ministries and research organisations is not fully implemented during the development of strategies and concepts in different sectors and this can lead to the conflict of interest (e.g. to meet food security and conservation needs). Strategies should define basic sets of measures with responsibility, financial and human sources complemented with regular revision of progress in implementation. Insufficient national capacity for monitoring and assessing the implementation of strategies and programmes and poor coordination of sectors, low effectiveness of cross-sectoral associations are the most vulnerable spots in Kenya's system for climate change and adaptation activities. Capacity building should entail development of human and institutional as well as infrastructural capacities required to facilitate implementation of climate change mitigation actions. It has involved training to improve managerial as well as technical expertise to help institutions comply with environmental regulations.

PREAMBLE

The Technical Report (TR) “Capacity Building for Climate Change Mitigation and Adaptation Activities in the Republic of Kenya” was one of the main outcomes of the project “Capacity Building Support for the Activities in Climate Change and Adaptation” also listed in the project document. The project was funded by the Slovak Aid via the Fast Start Funding mechanism of the Slovak Ministry of Environment.

This Technical Report presents the results of a detailed assessment of existing capacity of Kenya in relation to new and wide-ranging set of requirements and commitments under the United Nations Framework Convention on Climate Change within the future regime. It also contains an assessment of capacity for commitments of the country under the Monitoring, Reporting and Verification (MRV) framework in Kenya based on requirements of Article 5 of the Copenhagen Accord for Parties not included in Annex I to the UNFCCC. The functioning of MRV systems in the developing countries such as Kenya is a challenging task. It is, at the same time, a crucial precondition for a transparent regime of cooperation between developed and developing countries, including providing for financial and in addition to the results of the capacity for GHG emission inventory. The report also provides recommendations on strengthening, mobilisation and development of new capacities allowing successful implementation of mitigation and adaptation measures, including monitoring of their impacts. The Technical Report has been prepared as a separate assessment document, which can be used for the upcoming National Communications and the Action Plan on Climate Change.

1. INTRODUCTION

1.1. COUNTRY PROFILE (INCLUDING CLIMATE CONDITIONS, SECTORAL IMPORTANCE, JUSTIFICATION OF THE PROJECT)

1.1.1. Climate Conditions

Kenya is located in East Africa between latitudes 4°30'S and 4°40'N and longitude 34°E and 42° 39'E. The country occupies an area of approximately 587 900 km² and has a population of about 38 million people. Inland waters cover about 11 200 km² of the total area. The land rises from sea level on the India Ocean Coast through a series of plateaus to the highest point on Mt. Kenya at about 5 200 m above sea level.

The topography of the country influences the climatic pattern with inland rainfall and temperatures generally relating to changes in altitude. The climate is of the equatorial type along the coast, modified equatorial in central and western and semi-arid to arid in all other areas that cover about 80% of the country. The annual rainfall varies from as low as 250 mm in the arid zones to as high as 2 000 mm in the high rainfall potential areas. Most parts of the country exhibit a bimodal (two peaks) rainfall regime. The major rainfall season is the "Long Rains" that lasts from March to May while the second rainfall season called the "Short Rains" lasts from October to December. The are more abundant and reliable in the South-eastern lowlands and some areas of the eastern highlands. The western parts of the country experience another rainfall peak from June to August. Highest temperatures are recorded in the arid regions to the northeast and northwest, where annual mean temperatures are above 34°C. The economy of the country is mainly agro-based with tea, coffee and horticulture leading the export markets. Tourism on the other hand contributes significantly to foreign exchange earnings.

Most of the population resides in the rural areas where over 80% energy use is from biomass (firewood, charcoal and agricultural residues). On the other hand, energy for industrial activities (manufacturing and processing) and urban areas is hydro and petroleum based with hydroelectricity predominantly being used in industries and petroleum in the transport sector. A significant amount of petroleum products are also used in the industrial sector. Consumption of these sources of energy has continued to increase sharply year after year with demand currently outstripping supply. For example, clearance of forests to meet energy requirements is a problem in Kenya and only about 2% of the country's land surface consists of closed canopy natural forests Though there are other open forests, these have been declared forest reserves by the government for purposes of conservation specifically to meet requirements of the tourism sector. Deforestation in Kenya has been a result of three main reasons namely:

- To provide more land for cultivation.
- To provide fuel and building materials.
- To create space for expansion of urban centers due to population increase and the migration of people from rural to urban areas in search of employment.

Figure 1.1: Kenya physical features

The country is endowed with natural resources including agricultural land, forests, wildlife, minerals and marine ecosystems. It is estimated that about 60% of the socio-economic activities are climate dependent. These activities are in climate sensitive sectors such as agriculture, water resources, energy, transport and health, among others. Kenya is thus quite vulnerable to climate variability and climate change. Variability in the climate patterns have exhibited significant disruption and associated impacts on the economic activities in these sectors. This is exacerbated by climate change that depicts itself in more frequent and intense extreme climate events such as floods and droughts.

1.1.2. Water sector

The water sector is considered to be very sensitive to climate changes. In many parts of the world, changes are manifested in the physical and chemical aspects of lakes and rivers. During the last decade, main changes included observed higher water temperatures, shorter periods of ice cover and decreases in river – and lake-ice thickness.

Kenya is classified as a water-scarce country. The country's water resources are unevenly distributed in both time and space in five drainage basins namely Lake Victoria, Rift Valley, Athi River, Tana River, and Ewaso Ngiro. For example, the Lake Victoria basin which occupies only 8% of Kenya's total land cover, accounts for 60% of the total surface water availability while Ewaso Ngiro North which occupies 36% of the total land cover only accounts for 2% of the total surface water available in the country. Climate change will definitely worsen the already precarious situation. Major floods that periodically afflict Lake Victoria basin, the Lower Tana basin and the coastal region have occurred at least six times in the past 50 years (NEMA, State of Environment Report, 2006/2007). In these areas, higher turbidity, siltation, and sedimentation occur. Floods carry fertilizer and pesticide residues into water bodies. This results in eutrophication which has detrimental impacts on water quality and aquatic life. Until recently, such episodes were assumed to represent natural climate variability. However, scientific evidence now points to climate change as the driving force behind the frequency and intensity of these extreme events.

According to the 2006/7 State of Environment Report, serious droughts have occurred at least 12 times in the past 50 years. Major rivers including the Tana, Athi, Sondu Miriu, Ewaso Ngiro and Mara have experienced severe reduced volumes during droughts and many seasonal ones have completely dried up. Eastern, North Eastern and parts of Rift Valley provinces bear the brunt of this situation.

1.1.3. Agriculture sector

Agriculture, the mainstay of Kenya's economy, currently contributes 26% of the Gross Domestic Product (GDP) directly and another 25% indirectly. The sector also accounts for 65%of Kenya's total exports and provides more than 18% of formal employment. More than 70% of informal employment is in the rural areas.

The agricultural sector comprises six subsectors: industrial crops, food crops, horticulture, livestock, fisheries and forestry and employs such factors of production as land, water and farmer institutions (cooperatives, associations). Industrial crops contribute 17% of the Gross Domestic Product in Agriculture (AgGDP) and 55% of agricultural exports. Horticulture, which has recorded a remarkable export-driven growth in the past 5 years and is now the largest subsector, contributes 33% of the AgGDP and 38% of export earnings. Food crops contribute 32% of the AgGDP but only 0.5% of exports, while the livestock subsector contributes 17% of the AgGDP and 7% of exports. Livestock and fisheries subsectors have huge potential for growth that has not been exploited.

1.1.4. Forestry sector

The forestry sector is considered to be very sensitive to climate changes due to high pressure by local communities and also to the changing environment. About 71% of the domestic energy consumed in the country comes from wood. Out of the 20 million m^3 of fuelwood consumed annually, 95% is collected from forests and rangelands.

Both hardwoods and softwoods are produced in Kenya. The chief hardwoods include *Olea africana, Olea capensis, Prunus africana, Dombeya torrida, Hagenia abyssinica, Croton megalocarpus, Ocotea usambarensis, Aningeria adolfi-friederici, Polyscias kikuyuensis, Syzygium guineense, Albizia gummifera, Zanthoxylum gilletii, Vitex keniensis, Neoboutonia macrocalyx Afzelia quanzensis, Milicia excelsa and Dombeya torrida*. The chief softwoods are podo (*P latifolius* and *P falcatus*), and cedar (*Juniperus procera*). The main exotic plantation species are cypress (mainly *Cupresss lusitanica*) and Pine (mainly *Pinus patula*). The supply of softwoods is adequate for local needs, both for building and other purposes. However, a ban on logging that was effected in the late 1990s has increased demand for softwoods resulting to imports from countries like Tanzania and Malawi. However, this shortage is expected to cease with the Kenya Forest Service initiating a new plantation establishment programme (PELIS) that aims at a sustainable production on of roundwood. Wattle (*Acacia mearnsii*), was widely, grown on small plantations, providing the base of an important industry. However, since the closure of the East African Tanning Extraction company in the late 1990, such plantations have now been replaced by the controversial but versatile Eucalyptus trees. Kenya maintains some 2 320 kha in indigenous forests, mangroves, and forest plantations, all covering about 4% of the total land area. Total forest and woodland coverage is about 30%. The timber cut in 2000 was nearly 21.6 billion m^3 of roundwood, of which 95% went for fuel. Production that year included 185 000 m^3 of sawn wood and 66 000 m^3 of wood pulp.

From the climate change view, a special focus is oriented on "water towers". The five "water towers" of Kenya – Mount Kenya, the Aberdare Range, the Mau Forest Complex, Mount Elgon, and the Cherangani Hills are mountains forests and the five largest forest blocks in the country. They form the upper catchments of all the main rivers in Kenya. The "water towers" are sources of water for irrigation, agriculture, industrial processes, as well as to all installed hydro-power plants. These mountain forests are also surrounded by the most densely populated areas of Kenya, because they provide enough water for intensive agriculture and urban settlements.

Their importance in the supply of timber and non-timber products to the communities living within their surroundings cannot be over emphasized. As such these forests are important and support livelihoods for all Kenyans in one way or another. At the same time, however, they are being lost or degraded by extensive illegal, irregular, and ill planned settlements and illegal forest resource extraction.

1.1.5. Biodiversity

Kenya is a biodiversity hotspot, up to 7 000 vascular plants have been noted. Kenya also ranks among the top African countries in terms of the number of total mammal species (The World Conservation Union, Nairobi).

The challenges facing wildlife and biodiversity conservation in Kenya are many and varied. They include climate change, habitat degradation and loss, forest depletion, tourism market volatility, human wildlife conflict brought on by population growth and changing land use habits of communities that co-exist with wildlife as well as wildlife crime.

Significant pressure for capacity building of institutions dealing with climate change and its adaptation puts technology transfer aimed to meet technology needs. These are enormous for Kenya. GDP growth rates of above 7% are required to achieve the industrial transformation goals by 2020. Most important needs creating biggest pressure for environment and thus also for the ecosystem services are adequate food supplies, sustainable land use management, high quality of energy services, rapid industrialization of basic commodities, adequate supply of economic, education and social services and adequate housing and transportation infrastructure. Institutions needed for such transfer, which is necessary for climate change adaptation include government ministries that are responsible for policy development and implementation, including those of coordination and monitoring, private sector institutions and Research and Development institutes involved in innovation of processes. In the forestry sector Kenya has inadequate capacity to implement sustainable forest management as a result of economic, social and institutional constraints. Excisions, encroachment, wildfires, overgrazing and charcoal burning and drought have all undermined the forest resource base down to the present low coverage. Most of the factors that are affecting forestry sector are external, thus implementation of broad measures across other sectors is needed.

1.1.6. Energy sector

Energy sector plays an important role in connection to forestry in Kenya. While Kenya has an institute responsible for development and use of technologies, it suffers from poor integration with other energy institutions so as to increase their effectiveness. Woodfuel is the largest form of energy consumed in the country, accounting for about 68% of the national total.

Biomass energy resources are derived mostly fro m forest formations such as closed forests, woodlands, bush lands grasslands, farmlands, and plantations. Only 2% of Kenya's land area is closed canopy forest, and with a production of about 45% of the total biomass energy resources including wood wastes coming from the tree products, these forests are threatened. The widening gap between supply and demand for wood fuel and recommended policy interventions are needed to redress this challenge.

1.2. BASIC INFORMATION ABOUT THE PROJECT

The objective of the project was to determine priority needs for capacity development in Kenya in order to extend the country's capacity to meet new reporting commitments according to the outcomes from the UN Framework Convention on Climate Change (UNFCCC) negotiation process.

Priorities of the project are proposals for enhancement of capacities to meet obligations as given in the Decision 1/CP.16 ns from Cancun[1] and Durban[2].

New extensive tasks will require defining a complex system of monitoring, reporting complemented with framework for assessment of reduction impacts of implemented policies and measures focused on reduction of greenhouse gas emissions.

The new and complex system of MRV should also provide for information on financial and technological transfers from developed countries to support mitigation and adaptation. As an inseparable part of MRV system, the methodology for assessment of vulnerability of the individual sectors to adverse effects of climate change has to be developed.

Project activities were as follows:

- Expert co-operation in the development of the national inventory system of the greenhouse gas emissions, including the necessary capacity identification for continuous support of demands on transparency, accuracy, consistency, comparability, and complexity of providing information according to UNFCCC, the Kyoto Protocol and relevant decisions of the Conference of the Parties to the Convention.
- Expert co-operation while preparing proposal of complex system of MRV for mitigation and adaptation activities, including the monitoring and reporting of financial and technological transfers in this area.
- Expert co-operation to develop methodology for assessment of vulnerability of the individual sectors to the adverse effects of climate change supplemented with training focused on its practical implementation. The methodology has to be aimed at the relationship of climate change (air temperature rise, precipitation regime changes, extremes variability increase etc.) and its adverse impacts (floods, extreme droughts, water resources degradation, adverse impacts to air quality and human health threat.

1.3. SCOPE OF THE PROJECT

This Technical Report covers the following areas:

- Analysis of the current status of the national circumstances in Kenya.
- Project background, which includes the scope and the justification of the project.
- Available information on Climate Change in Kenya and methodological approach.
- Available capacity description of Kenya.

[1] http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2
[2] http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cop17_national_communications.pdf

- The establishment of the National System for calculation and reporting on anthropogenic GHG emissions by sources and removals by sinks.
- Improving the availability of statistical data for significant sectors and across all components of the National Communications.
- Developing capacity for establishing a national greenhouse gases inventory system.

1.4. KENYA POSITION UNDER UNFCCC

Kenya ratified the UNFCCC on 30th August 1994 and the Kyoto Protocol on 25th February 2005 with entry into force on 26th May 2005. Since then the country's participation in the climate change activities has been vibrant on various fronts with the culmination of hosting the 2006 COP/MOP conference, which contributed towards heightened awareness of climate change.

Kenya submitted the Initial National Communication prepared by the Ministry of Environment and Natural Resources (Currently Ministry of Environment and Mineral Resources) and coordinated by the National Environmental Secretariat on 2nd October 2002.

With this submission, Kenya demonstrated the willingness to join the international community in combating the climate change issues and meet the obligation under the UNFCCC. According to the official UN rules and economic conditions, Kenya became a Party to the UNFCCC not included in Annex I of the Parties following the specific rules and requirements in guidelines for the preparation of the national communications for non-Annex I Parties.

Article 12.5 of the UNFCCC requires non-Annex Parties (except those Least Developed Countries (LDCs)) to make their Initial National Communication "*within three years of entry into force of the Convention for that Party, or of the availability of financial resources…*." the Government of Kenya being fully committed to the implementation of the UNFCCC put in a request to the Global Environmental Facility (GEF) for funding in 1996 that was approved and the resources made available in July 1999. This was the Climate Change Enabling Activities Phase 1. The Project activities were carried out through four Technical Working Groups, which were constituted along the thematic lines of the Convention. The execution of these activities involved active participation of major stakeholders that included Government agencies, Non-Governmental Organizations (NGOs) and the private sector.

1.5. LIST OF PREPARED REPORTS AND STRATEGIES ADDRESSING CLIMATE CHANGE IN KENYA

Though the Republic of Kenya has no direct law on climate change, the Kenya constitution 2010 and the Kenya Vision 2030 have specific guidelines on tackling climate change. Furthermore, Kenya has a Climate Change Response Strategy that gives a roadmap for climate change adaptation activities by sectors. The development of a policy is in the pipeline. The multi-sectoral nature of the climate issues implies that a broad range of sector policies and regulations such as environmental conservation, energy, manufacturing, natural resources are of relevance.

The country has already in place several crucial general documents and policies useful for new reporting and development of low-carbon strategies:

- Kenya's First national Communication on Climate Change
- National Climate Change Response Strategy
- Economic Impact of Climate Change in the East African Community (GTZ and Global 21 Consulting)
- Institutional Mapping for Climate Change in Eastern Africa (Industrial Ecology Institute)
- Kenya Adaptation to Climate Change in Arid and Semiarid Lands
- National Reporting Framework of Indicators: The Vision 2030
- Kenya State of the Environment and Outlook 2010
- The "Energy Act 2006" and the "Kenya Forest Policy" specifically provide for carbon finance activities
- An assessment of opportunities for Low Carbon Growth in Kenya by the Stockholm Environment Institute (SEI)
- Adapting East African Ecosystems and Productive systems to Climate Change
- The Economics of Climate Change in Kenya by Stockholm Environment Institute (SEI)
- Kenya Atlas of our Changing Environment; 2009
- Coping with Floods in Kenya: Vulnerability, Impacts and Adaptation Options for Flood prone areas of Western Kenya; 2004
- Several key documents address environmental and energy concerns. These include, inter alia, Environmental Management and Coordination Act of 1999 (EMCA, 1999), Energy Policy, Energy Act 2006, as well as the Forest Act 2005.

2. CURRENT MRV SYSTEMS AND THE PROPOSED CHANGES BASED ON THE CANCUN AGREEMENTS FOR NON-ANNEX I COUNTRIES

The UNFCCC commits all Parties to formulate, implement, publish and regularly update national, and where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases and to adapt on the short as well as long term changes resulting from the Climate change impacts on different natural and human processes. Since the future framework of the global or regional regime after 2012 will bring additional requirements going beyond the current UNFCCC requirements for non-Annex I countries, as well as that the UN expects the countries to gradually become Annex I countries, there is ample scope for assistance to support the countries to take further steps as appropriate.

The project is closely based on document “Kenya National Climate Change Response Strategy”, identifying the needs for further capacity building and development of expert capacities for national communications on climate change preparation and building of the MRV system in the country. The requirements for the implementation of transparent MRV systems in the developing countries is based on Article 5 of the Copenhagen Accord and is prerequisite for the future efficient and transparent cooperation regime between the developed and developing countries to meet global environmental objectives for climate change after 2012.

The capacity building for the vulnerability assessment and the identification of the most sensitive sectors impacted by climate change will be the task of the adaptation part of the project according to the guidelines for the preparation of the national communications as well as according to the outcomes and findings of the IPCC Working Group II contribution to the Fourth Assessment Report (Impacts, Adaptation and Vulnerability). The project activities were fully in line with the strategic document Vision 2030 in which the strong economic growth in Kenya has been projected with the urgent needs for sustainable implementation of adaptation measures for the damages caused by climate change.

2.1. DESCRIPTION OF MRV ON MITIGATION IN DEVELOPING COUNTRIES BEFORE CANCUN NEGOTIATIONS

The current requirements in developing countries is to submit their first national communication on Climate Change (NatCom) including national GHG inventory within three years of becoming a Party to the UNFCCC, dependent on the availability of financial resources. There is no regular reporting timetable for non-Annex I countries and the periodicity in submission of the next

NatCom can vary and depends on available funding. The statistics of submitted NatComs to the UNFCCC from the non-Annex I countries up to date represents 140 Initial (first) NatComs, 42 Second NatComs, 2 Third NatComs and one Fourth NatCom. Kenya has submitted up to date its Initial National Communication on 22nd October 2002.

Current reporting on mitigation is according to the Decision 1/CP.16 revised, based on new requirements approved in Cancun 2010, and will cover among others:

- more frequent reporting and submitting on mitigation,
- more comprehensive reporting in the frame of MRV definitions,
- reporting will be subject to international consultations and analysis (ICA),
- reporting will be much more explicit in information on progress in achieving mitigation targets or goals.

The negotiations in 2011 are focused on preparation of implementation of decisions on:

- frequency and regularity of NatComs submissions by non-Annex 1 countries,
- definition of scope and guidelines for ”short“ (biennial reports) and “full” NatComs,
- inventory guidelines,
- guidelines for ICA, establishing a registry for Nationally Appropriate Mitigation Actions (NAMAs) seeking financial support.

2.2. DESCRIPTION OF MRV ON MITIGATION IN DEVELOPING COUNTRIES AFTER NEGOTIATIONS

Main goals negotiated in Cancun in national reporting on climate change mitigation and adaptation prepared directly by country experts will have following direct advantages:

- identifying national priorities for such actions in line with sustainable development objective,
- serving international functions to assess progress achieved collectively or by individual countries,
- helping to select areas where support for mitigation and adaptation is needed,
- facilitating national policy making process,
- ensuring transparency and credibility of carbon markets,
- incentivize formulation, implementation and updating of national climate programmes,
- be most useful when information in them are tailored to the needs of their users.

Decision 1/CP.16 approved in Cancun follows namely these elements:

- More frequent submitting of "full" national communication, it means every four years or according to the COP decision.
- Biennial update reports or "short" national communication every two years containing update GHG inventory, information on mitigation actions and support received.
- National communications and biennial update reports will be the subject of international consultations and analysis (ICA).
- Non-Annex I countries are encouraged to prepare low-carbon development strategies and long-term cooperation of countries to tackle climate.

Practical implementation of the MRV provisions from Decision 1/CP.16 and outcomes of Ad Hoc Working Group for Long-term Cooperative Action (AWG LCA) meeting in Panama 2011 specifying areas of national biennial reporting and international consultation and analyses processes.

Table 2.1: Domestic functions of new national reporting

Theme	Possible functions of new national reports	Steps needed to support functions
Mitigation	Identify mid-and long-term mitigation goal (2020 and 2050). Facilitate monitoring of data and/or trends at appropriate level of aggregation.	National inventory report (including sectoral or subsectoral data as required). Mitigation potentials and costs; national development needs and priorities.
Policy enabling environment	Identify country driven priorities. Enhance regulatory certainty for investors. Improve policy coherence (via increased inter-departmental co-ordination of policy and planning). Enhance engagement and awareness- wide range of stakeholders, e.g. through consultations. Identify barriers to implement mitigation and adaptation actions.	Legislative and policy planning process in place – with clear distribution of responsibility.
Implementation	Facilitate monitoring of progress for both mitigation and adaptation actions by tracking of success in implementing them.	Domestic MRV frameworks in place.
Support needs	Identify support needs- either for whole country or individual sectors/actions. Ensuring mitigation actions are cost-effective.	Provide estimates of the costs of future reduction costs- in aggregate, for groups of actions, or individual actions – develop marginal abatements costs.
Capacity building	Developing knowledge, research activities and implementation capacities.	Engaging institutions- universities, research for input into national strategy documents.

2.3. BIENNIAL REPORTS (BR)

Parties not included in Annex I to the Convention (non-Annex I countries) will be committed to submit reports on biennial basis as a component of their national communication and in biennial

update reports. Non-Annex I countries will implement MRV guidelines consistent with their capabilities and the level of the provided support with the link to the support and flexibility regarding addressed capabilities. The preparation of the guidelines for biennial reporting will be broadly based on the relevant sections of the guidelines for the preparation of national communications from Parties not included in Annex I to the Convention as contained in the annex to decision 17/CP.8. The objectives of the guidelines for the preparation of the biennial update reports from non-Annex I countries will be:

- To assist non-Annex I countries in meeting their reporting requirements under Articles 4, paragraph 1 and 12 of the Convention and decision 1/CP.16.
- To encourage the presentation of information in a consistent, transparent, comparable, complete, accurate, timely and flexible manner, taking into account specific national and sectoral circumstances.
- To facilitate provision of transparent and consistent information on mitigation actions and their effects.
- To facilitate the presentation of information on finance, technology and capacity building support for the preparation of biennial update reports.
- To serve as policy guidance to the operating entity of the financial mechanism for the timely provision of financial support needed by developing country in order to meet the agreed full costs of complying with their obligations under Article 12, paragraph 1.
- To enable enhanced reporting by non-Annex I countries in accordance with their capacities and respective capabilities, and the availability of support.
- To ensure that the Conference of the Parties (COP) has sufficient information to carry out its responsibility of assessing the implementation of the Convention.
- To facilitate the international consultations and analysis of biennial reports under the Subsidiary Body for Implementation (SBI).

The principles of the non-Annex I countries' reporting can follow principles for Annex I countries in terms of transparency, consistency, comparability, completeness and accuracy:

- Transparency means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information.
- Consistency means that an inventory should be internally consistent in all its elements with inventories of other years. An inventory is consistent if the same methodologies are used for the initial and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks. Under certain circumstances an inventory using different methodologies for different years can be considered to be consistent if methodologies provided by the IPCC for such situations have been applied.
- Comparability means that estimates of emissions and removals reported by non-Annex I countries in inventories should be comparable among non-Annex I countries. For this purpose, non-Annex I countries should use the methodologies and formats agreed by the COP for estimating and reporting inventories.
- Completeness means that an inventory covers all relevant sources and sinks, as well as all gases, included in the IPCC Guidelines. Completeness also means full geographic coverage of sources and sinks of non-Annex I countries.

- Accuracy is a relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies should be used, in accordance with the IPCC good practice guidance, to promote accuracy in inventories.

The proposed scope of the biennial reporting of the non-Annex I countries will cover the following issues:

- The national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol, including a national inventory report.
- Information on mitigation actions and their effects including a description, analysis of the impacts and associated methodologies and assumptions, progress in implementation and information on domestic measurement, reporting and verification.
- Information on methodologies and assumptions.
- A description of support needed and received and provided.
- Information on the level of support received to enable the preparation and submission of biennial update reports.
- Information on domestic measurement reporting and verification.
- Any other information that the non-Annex I countries considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its biennial update report.

2.4. INTERNATIONAL CONSULTATION AND ANALYSIS (ICA)

Review structure are already in place under UNFCCC and under KP for Annex I countries' reports, but not for non-Annex I countries. After Cancun and Panama talks is evident, that reporting will be more frequent for all countries in future. There are differences in reports, review and consequences to market mechanisms for Annex I and non-Annex I countries.

Now it is evident that for developed countries, the COP 16 decided to establish a process for international assessment of emissions and removals related to quantitative economy-wide emission reduction targets and a work programme for international assessment and review (IAR) related to the emission reduction targets including the role of land-use, land-use change and forestry, and carbon credits. For developing countries, it was decided to conduct international consultations and analysis (ICA) process of biennial reports under the SBI agenda. The main difference of ICA process against the IAR is not to review but help non-Annex I countries in their reporting.

The overall objectives of the international consultation and analysis (ICA) of the biennial reports are as follows:

- enhance capacity-building efforts in developing country,
- increase transparency and promote continuous learning and improvement of nationally appropriate mitigation actions,

- access to the information on emissions from non-Annex I countries,
- assist non-Annex I countries in overcoming difficulties in developing national systems,
- implementing, reporting and verifying nationally appropriate mitigation actions through the sharing of best practices,
- assist non-Annex I countries in addressing technical difficulties faced in preparation of the biennial reports and support needs,
- identifying submission of required information,

In addition to the overall objectives in paragraph 1, the specific objective of the international consultations is to promote transparency of developing country mitigation actions and GHG emissions through a facilitative consultation process and to build the capacity of non-Annex I countries.

The main principles that provide the basis for the ICA and differ from the Annex I countries' review are as follows:

- be non-intrusive, non-punitive, non-confrontational and respectful of national sovereignty,
- be a facilitative and cooperative process based on interactive dialogue,
- be fully involve the non-Annex I country concerned,
- take into account the wider economic and development needs of the Party concerned, as well as its national circumstances,
- not be overly burdensome on the Party concerned in terms of time, human and financial resources.

The ICA will provide a report on the support needs, including for enabling environment, required for preparation of biennial update reports from developing country Parties. The ICA process will consist of the following two steps and will be completed within a fixed timeframe:

- Technical analysis of biennial reports by a team of technical experts.
- International consultations on biennial reports and expert analysis reports under the SBI.

The technical analysis of biennial reports will focus on greenhouse gas inventories and inventory reports, information on mitigation actions, their effects, methodologies assumptions and status of implementation, domestic measurement, reporting and verification system and information on received support. The output of the technical analysis by the technical expert team will be an analysis report. Prior to finalizing the report, the draft analysis report prepared by the expert team will be shared with the Party concerned for review and comment with the aim of resolving any difference of opinion between the expert teams and the country on the report. The final analysis report, incorporating comments from country should be made available several weeks before the next session of the COP. The ICA process will consist of the following:

- Session of consultations, which will consist of a brief presentation by the country concerned, followed by an oral question and answer session between.
- During the two-week period following the consultation process, any country may submit in writing follow-up questions to the concerns within a specified time period.

3. CURRENT INSTITUTIONAL AND EXPERT CAPACITY FRAMEWORK FOR CLIMATE CHANGE AND ADAPTATION ACTIVITIES IN KENYA

This chapter includes a comprehensive list and linkages (horizontal, vertical) among the institutions and bodies involved in climate change activities in Kenya within the above mentioned sectors.

3.1. COORDINATION OF CLIMATE CHANGE ISSUES

- Ministry of Environment and Mineral Resources (MEMR) – Climate Change Secretariat

The Ministry of Environment and Mineral Resources is the policy arm of the government that informs environmental governance in Kenya. The Ministry develops the various policies, legislations, standards and institutions that govern environmental management in Kenya. One of the key achievements of the Ministry in regard to climate change policy is the development of the Climate Change Response Strategy for Kenya which sets the agenda for climate change mitigation and adaptation.

Within the Ministry is the Climate Change Secretariat which has the overall responsibility for policy formulation on climate change issues in collaboration with other relevant Ministries and lead agencies in Kenya.

It is worth noting that Kenya does not have a policy or legislation that explicitly deals with climate change. The only policy that has attempted to deal with climate change issues is the draft environmental policy of 2008 – hence the need to review the policy and to include urgent global issues such as climate change challenges.

3.2. INSPECTION, ENFORCEMENT OF ENVIRONMENTAL ISSUES

- National Environment Management Authority (NEMA)

The National Environment Management Authority (NEMA) is the Designated National Authority (DNA) and was established under the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, as the principal instrument of government in the implementation of all policies relating to

the environment. The Authority became operational on 1st July 2002 and has since been actively involved in environmental protection through coordination of key stakeholders and lead agencies in ensuring that Kenyans enjoy their right to a clean and healthy environment. The authority has since developed a number of environmental standards and regulations and continues to monitor their implementation though promotion of compliance and enforcing the same. NEMA reviews, approves and recommends projects for funding under the clean development mechanism.

3.3. CLIMATE CHANGE, CLIMATOLOGY, METEOROLOGY

- Kenya Meteorological Department (KMD)

The Kenya Meteorological Department (KMD) was established to provide information to the shipping lines and aviation industry. The services have increased to include other sectors such as print and electronic media, military, agriculture and forestry, water resource management, energy, health, disaster management among others. The Department is responsible for providing early warning information for the safety of life, protection of property and conservation of the natural environment.

The Agro-Meteorological Section (AMS) within KMD, collects, analyses, and interprets agrometeorological data. The agro-meteorology parameters that are measured by the field stations include types of crops, stages of crop growth, pests/disease damage and crop population density. These measurements are sent to AMS at the KMD for analysis, interpretation and compilation of crop weather farming reports, copies of which are sent to institutions such as the Ministry of Agriculture and Rural development, Office of the President, NGOs, Research Institutes and Local Universities, among others in addition to being posted on the KMD website.

The Kenya Meteorological Department also generates and disseminates forecasts on different ranges such as Long Range (one and three months ahead), 7-day and 4-day forecasts that are important for agricultural planning.

The main functions of the KDM are as follows:

1. Provision of meteorological and climatological services to agriculture, forestry, water resources management, civil aviation and the private sector including industry, commerce and public utilities for the better exploitation and utilization of natural resources for national development.
2. Provision of meteorological services to shipping in the western Indian Ocean including the issuing of cyclone warnings for the safety of merchant and other ships.
3. Provision of meteorological services to military aviation for the safety of the Kenya Air Force aircraft for national defence.
4. Organization and administration of surface and upper air meteorological observations within its area of responsibility and the publication of climatological data.
5. Maintenance of an efficient telecommunications system for rapid collection and dissemination of meteorological information required for national and international use in accordance with the World Meteorological Organization (WMO) and the International Civil Aviation Organization (ICAO) procedures.

6. Co-ordination of research in meteorology and climatology including co-operation with other authorities in all aspects of applied meteorological research, and the maintenance of the National Meteorological Library.
7. Evolvement of suitable training programmes in all fields of meteorology and other related scientific subjects which are relevant to the development of Kenya and other countries that participate in the Department's training activities.

▪ Department of Resource Surveys and Remote Sensing (DRSRS)

The DRSRS is a department in the Ministry of Environment and Mineral Resources. It uses aerial photography and other remote sensing techniques as effective means of monitoring land use for crop, livestock, and wildlife. Photographic analysis of land use can generate satisfactory data quickly and at low cost. The department has the capacity to carry out survey of range conditions, livestock/wildlife census and trends, on regular periodic intervals. It has access to a variety of satellite images and has adequate software for image analysis. In addition, the department receives 10 day data on vegetation health, density and biomass productivity for the whole country which allows assessment of changes over time and space and can highlight effects of climatic variations on specific areas. The objectives of DRSRS are to:

1. Provide baseline resource data to planners and decision makers that would enable them prepare economically viable and ecologically sound development programs.
2. Avail knowledge regarding land use changes in various administrative and planning units.

National planners and policy makers need advance knowledge of projected crop yields in order to prepare for imports if shortfall in a certain commodity is expected, or exports if there are surplus and strategic reserves adequately stocked. The areal estimates provide valuable and timely information especially for maize production. Livestock is the largest food resource in pastoral areas, hence the numbers, mortality rates, livestock/wildlife migration form crucial information for drought preparedness. Similarly, forest managers who need to identify effects of degradation or conservation efforts get the data from the Department's water tower monitoring projects.

▪ Famine Early Warning System-Network (FEWS-NET)

USAID FEWS-NET is designed to help decision-makers in Sub-Saharan Africa. It assesses remotely sensed data and ground based meteorological crop and rangeland conditions for early indications of likely famine areas. It also evaluates other factors affecting local food availability for vulnerability mapping and further investigations in preparation for mitigating interventions.

The assessments are continually updated and disseminated to provide decision-makers with timely and accurate information available. The information collected includes biophysical, socio-economic, remote sensing, market supply, climate data, food prices, crop growth, school attendance, crop production and household income. Information is also collected on demographic, health and nutrition and population growth.

FEWS-NET offers a range of reports such as current vulnerability assessment, food security update and Kenya Vulnerability Update. The food security situation bulletin is produced and distributed

monthly to all interested users of early warning information for famine relief aid programmes and disaster response preparedness.

Current vulnerability assessments are published in periodic bulletin supplements, which identify local populations that are vulnerable to famine, and provide insight into the root causes of vulnerability

- Arid Land Resource Management Project (ALRMP)

ALRMP is based in the office of the President and maintains a drought early warning system, covering ten northern arid districts. Primary data and information collected through direct interviews and direct measurements from community members include, household food stock balances, diet composition, livelihood activities, yields from crops/livestock, forage and water status and actual rainfall amount in the affected areas.

The project collects and analyses primary data from sample sites and produces monthly early warning reports at district level. These are passed directly to ALRMP head office, for distribution to the relevant agencies. The focus for analysis is at the district level. The system uses standard survey methodology (Quantitative and qualitative) and indicators selected for their sensitivity to pastoral production system and livelihoods.

- World Food Programme (WFP)

The WFP analyses district and national level secondary data mainly for emergency food relief programmes. The main thrust is and has been emergency food aid and responses to the Government food aid appeals. WFP provides early warning information to its donor agencies and is highly linked with all early warming institutions and Kenya Food Security Meeting for efficient emergency food aid area targeting and distribution.

Secondary data examples are district wealth status, population figures, average crop yield potential etc., usually already documented and not specific to the time and area affected. The data gives general picture and averages, which may not be sufficient for decision making and actual intervention targeting.

3.4. WATER SECTOR

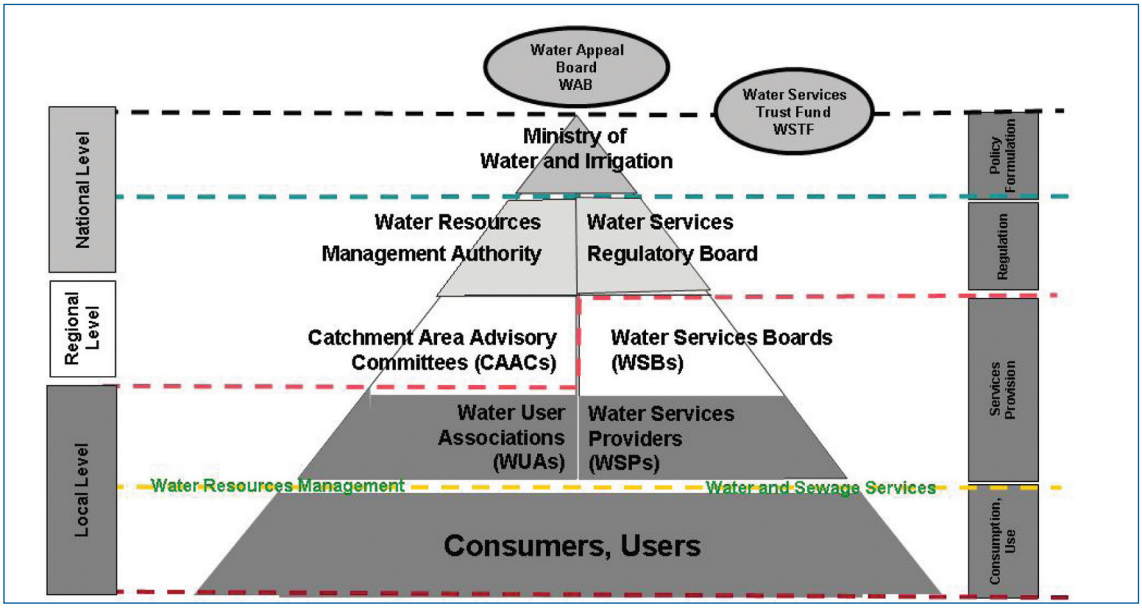
Formulation of the National Water Policy in Kenya was followed by an intensive long-term consultation process that involved various stakeholders at different levels, in order to develop the Water Act and thus operationalize the National Water Policy. The Water Act was accepted in the year 2002 and stands for a marked shift in water delivery in Kenya. This Water Act established an autonomous Water Resources Management Authority, destined to manage and protect Kenya's resources. It also shaped an institutional framework that gave responsibility for providing decentralised services to Seven Regional Water Services Boards (WSB). These Boards manage water services assets and ensure that they remain in the public realm. An essential aspect of the reform outlined in the Water Act is the separation of water and sanitation from the management of resources. The government is the main player to manage water resources, assuming respon-

sibility both for financing the water sector and for providing all services. The main objective of the Ministry of Water and Irrigation in Kenya is to achieve positive developments by means of policy instruments that are adapted to the current challenges, and thus differ from previous approaches.

The new structure of the water sector in Kenya can be distinguished in different levels: The Ministry of Water and Irrigation is at the top, followed by the regional authorities and the catchment area advisory authorities. The communities form the base of the pyramid. There is also a differentiation between service delivery and water resources management tasks (Figure 3.1). The bill defines that water services are delivered through seven Water Services Boards. Six Catchment Area Advisory Committees (CAACs) carry out water resources management tasks. At the national level, the Water Services Regulatory Board and the Water Resources Management Authority which have regulatory functions – for example, with regard to water services, tariffs, licensing, and similar issues.

Services are supplied by non-governmental water service providers. A service provider must go to a Water Services Board and sign a water services agreement. Licenses are given to the Water Services Board by the Water Services Regulatory Board.

Figure 3.1: The institutional set-up of the Kenyan Water Sector (Figure by Engineer Mahboub Maalim, Permanent Secretary of the Kenyan Ministry of Water and Irrigation)



The two functions are linked at the top management level – the Ministry of Water and Irrigation – as well as at the bottom, community level. At the top level, the government is in charge of the overall coordination, control, policy-making, and the like. At the community level it is simply impossible to separate water services delivery from sustainable water resources management.

The Water Services Trust Fund is another agency meant to finance micro-projects at the community level. In some Kenyan communities it is very difficult to set up a water services provider organisation in order to get a license. The Water Services Trust Fund provides direct funding for these small communities, which would otherwise be disadvantaged. The Trust Fund was created for to support marginalised areas and marginalised communities so that they may not suffer from

the privatisation of water services delivery. In areas of Kenya that are characterised by pastoralists it is difficult to form a water service provider organisation. However, such an organisation is necessary in order to get a license for water provision from the Water Services Board. In these areas, water services delivery is supported by means of the Trust Fund.

In Kenya there are the following research institutions which deal with research in water sector:

- Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporation in the Ministry of Livestock and Fisheries Development of the Government of Kenya. It is mandated to conduct aquatic research covering all the Kenyan waters and the corresponding riparian areas including the Kenya's Exclusive Economic Zones in the Indian Ocean waters.
- African Centre for Technology Studies (ACTS) in Kenya is centre based to international intergovernmental science, technology and environmental policy, which generates and disseminates new knowledge through policy analysis, capacity building and outreach.

IGAD Climate Prediction and Applications Centre (ICPAC) is a specialized institution of the Intergovernmental Authority on Development (IGAD) working with the National Meteorological Services of the Greater Horn of Africa countries, World Meteorological Organisation (WMO) and other partners to address regional challenges of climate risks including climate change.

State of Monitoring Water Resources in the Country

The water resources base is very vital in the overall development in Kenya. Consequently, the government of Kenya places a high priority in monitoring the quality and quantity of the different types of water resources in the country. The Department of Water Development is charged with the full responsibility of monitoring the quality of both the surface and ground water throughout the country. The Department is therefore expected to maintain an updated water quality database (both physical – suspended solid loads, turbidity, etc and chemical – CODs, BODs, dissolved solid loads, etc.) for the complete spectrum of the water resources base in the country. Unfortunately, the water quality data is very scanty and unreliable, especially in the more recent years. The Kenya Marine and Fisheries Research Institute (KMFRI) also maintain a good quality database on the major lakes and coastal areas in the country.

Similarly, the Department of Water is charged with the full responsibility of monitoring the quantity of both the surface and ground water throughout the river systems in the country. The Department thus, maintains a fairly good observational hydrographic network of river gauging stations throughout the country. However, this network has been dwindling with time due to poor operational and maintenance support systems in the country. It is noted that the main problem in monitoring the quantity of the surface water resources in the country is data discontinuities. While this problem can be partly attributable to gauge breakdowns and malfunctions, it is mainly as a result of poor commitment and attitudes on the part of those who are charged with such responsibilities. There is therefore need for the development of a policy that could guide the ministry to analyse, objectively, the existing gauge network so as to identify, on a cost benefit basis, the optimum and primary network that could be made operational continuously and consistently. It is worthwhile noting that the Department maintains a very good database on bore hole yields for the initial pumping tests, and well logs covering most of the country.

3.5. AGRICULTURAL SECTOR

Kenya's agriculture and food security are highly weather dependent. As such, there is need for timely and reliable climate and weather information and data that can facilitate appropriate responses to enable the Government make timely and informed policy decisions and sound strategic plans.

- ### Ministry of Agriculture (MoA)

The Ministry of Agriculture is charged with the promotion of sustainable and competitive agriculture through policy formulation and provision of support services to enhance food security in the country. The Ministry has agricultural extension personnel from sub-location to the national level, with two-way information flow from the Minister, Permanent Secretary, Province, District, Division, Location and sub-location and vice versa. At the district level, the District Agricultural and Livestock Extension Officers (DALEO) are responsible for aggregating reports from the grass roots to produce district reports. The reports are then forwarded for compilation at provincial and national levels. Information covered includes states of land preparation, inputsavailability and distribution, crop growth stage and condition, effects of weather and other natural hazards, pests, diseases and trend in production targets. It also includes Pre/Post-harvest losses, marketing issues and food commodity prices. In addition, areas of food surpluses or deficits are also covered.

Food, crop and livestock situation reports are prepared on monthly basis, but fortnightly during alarm and emergency stages of drought disaster. The information gathered is used in calculation of expected deficits/surpluses of food and input status and import/export requirements. Recommendations for the appropriate interventions are made to the National Disaster Management Committee, and the Ministry takes appropriate actions within its mandates and ability, involving the affected communities and other stakeholders in the sector. There are a number of agencies under the Ministry that help achieve the national mandate.

- ### Agricultural Finance Corporation (AFC)

Agricultural Finance Corporation (AFC) is a government owned non-bank development financial institution. The institution is mandated in taking over the functions of the Land and Agricultural Bank of Kenya.

- ### Pest Control Products Board

Mandated to regulate the importation and exportation, manufacture, distribution and use of pest control products.

- ### Kenya Agricultural Research Institute (KARI)

A premier national institution bringing together research programmes in food crops, horticultural and industrial crops, livestock and range management, land and water management, and socio-economics. KARI promotes sound agricultural research, technology generation and dissemination to ensure food security through improved productivity and environmental conservation that are even applied at the farm level. This research aspect allows farmers to diversify in the agricul-

tural enterprises in their respective agro-ecological zones. Research considers long-term climate and weather risks and vulnerability. Research institutions, universities and extension services of the MoA create awareness on new production technologies, conduct field days and on-farm demonstrations.

- Kenya Plant Health Inspectorate Service (KPHIS)

The KPHIS is a regulatory agency for quality assurance on agricultural inputs and produce in Kenya. KEPHIS undertakes: Plant Variety Protection; Seed Certification; Phytosanitary Inspection of Imports and Exports and Analysis of Soil, Water, Agricultural Produce, Fertilizers and Pesticides.

- Agriculture Society of Kenya (ASK)

The ASK deals with promotion of agricultural development.

- Tea Board of Kenya

The board regulates the tea industry and promotes competition in the tea sub-sector.

- Tea Research Foundation

Promote research into and investigate all problems relating to tea and such other crops relating to tea production.

- The Kenya Tea Development Agency

The Kenya Tea Development Agency was formed on the privatization of Kenya Tea Development Authority in June 2000.

The Agency is contracted by the tea factory companies to:

1. Manage tea cultivation.
2. Develop and maintain tea husbandry.
3. Collect, weigh, handle and pay farmers for green leaf delivered.
4. Manufacture green leaf into tea.
5. Market the manufactured tea.
6. Develop and provide sound technical, financial and managerial infrastructure.
7. Provide services in procurement, ICT and HR.

- Cotton Development Authority (CODA)

The CODA is a regulatory state corporation under the Ministry of Agriculture established under section 4 of the cotton (Amendment) Act 2006. The role of the authority is to promote, coordinate, monitor, regulate and direct the cotton industry in Kenya.

- Kenya Sugar Research Foundation (KSRF)

The KSRF is mandated in development and dissemination of technology and information needed for increased productivity, profitability and sustainability of the sugar industry in Kenya.

- Kenya Sugar Board

The Kenya Sugar Board is charged with the responsibility of regulating, developing and promoting the Kenya Sugar Industry.

- South Nyanza Sugar Company Ltd.

The company is involved in Production and milling of white sugar and associated products.

- Nzoia Sugar Company

Production and milling of white sugar and associated products.

- Chemelil Sugar Company

Production and milling of white sugar.

- Pyrethrum Board of Kenya

This board serves international clientele of distributors, manufacturers and ultimate consumers of end-use products.

- Kenya Seed Company

The mandate of Kenya Seed Company is to carry out focused research, promote and facilitate production of high yielding, better quality certified seed to farmers and stakeholders, to enhance food self-sufficiency which is an indicator of the quality of people's lives and a condition for sustainable economic prosperity.

- National Cereals and Produce Board (NCPB)

The NCPB has the mandate of procuring, managing and marketing grains and related enterprises. The Board offers third party services within its network of depots and silos countrywide. It monitors production, sales and stocks of food in the country. It combines field sample surveys with complementary data collected by the Central Bureau of Statistics (CBS), Department of Resource Surveys and Remote Sensing (DRSRS), KMD and MoA to estimate food production. This information is passed on to the National Disaster Management Committee through Department of Relief and Rehabilitation in the Office of the President. The mission of NCPB is to cost effectively maximize the use of resources in order to achieve the highest level of commercial performance for the benefit of our customers, employees and stakeholders, by providing high quality products and services at competitive prices, in a socially responsible manner.

- Coffee Board of Kenya

The Coffee Board of Kenya is mandated to promote competition in the coffee industry and regulate the coffee industry.

- Coffee Research Foundation

The Coffee Research Foundation promotes research into and investigates all problems relating to coffee and such other crop system of husbandry as are associated with coffee throughout Kenya including productivity, quality, value addition and suitability of land in relation to coffee planting and matters ancillary thereto.

- Nyayo Tea Zones Development Corporation (NTZDC)

The NTZDC aims at promoting forest conservation by providing buffer zones of tea and fuelwood to check against human encroachment. Among other objectives, the Corporation was formed to enhance the conservation of forests and protection of the environment, to produce the internationally renowned Kenyan quality tea, to produce fuelwood that is essential in tea factories for tea processing, create jobs as well as revenue for the Kenyan government. In achieving its mandate, the buffer helps to curb human encroachment into forests by acting as a continuous belt of tea and fuelwood around these forests. The existing buffer zones have formed protective belts in both Mt. Kenya and Mt. Elgon, the Aberdare ranges, Mau-Transmara, Olpusimoru forest complex and Cherangani Hills.

- Agricultural Development Corporation (ADC)

The organisation is mandated in promotion and execution of agricultural schemes, and reconstruction in Kenya by initiating, assisting or expansion of agricultural undertakings and enterprises. It is on the basis of this Act that the Corporation runs its operations across the country.

- The Kenya Agricultural Productivity programme (KAPP)

A Government of Kenya, World Bank supported multi-sectoral and multi-institutional programme, with the long-term objective of increasing agricultural productivity. KAPP's objective is to increase agricultural productivity by empowering farmers through an improved policy environment, support for more effective and efficient extension services and agricultural research.

- Horticultural Crops Development Authority

The authority facilitates the development, promotion, coordination and regulation of the horticultural industry in Kenya.

- Kenya Coconut Development Authority

The Authority regulates the coconut industry in the country.

- The Agricultural Sector Programme Support (ASPS)

The Programme was initiated in July 2005 as a co-operation between Government of Kenya (GoK) and the Government of Denmark (Danida). ASPS support GoK in implementing the SRA through facilitating a transition of the agricultural sector, where the private sector becomes the vehicle for economic growth, while the public sector establishes an environment conducive for this development. The Programme development objective is equivalent to the SRA immediate objective. The immediate objective of ASPS is: Increased sustainable income of female and male smallholder farmers and agri-based micro and small enterprises in ASPS supported arid and semi-arid districts.

3.6. FORESTRY SECTOR

The Ministry of Forestry and Wildlife is responsible for the forest management and wildlife protection in Kenya. In 2005, a new forest Act was entry in force. This Act changed the management of forests in Kenya and outlined the participation of other stakeholders in the management and conservation of the forest including forest adjacent communities, the timber manufacturers and other private and government institutions.

The state forestry policy is now oriented to build up the general principles for the priorities in forestry. The development of a National Forest Programme for Kenya begun with stakeholders in the forestry sector holding the first consultative workshop from September 20th to 21st 2011 to prepare a road map. The Permanent Secretary in the Ministry of Forestry and Wildlife Mr. Mohamed Wa-Mwachai said the forestry sector needs to enhance the use of technology and research in order to develop tree species that can thrive in the Arid and Semi-Arid areas which constitute 75% of the landmass in Kenya.

The National Forest Programme (NFP) is a generic expression for a wide range of approaches towards national forest policy formulation, planning and implementation. This is the first commonly agreed framework for sustainable forest management which is applicable to all countries and to all types of forests.The NFP will be implemented through the Miti Mingi Maisha Bora Programme which will provide 201 700 Euros from the Government of Finland and 11 790 Euros from the Government of Kenya. The funds will be used in sensitization phase of the NFP during FY 2010/11. A similar level of financing is expected to be available for FY 2011/12.

The structure of the forestry sector in Kenya can distinguish in different levels: The Ministry of Forestry and Wildlife is at the top level, followed by the Kenya Forestry Service (KFS) and its regional authorities. KFS plays an important role to ensure the seed control and distribution, management of the state forests and cooperation with private entities, local communities and NGOs.

- Forestry and Wildlife Institutions in Kenya

The Kenya Wildlife Service (KWS) conserves and manages Kenya's wildlife for the Kenyan people and the world. It is a state corporation established by an Act of Parliament Cap 376 with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. KWS undertakes conservation and management of wildlife resources outside protected areas in collaboration with stakeholders. It is the goal to work with others to conserve, protect and sustainably manage wildlife resources. The community wildlife program of KWS in collaboration with others

encourages biodiversity conservation by communities living on land essential to wildlife, such as wildlife corridors and dispersal lands outside parks and reserves. The premise is that “if people benefit from wildlife and other natural resources, then they will take care of these resources.”

- Kenya Forestry Research Institute (KEFRI)

The Kenya Forestry Research Institute was established in 1986 under the science and Technology Act (Chapter 250) to carry out research in forestry and allied natural resources. The institute has a role to play in influencing polices on forest resource management. Since 1998, the Institute has continued to restructure its research programme by:

1. Consolidating 17 discipline-oriented divisions into six programmes as contained in Kenya Forests Master Plan.
2. Adopting multidisciplinary research approach.
3. Focusing on problem oriented research.
4. Decentralizing research activities to facilitate improved interaction and linkages with the local users.
5. Improving facilities in six centres in representative ecological zones of the country.
6. Adopting focused capacity building.
7. Developing beneficial partnerships.
8. Decentralizing dissemination of research findings and seed distribution.

4. IDENTIFICATION OF NEEDS, THREATS AND VULNERABLE SPOTS OF CURRENT SYSTEM IN KENYA

4.1. COORDINATION

The identification of cross-cutting problems and fields of the UNFCCC has been an important part of the inventory of capacities within this project. Cross-cutting issues resulted from the discussion of the experts in the Slovak and Kenya teams about effective collaboration without any prioritisation and other qualification criteria are as follows:

- Science, research and systematic observation (monitoring) of the environment.
- Data collection and processing from monitoring, interpretation of environmental changes, reporting.
- Exchange and mutual use of information databases and expert capabilities.
- Dissemination of information, public participation in handling the issue of climate change and related decisions.
- Research, use and transfer of new environmentally sound technologies.
- Implementation of policy and measures with positive impact on monitored parameters.
- Evaluation of the impacts of policy and measures and adaptation possibilities (for example risk of drought, floods, diseases, desertification, bio-diversity of forest, agriculture, etc.).
- Use of national and international mechanisms of funding.
- International cooperation and links to international organizations.

4.1.1. Needs

- Political support for development of national policy for mitigation and adaptation, including proposal of measures to achieve defined goals.
- Ability to formulate and develop strategy and conceptual documents for decision making process (cross-cutting or sectoral documents); ability to identify potential tools and instruments to achieve strategic objectives and to adjust them according to the actual needs.
- High qualification of experts and technicians for developing technical background documents and assessment tools for decision making.
- Conceptual documents or programs for climate change and adaptation, and if necessary also action plans to implement in all relevant sectors.

- Programs on mitigation and adaptation to be formulated and implemented at the regional level (at least as indirect measures).
- Co-ordination of activities of all relevant sectors and bodies involved in the process (to use positive synergy and to increase efficiency and cost effectiveness).

4.1.2. Threats

- The change of political and economic priorities of the country.
- Missing feedback, results of monitoring, analyses and assessments are not directly transferred and reflected in new proposals for policy and strategy.
- Extreme dependence of Kenya on the weather and natural conditions (droughts, floods, unexpected seasoning weather).
- Lack of expert capacity to update strategies according to new requirements.

4.1.3. Vulnerable spots in current system

Strategic priorities of the country are changing continuously; synergy of different ministries and research organisations is not taken into account in the development of concepts in sectors and can be in conflict of interest (sector food security and forestry sector). Strategies are not sufficiently transformed into action plans and sets of measures with identified responsibility, financial and human sources. Insufficient capacity to monitor and assess the implementation of strategies and programmes and insufficient coordination of sectors in the development of strategies, low effectiveness of cross-sectoral associations are the most vulnerable spots in current Kenya system for climate change and adaptation.

4.2. WATER SECTOR

Many of Kenya's important water bodies such as Lake Victoria, the Mara River, Lake Turkana and Lake Natron are trans-boundary, necessitating an integrated regional approach to managing them. In 2010 Kenya along with Uganda, Tanzania, Rwanda, Burundi and Ethiopia signed the landmark Nile Cooperative Framework Agreement which seeks to ensure equitable and sustainable use of water of Nile river basin.

Monitoring of water is under government activities and is provided by National Environment Management Authority (NEMA).The linkages between water and human and environmental health as well as the major sectors of the economy, access to clean water in adequate quantities is very important goal for the future.

Most institutions and departments have limited facilities in form of networks of stations for monitoring purposes. There is evidence of declining or low numbers of monitoring stations over the years in departments such as water, meteorology, KMFRI among others. The need for more monitoring stations cannot be overemphasized. Most institutions lack sufficient financial resources, equipment, laboratories and even adequate human resources (especially in terms of numbers but also partly training) to undertake monitoring activities.

The increasing requirements for monitoring disasters especially those related to extreme climate events calls for more and better trained personnel in order to cope with rapidly changing technologies in the area of information gathering and processing. Many decision-makers are inadequately informed about the role monitoring plays in disaster preparedness. They therefore do not give high priority to monitoring when allocating national financial resources. Competing demands for those resources e.g. meeting basic needs, health provision among others rank much higher in priority.

There is a critical need for sensitizing policy decision-makers on the significance of monitoring aspects related to the water sector especially for disaster preparedness. This will ensure that the country avoids undertaking costly reactive measures when a disaster strikes. It is clear that some monitoring activities could only be supported with analysis that requires the use of complex equipment only found at institutional headquarters. However, there are also some monitoring activities that do not require expensive equipment and thus could be undertaken at district, division or even location level. It is therefore necessary that monitoring be undertaken at different institutional levels depending on nature of analysis and complexity. These issues should therefore be given serious consideration during the distribution of technical and human resources for monitoring purposes.

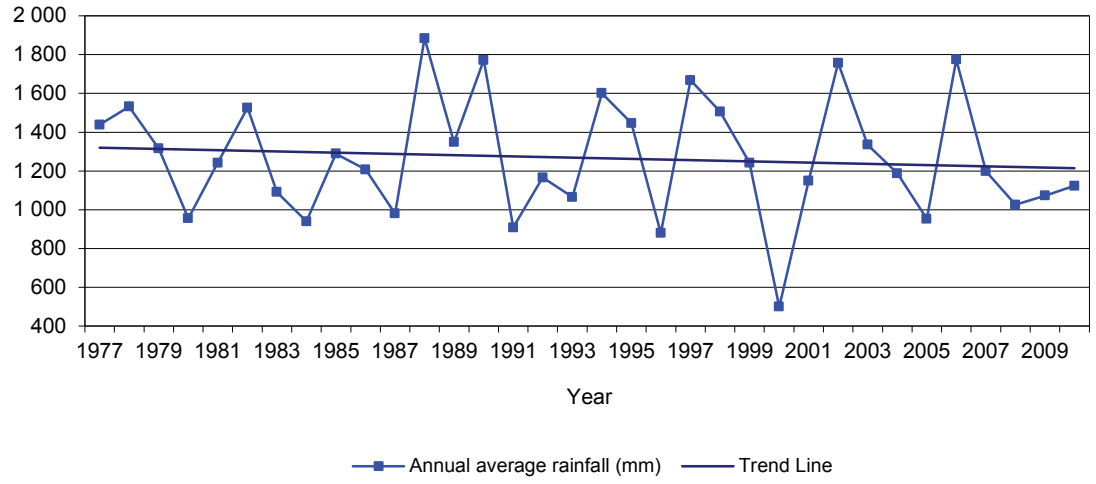
4.2.1. The situation of water resources in Kenya

Water resources contribute enormously to economic productivity and social well-being of human populace as both social and economic activities rely heavily on the availability of water in sufficient quantity and safe quality. As result of the increase of population in Kenya, demand for water has been constantly increasing. In some parts of the country, a stage has been reached where the availability of water has become a limiting factor for any further development. In such areas conflicts have arisen amongst various competing sectors and users. The fragmentation of the water management has not only compounded this problem but also undermined the sustainability of the resources base. To address the above water problems, the government has formulated a definitive water policy, the Sessional Paper No. 1 of 1999 and the National Policy on Water Resources Management and Development which calls for the decentralization of water operational activities to all sectors. The same paper has also addressed institutional issues and financing mechanism for the water sector. The emphasis by the policy is on integrated water resources management. The government is also developing a National Water Master Plan for the country.

4.2.2. Physical conditions and water resources potential in Kenya

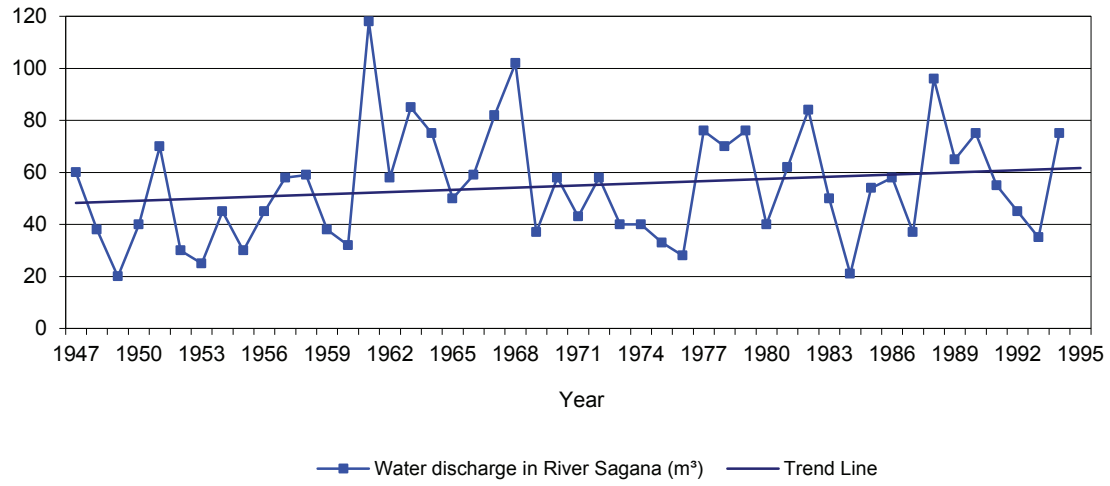
The territorial area of the republic of Kenya is 582 646 km^2 with an area of water of 11 230 km^2 and a land 571 416 km^2. 85% of the land is classified as Arid and Semi-Arid Land (ASAL). The remaining land of approximately 81 000 km^2 sustains more than 75% of the nation's population and contributes a substantial portion of the Gross Domestic Product. The average annual rainfall over Kenya is approximately 630 mm, ranging from less than 200 mm in some areas to 2 000 mm in other areas. Rainfall is the main source of water in the country. Long term observations from meteorological stations in Kenya show that the amount and frequency of rainfall in the country has been reducing over time (Figure 4.1).

Figure 4.1: Rainfall fluctuations in Embu meteorological station in the period 1977-2008



Water availability is also affected by the reduction in river water discharge. Data collected from stations in the country indicates that there has been continuous reduction in rivers regime / discharge.

Figure 4.2: Water discharge in River Sagana in the period 1947-1996



The main courses of continuous reduction in river discharge and rainfall is associated with climate change and poor land use that do not support environmental conservation. There have been reports that Water volumes in all rivers in the country have reduced and the small springs that communities used to get domestic water from no longer exist. In most rivers the water is no longer fit for consumption due to pollution. This is mostly caused by poor land planning and management of urban areas.

Figure 4.3: The upper Sondu Miriu River less polluted and illegally abstracted at Mau and heavily polluted lower Nyatike

The per capita endowment of water in Kenya is 650 m^3 per year and in 2025, it is projected that Kenya will have 235 m^3 of water per capita (Table 4.1). This is a good indicator that water resources management should continuously be given first priority in development.

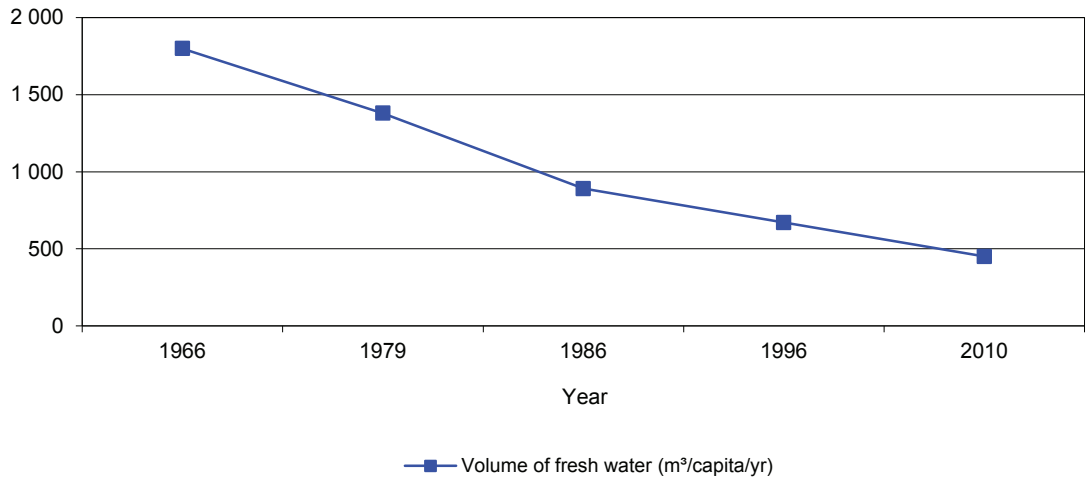
Table 4.1: Water availability per capita in Kenya

Year	Kenya Population	Per Capita water availability m^3/year
1969	10,942,705*	1 853
1979	15,327,061*	1 320
1989	21,448,774*	942
1999	28,686,607*	704
2010	40,311,794**	503
2010	56,481,427**	359

Source: *GOK Census, ** Kenya National Water Master Plan, 1992

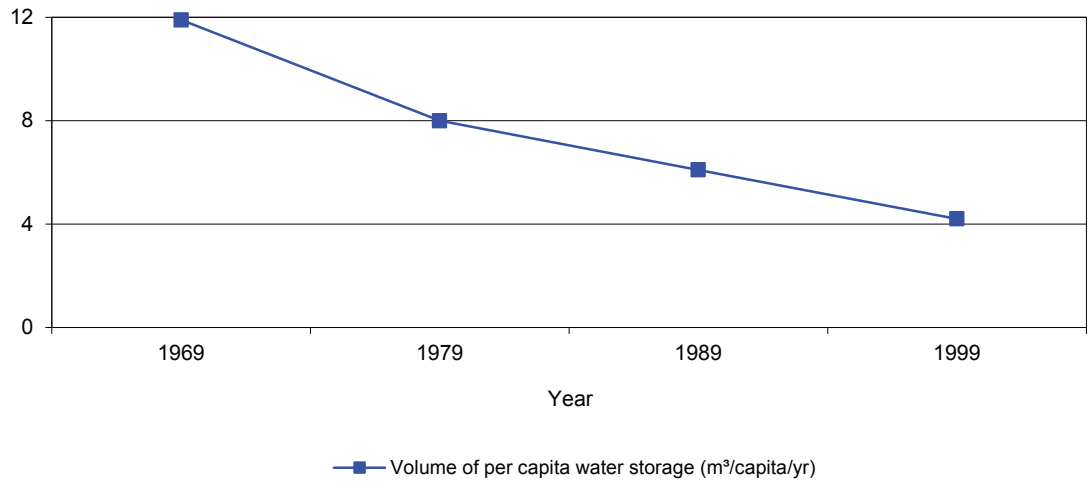
Kenya is classified as a chronically water scarce country in absolute and relative terms. Currently Natural endowment of renewable fresh water is 650 m^3/capita/yr. This has been decreasing over time.

Figure 4.4: Decline in renewable fresh water in last forty years in Kenya



A country is categorized as water scarce if its renewable fresh water supply is less than 1 000 m^3/capita/yr and water stressed if its renewable supply is less than 1 700 m^3/capita/yr. In Kenya the renewable water sources is estimated at 235 m^3/capita/yr. Not all the nations' water resources can be exploited. Accessible component of natural water is known a safe yield. Surface water safe yield in Kenya is approximately 7.4x109 m^3/year while the estimated ground water safe yield is estimated at 1.0x109 m^3/year. The withdrawal in 1992 was 1.1x109 m^3/yr (3x106 m^3/day) from surface and 0.18x109 m^3/year (493x10^3 m^3/day) from both shallow wells and boreholes. Kenya per capita water storage for all uses (excluding energy) has been declining continuously with time.

Figure 4.5: Decline in Kenya per capita water storage during last forty years



Kenya's water resources are distributed over six catchment areas of five drainage basins. Lake Victoria carries 50% of the total water in Kenya and is the only basin with surplus water resources Table 3.2. All other basins have water deficit. Major water towers in elevated areas are also major sources of water.

Table 4.2: Average annual water availability and utilization for Kenya

Catchment area	Area (km^2)	Surface water 10^6 (m^3)	Surface water abstraction (%)	Ground water 10^6 (m^3)
Lake Vitoria	46 229	11 672	2.2	116
Rift valley	130 452	2 784	1.7	126
Athi	66 837	1 152	11.6	87
Tana	126 026	3 744	15.9	147
Ewaso Ngoro	210 226	339	12.4	142
Total	579 770	19 691	5.1	618

WARMA Strategic Plan 2009-2012

4.2.3. Water resources problems and management challenges in Kenya

The water resources management problems facing Kenya are many and very diverse. The problems include water scarcity, climate variability, growing population and large unmet water demand, catchment degradation, water pollution, invasive plant species, storage and infrastructure invest-

ment, water demand, groundwater depletion, water allocation problems, demand management, water resources assessment, aquatic ecosystems, enabling environment, huge impact on the economy.

NEMA is mandated by EMCA to ensure sustainable water utilization in the following parts:

- Protection and conservation of environment. Prohibits interference with any aquatic resource without a license from the Director General NEMA. It also authorizes the Minister in consultation with lead agencies and stakeholders to identify, gazette and declare any aquatic site to be a protected area, issue and implement guidelines and measures for sustainable utilization of such areas. Section 44 and 50 empowers the minister in collaboration with the lead.
- agencies and stakeholders to identify issue and implement guidelines, measures (a forestation and reforestation) for sustainable use of hills sides and hill tops for sustainable utilization of such areas and protection of catchment areas. Section 50-54 empowers the minister in consultation with the lead agencies to develop guidelines for the conservation of biological resources (in-situ & ex-situ) and identification of environmentally significant areas for their purpose of promoting and preserving specific ecological processes, natural environment systems or preservation of biological diversity in general.
- Part on environment quality and standards prohibits effluent discharge into any aquatic environment and requires all industrial, irrigation plant operators to submit annual audits reports to the authority and before any discharge to obtain discharge license from the director general.

4.3. AGRICULTURAL SECTOR

In Kenya, growth of the national economy is highly correlated to growth and development in agriculture. In the first two decades after independence, the agricultural sector, and in turn the national economy, recorded the most impressive growth in sub-Saharan Africa at average rates of 6% per annum for agriculture and 7% for the national economy. During this period, small-scale agriculture grew rapidly as the population rallied around the call by the first president of the republic of rudini mashambani (return to the farms). This growth was spurred by expansion because there was ample land and better use of technology. Moreover, agricultural extension and research were supported by the Government. The Government also established and supported many agricultural institutions such as farmer cooperatives and those for agricultural inputs, marketing, credit and agroprocessing. Budgetary allocation to the agricultural sector during this period was at an average of 13% of the national budget.

However, this growth was not sustained. Between 1980 and 1990 the sector recorded an average annual growth rate of 3.5% that reduced to 1.3% in the 1990s. During this period, Kenya compared badly with Tanzania (3.2%), Uganda (3.7%), China (4.1%), India (3.2%) and Vietnam (4.8%), which had all been performing badly in the previous decades. The main reasons for this decline were low investment in the sector, mismanagement, virtual collapse of agricultural institutions and, more importantly, negligence of agricultural extension and research. It was also during this period that the Government was implementing structural adjustment programmes prescribed by the Breton Woods institutions, which encouraged poorly sequenced privatization in the sector. Investment in the sector was at its lowest during this time with budgetary allocation declining to as low as 2% or less of the national budget. The overall goal of the agricultural sector is to achieve an

average growth rate of 7% per year over the next 5 years. Given the critical strategic issues that need to be addressed, the strategic mission for the sector is an innovative, commercially oriented and modern agriculture.

The overall development and growth of the sector is anchored in two strategic thrusts:

- Increasing productivity, commercialization and competitiveness of agricultural commodities and enterprises developing and managing key factors of production.

Assuming a conducive external environment and support from enabling sectors and factors, the agricultural sector has set the following targets to be achieved by 2015:

- Reduced number of people living below absolute poverty lines to less than 25%, to achieve the first MDG (Millennium Development Goal).
- Reduced food insecurity by 30% to surpass the MDGs.
- Increased contribution of agriculture to the GDP by more than KES 80 billion per year as set out in Vision 2030.
- Divest from all state corporations handling production, processing and marketing that can be better done by the private sector.
- Reformed and streamlined agricultural services such as in research, extension, training and regulatory institutions to make them effective and efficient.

The strategic thrust of increasing the productivity, commercialization and competitiveness of agricultural commodities will enable the sector to export more outputs, earn the country foreign exchange, and create employment. With the responsibilities of the agricultural sector currently spread across 10 ministries and the need for partnerships with several other ministries and stakeholders, implementation of Agricultural Sector Development Strategy (ASDS) requires strong partnerships among the Government, private sector, development partners and other non-State actors. A sector-wide approach and strong coordination mechanisms will be instrumental in the success of the strategy. At the national level, sector ministries and the Agricultural Sector Coordination Unit (ASCU) organizes the sector's biennial national forum of stakeholders. The forum discusses problems constraining progress and ways of overcoming them, and considers current and future prospects. To give the forum adequate authority, the highest political authority will preside over it.

At the middle level, the inter-ministerial coordination committee will be expanded to include all ministries that provide services to the agricultural sector. The committee will comprise permanent secretaries of the lead and collaborating ministries, and will be responsible for coordinating the planning of the strategy at the sector level and monitoring its implementation to ensure that its goals are achieved.

Locally, ASDS will be implemented through district agricultural development committees (DADCs) made up of the sector ministries and stakeholders. Priorities on implementation shall be agreed upon at district development committees and DADCs, as well as at constituency development committees. Many estimates of crop condition and production is usually based on visual indicators and past history, rather than direct scientific measurements. Data generated from such estimates has limited application.

While crop information is shared at National level, data from other departments such as livestock, veterinary, fisheries, among others, is not adequately analysed or shared and their product con-

tribution to food security is not adequately accounted. Usually, cereal/grain stocks are assumed to contribute 100% household food needs. The sparsely populated pastoral areas, with a greater share of communication problems, are not well covered, despite the fact that they are more prone to drought hazards. The Government bureaucracy is also a major bottleneck to effective and timely dissemination of climate information to farmers. There are several institutions in the country with technical capabilities for monitoring, early warning and food information systems. However, coordination of the food security information from various institutions has been limited. This has resulted in duplication of efforts and conflicts in assessment made by different institutions.

4.4. FORESTRY SECTOR

Identification of gaps and vulnerable points in the system – ecosystem-approach in adaptation to climate change.

Most important institutional limitations in forestry sector are:

- Lack of coherence due to different agencies managing different types of forest.
- Weak linkages with MENR, KEFRI and civil society
- Poor frameworks for integrating populations living near forest reserves into management planning;
- Forest management follows administrative boundaries which results in fragmentation of ecosystems
- Many forests are virtually unmanaged and communities harvest forest products in uncontrolled ways
- Forest zones and conservancies are inconsistent with the administrative boundaries. For example the central highlands conservancy includes parts of Mount Kenya forests and the aberdares. To manage mount Kenya calls for efforts from two different conservancies and in different administrative provinces

Adaptation for climate change includes an extremely wide variety of initiatives and measures, covering practically every sector such as health and social issues, production systems, spatial planning and the built environment as well as nature conservation, agriculture, forestry and water. Adaptation to climatic variability has a long history (e.g. adaptation to recurring drought events), however present climate change hazard enhances the need for increasing adaptation capacities. Preparation for adaptation should start with vulnerability assessment and increasing of adaptation capacities should start with lessening the general vulnerability level, i.e. strengthening the general resilience level. Strategies on adaptation to changing environmental conditions in all sectors needs to be integrated in a wider framework of environment policy, in order to avoid conflicts between the different sectors as well as with climate change mitigation targets.

Ecosystem-based approach is essential for many areas and activities; however it is not relevant for all of them. Therefore we are dealing below only with the most relevant areas and sectors directly linked to ecosystems – as nature conservation, agriculture, forestry and water. In these sectors, technological solutions for adaptation are often conflicting with the goal of biodiversity protection or even with mitigation targets, especially measures which require large inputs in terms of energy and natural resources. On the other hand, ecosystems often offer cheap and ready-to-use solutions

mutually beneficial for the challenges of climate change and biodiversity loss. These win-win solutions are safe and work locally even if the international efforts to halt climate change might fail. In most cases they are even much cheaper than sophisticated and energy-demanding technologies. The need for such coherent approach is well reflected in the cooperation between the two relevant conventions (and their secretariats), i.e. UNFCCC and CBD.The resilience and adaptation capacity of forests against climate change largely depends on their natural dynamics as well as biological (i.e. diversity of micro-habitats, species and genetic variables within species) and structural diversity (i.e. age distribution of trees as well as mosaic-structures with large trees, openings, young groups, deadwood and in certain habitat types, patches of grasslands and wetlands).

Currently there are two different approaches in forestry when facing climate change. The "technocratic approach" prefers intensification of forest use, using arguments for both climate change mitigation and adaptation. According to the mitigation arguments, intensive growth and short rotation period is supposed to result in higher carbon sequestration. However, recent scientific studies have shown that C sequestration and storage is, in the long-term, significantly higher in non-managed forests or forests under sustainable management than those with intensive use, especially if we calculate with dead biomass and soil carbon too. Arguments for adaptation aim to control natural shift in species composition by artificial replacement of species. However, this requires intensive forest management, leading to decreased biological and structural diversity and consequently lower natural resilience to disturbances. Irreversible and long-term artificial changes in species composition alter the structure and dynamics of forests in an unpredictable way, thus this approach involves high risks and should be clearly distinguished and restricted to plantations.

On the other hand, the approach of "sustainable forest management" enables long-term carbon sequestration and storage in old-growth forests, considering also the significant capacities of dead biomass and soil. In fact, close-to nature forests already store huge amounts of carbon in Europe. Avoiding the emission of this stored carbon by maintaining the natural state of forests should be priority. When it comes to adaptation to climate change, natural systems enable gradual changes in species composition during a natural process. Sustainable or close-to-nature forest management systems serve as integrated solution, increasing structural diversity, enabling natural processes and strengthening the forests' natural resilience and adaptation capacity. Close-to-nature forests host a variety of micro-habitats, among which especially wetlands make forests effective in buffering extreme hydrological events as functioning as a natural sponge, retaining water in periods of excessive precipitation and gradually releasing it in periods of water scarcity, thus effectively working against both floods and droughts at landscape level. Therefore, in protected areas and in special environments (e.g. riparian forests, dry forests), close-to-nature adaptive management should be the only acceptable method everywhere, not only in Europe, but equally in Africa. As a general rule, the ratio between forested areas with non-use, sustainable use and intensive use should be changed in the future to a growing proportion of non-use and sustainable use, and intensive use should be only allowed in plantations, clearly distinguished from natural forests.

It is absolute necessary to limit further degradation of green areas, and to stand for the largest possible reconstruction of natural cover. The overall natural status and permeability of landscapes needs to be enhanced by maintaining or restoring natural corridors as well as shifting more and more areas from intensive use towards sustainable use or non-use. This can only be achieved if ecosystem-based adaptation is integrated in all relevant sectoral policies. It is crucial to harmonize climate policy with key national policies – such as sustainable development, energy, transport, agriculture and rural development, forestry, biodiversity, water and spatial planning and so creating a strong, coherent and holistic environmental policy framework, which is able to identify and effectively tackle the drivers behind systemic problems.

4.4.1. Needs

Ecosystem-based approach is essential for forestry activities in the country. In this sector, technological solutions for adaptation are often conflicting with the goal of biodiversity conservation or even with mitigation targets, especially measures which require large inputs. Ecosystems often offer cheap and ready-to-use solutions mutually beneficial for the challenges of climate change and biodiversity loss.

The resilience and adaptation capacity of forests against climate change largely depends on their natural dynamics as well as biological (i.e. diversity of micro-habitats, species and genetic variables within species) and structural diversity (i.e. age distribution of trees as well as mosaic-structures with large trees, openings, young groups, and deadwood and in certain habitat types, patches of grasslands and wetlands). Currently there are two different approaches in forestry when facing climate change in Kenya. The "*technocratic approach"* prefers intensification of forest use, using arguments for both climate change mitigation and adaptation. According to the mitigation arguments, intensive growth and short rotation period is supposed to result in higher carbon sequestration. Recent scientific studies have shown that C sequestration and storage is, in the long-term, significantly higher in non-managed forests or forests under sustainable management than those with intensive use, especially if we calculate with dead biomass and soil carbon too. Arguments for adaptation aim to control natural shift in species composition by artificial replacement of species (Eucalyptus in farms and pine plantations in shimba hills). However, this requires intensive forest management, leading to decreased biological and structural diversity and consequently lower natural resilience to disturbances. Irreversible and long-term artificial changes in species composition alter the structure and dynamics of forests in an unpredictable way. This approach involves high risks and should be clearly distinguished and restricted to plantations.

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Over the last 10 years more than 45 million trees have been planted under reforestation of water catchments. The country requires planting of an additional 384 million tree seedlings to attain the recommended 10% forest cover.

It is crucial to harmonize climate policy with key national policies – such as sustainable development, energy, transport, agriculture and rural development, forestry, biodiversity, water and spatial planning and so creating a strong, coherent and holistic environmental policy framework, which is able to identify and effectively tackle the drivers behind systemic problems.

4.4.2. Threats

The main forestry threats includes:

- Lack of coherence due to different agencies managing different types of forest, local authorities, communities and Government forest land.
- Weak linkages with other stakeholders and civil society.
- Weak frameworks for integrating populations living near forest reserves into management planning.
- Poor political recognition and knowledge of ecosystem linkages that results in fragmentation of ecosystems.
- Poor management of existing forests and uncontrolled harvesting.

4.4.3. Vulnerable spots in current system

The most vulnerable points in Kenya are the five water towers that include Mau complex, Cherangani complex, Aberdare ranges, Mt Elgon, and Mt Kenya. The major threats to these areas are encroachment for agriculture. In other catchment areas indigenous species had been replaced with exotic species threatening ecosystem functions. These are the country's most valuable areas for water catchment and biodiversity conservation. Other areas include the riverine forest ecosystems in the arid and semiarid areas in the country for their resilience and high value in support to large biological resources and millions of pastoralist communities. They serve as dry season refuge areas for the pastoralists but they are threatened by adverse land use changes and mainly encroachment for agriculture and charcoal burning.

5. RECOMMENDATIONS FOR ENHANCING OF CAPACITIES IN CLIMATE CHANGE

5.1. COORDINATION

The shift from international teams and experts hired for short-term cooperation to the sustainable team of domestic experts and stakeholders involved in national system for monitoring, reporting and verification requirements is needed to fulfill commitments in future:

- Strong country driven approach.
- Good inter-ministerial co-operation and coherency of effort.
- Solid base of input data, modeling and software tools.
- Develop methodology to quantify progress of adaptation as well as mitigation policy and measures.

5.2. CAPACITY STRENGTHENING, MOBILISATION AND CAPACITY DEVELOPMENT AT THE SYSTEMIC LEVEL

Measure 1 – Strengthening capacity of the coordination body on climate change

- Clear identification of the coordination body on climate change within the organizational scheme of the Government.
- Personnel strengthening of the coordination body on climate change.
- Releasing the mandate of the coordination body for international representation and ensuring continuity in this area.
- Releasing the competence scope of the coordination body at the national level.
- Appointing national experts in the area of emission inventory and emission projections to be contact persons for international organizations.
- Development of a long-term concept for national cooperation in the implementation of UNFCCC and its relevant Decisions, including the determination of responsibilities for individual areas.
- Management responsibility for the implementation of UNFCCC in science and research.
- Establishment of a separate information portal on climate change (it would be appropriate to divide it into two sections: a section for experts and a section for the general public).

The requirements of the coordination body capacity strengthening are connected with the requirements for financial, material and human resources.

Measure 2 – Establishment of a cross-sectoral group for climate change and adaptation

The main task of the group should be the coordination of the national activities connected with issues of climate change. The members of the group should consist of the representatives from the relevant ministries, involved institutions, bodies and agencies as well as representative of the statistical authority.

Proposed competences of the group:

- Support of the transparent institutional division of responsibilities for the topics/fields and creating conditions to implement them.
- Coordination of sectors in suggesting strategies and implementation of policy and measures to mitigate climate change impacts and adaptations.
- Coordination of activities within the UNFCCC at the national level, running on the basis of detailed analysis of identical or similar topics.
- Continual monitoring and assessment of implemented policy and measures in the sectors, releasing information on the current status of implementation.
- Ensuring feed-back in relation to the change of strategy and policy based upon the results of monitoring and assessment.
- Coordination and support for the effective use of knowledge, information sources, experience and financial sources among the sectors, with the stress on minimising duplication.
- Promotion of the exchange of information connected with the use of environmentally sound technologies and innovations and adaptation measures.
- Ensuring the strategic approach and expertise of the Kenya representatives, who participate in international meetings on UNFCCC.
- Ensuring the accessibility of information sources at the regional and local levels.

The proposed measure is connected with requirements for material and information sources; it does not require additional resources from the state budget.

Measure 3 – Systemic support (regulatory measure) of the adjustment of scope, quality and deadlines of providing official statistical data according to the requirements of UNFCCC

The emission inventory essentially needed for the compilation of the national communications and fulfilling the future reporting requirements in some sectors (energy, transport and industry) directly depends on the quality and availability of official data from the statistical yearbook. The data have hardly been available for the First National Communication of Kenya and actual data are not available for the preparation of the Second National Communication. If the coordination of data collection and data release is not changed, it will be very difficult for Kenya to fulfill future UNFCCC requirements (biennial reports).

The official statistical information performs the statistical surveys according to their legislative mandate and in compliance with its main task to provide information on the status and development of national economy and society. The main problem which emerged during the development of outputs is availability, extent and timing of the official data in relation to the deadlines of the UNFCCC.

Measure 4 – Systemic support of the education and training of managers and experts in the field of climate change, inventory preparation and adaptation

There are some gaps in the qualification and skills of managers of the relevant sectors, in particular with regard to implementation capabilities. Therefore, the level of utilisation of financial and information sources is often very low. No conditions have been created for capacity maintenance and capacity development in the technical skills for achieving the commitments under the UNFCCC:

- To regularly educate and train the managers of the relevant sectors on climate change and adaptation.
- To ensure earmarked finances from the state budget or international sources for continuous training and education of experts and technicians with respect to climate change (inventories, projections, the impact assessment of policy and measures, national communications and action plans).
- To use the existing highly qualified potential of researchers and specialists in the training of managers.

5.3. WATER SECTOR

- Need is build sufficient and coherent monitoring system water quantity a quality. For this goal is needed to have sufficient financial resources for equipment, laboratories and even adequate trained human staff to undertake monitoring activities. Optimal will be to have centralized database for monitoring data (quality and quantity).
- Putting in place adequate hydrometric network to monitor river flows and flood warning telemetric systems.
- Building capacity for water quality improvement, which includes training of personnel to manage watersheds and monitor water quality.
- Investing in water treatment plants and recycling facilities for both domestic and industrial use.
- Reducing interference and contamination of water by protecting water towers (catchments), river banks, and water bodies through afforestation and fencing.
- Research on the potential impact of climate change on water quality across the different regions of the country.
- Strengthen and improve education in water sector.

5.4. AGRICULTURAL SECTOR

- Need for a more comprehensive list of data sources, especially for the industrial sector including medium and small-scale industries.
- Due to various data gaps in almost all sectors, capacity-building schemes are required to put in place to create awareness in data collection, data storage, data management and data availability. Data sources need to be identified by the type of GHG, amount

emitted, emission processes and/or their potential to emit GHG.

- The institution handling the national communication should be strengthened so as to have access to all sources and data on GHG.
- Noting that Kenya needs specific emission factors for all sectors, there is urgent need to carry out studies whose major aim is to develop emission factors for all sectors emphasizing on Waste sector, land use change and forestry sectors as a matter of priority.

5.5. FORESTRY SECTOR

Adaptation for climate change includes an extremely wide variety of initiatives and measures, covering practically every sector such as health and social issues, production systems, spatial planning and the built environment as well as nature conservation, agriculture, forestry and water. Adaptation to climatic variability has a long history (e.g. adaptation to recurring drought events), however present climate change hazard enhances the need for increasing adaptation capacities. Preparation for adaptation should start with vulnerability assessment and increasing of adaptation capacities should start with lessening the general vulnerability level, i.e. strengthening the general resilience level. Strategies on adaptation to changing environmental conditions in all sectors needs to be integrated in a wider framework of environment policy, in order to avoid conflicts between the different sectors as well as with climate change mitigation targets.

6. POSSIBLE AREAS FOR FUTURE COOPERATION BETWEEN THE SLOVAK REPUBLIC AND THE REPUBLIC OF KENYA IN CLIMATE CHANGE, MITIGATION, ADAPTATION, CLIMATOLOGY, METEOROLOGY AND HYDROLOGICAL MONITORING SYSTEM

Proposals for future projects in climate change mitigation and adaptation are:

- Project for GHG inventory (LULUCF, agriculture sectors, collecting input data, methodologies)
- Monitoring GHG inventory, training experts
- Climate data rescue
- Support for NatCom preparation
- Monitoring water quality

ANNEX 1: PUBLICITY OF THE PROJECT

A1.1. WORKSHOPS

During the project, three workshops between Kenya and Slovak experts took place. The workshops were planning in the project document and fulfilling the expert criteria set down in the beginning of the project. The number of presentations from the Kenya and Slovak experts and fruitful discussion brought ideas and contributions to the final findings of this Technical Report on capacity building. During the workshops, several excursions were completed in Kenya and in Slovakia.

Following meetings took place during the project:

- Meeting of experts in Kenya, 4 – 8 April 2011
- Meeting of experts in Slovakia, 15 – 19 August 2011
- Meeting of experts in Kenya, 31 October – 4 November 2011.

A1.2. PROJECT PUBLICITY

A Press Conference was held on 18 August to create awareness to the Slovak general public on scope, goals and expectations of the Project and also to bring attention on climate change issues. The media took up this information and informed the public in several TVs and Radios.

Two experts from the project team (James Kinyanjui and Pavel Stastny) attended in the ECAM 2011 Conference in Berlin scheduled from 11 to 15 September with a poster presentation EMS2011-441 „Capacity Building Support for Climate Change and Adaptation Activities in Kenya“.

The web page of this Project http://www.shmu.sk/sk/?page=1710 includes all important project documents, presentations, poster, minutes and photos.

ANNEX 2: LIST OF PRESENTATIONS AND PARTICIPANTS

A2.1. PRESENTATIONS OF THE SLOVAK EXPERT TEAM

Dr. Pavel Šťastný

1. Capacity Building Support for the Activities in Climate Change and Adaptation
2. Vulnerability assessment for sectors
3. Trends of selected parameters of precipitation in the Northern Carpathians in the light of water supply or agriculture
4. Actual status of the project
5. Planned activities for the second part of the project
6. ECAM Contribution
7. Climate change impacts and vulnerability assessment in some sectors in Slovakia
8. Project actualisation, deadlines, administration, description of final phase of the project
9. Capacity Building in Agricultural and Forest Sectors in Terms of Vulnerability

Dr. Janka Szemesová

10. Reporting under UNFCCC Capacity Frame in Slovakia
11. Proposal for the Technical Report
12. Biennial Report Requirements
13. Technical Report of the Project – State of Play
14. Reporting under UNFCCC – Biennial Report

Dr. Helena Princová

15. Fast-start finance mechanism – tool for better cooperation
16. Cancún Agreements – implications for MRV on mitigation and adaptation
17. Slovakia Environmental Performance Review

Dr. Bernard Šiška

18. Climate change impact on agriculture – methodology and uncertainties

Mr. Andrej Kovarik

19. Land Use, Land Use Change and Forestry sector (LULUCF)

Dr. Pavol Nejedlík

20. Adaptation in Slovakia
21. Economical Evaluation of Adaptations to the Climate Change

Dr. Lea Mrafková

22. Vulnerability in hydrological ecosystems on climate change
23. Description and Recommendation of the Situation in Institutional Capacity in Kenya for Estimation of Vulnerability Ecosystems and Impact of Climate Change in Hydro logical Sector

Dr. Oliver Bochníček
24. Climatologic Service on SHMU

Dr. Ľubor Kozakovič
25. Air Quality Monitoring

Dr. Eugen Kullman
26. Monitoring of Groundwater

Dr. Boris Minárik
27. International Water Assessment Centre IWAC

Dr. Martin Gera
28. Climate Change Scenarios for Slovakia

Dr. Marek Radvanský
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ABREVIATIONS

AgGDP	Gross Domestic Product in Agriculture
ASAL	Arid and Semi Arid Land
ASCU	Agricultural Sector Coordination Unit
ASDS	Agricultural Sector Development Strategy
AWG LCA	Ad-Hoc Working Group for Long-term Cooperative Action
BR	Biennial Report
CBD	Convention on Biodiversity
CBS	Central Bureau of Statistics
COP	Conference of the Parties
DNA	Designated National Authority
EMCA	Environmental Management and Coordination Act
GDP	Gross Domestic Product
GEF	Global Environment Facilities
GHG	Greenhouse Gases
GoK	Government of Kenya
IAR	International Assessment and Review
ICA	International Consultations and Analysis
ICAO	International Civil Aviation Organization
IGAD	Intergovernmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
KFS	Kenya Forestry Service
KMD	Kenya Meteorological Department
KMFRI	Kenya Marine and Fisheries Research Institute
KP	Kyoto Protocol
KWS	Kenya Wildlife Service
LCDs	Least Developed Countries
MDG	Millennium Development Goal
MEMR	Ministry of Environment and Mineral Resources
MoA	Ministry of Agriculture
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
NatCom	National Communication on Climate Change
NEMA	National Environment Management Authority
NFP	National Forest Programme
NGO	Non-Governmental Organizations
ODA	Official Development Aid
SAMRS	Slovak Agency for Development Aid
SBI	Subsidiary Body for Implementation
SHMÚ	Slovak Hydro Meteorological Institute, Bratislava
TR	Technical Report
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization
WMO	World Meteorological Organization
WSB	Water Services Boards
x/CP.y	COP Decision

Slovak Hydrometeorological Institute

Capacity Building for Climate Change Mitigation and Adaptation Activities in the Republic of Kenya

2011 – 61pp.
ISBN 978-80-88907-79-4