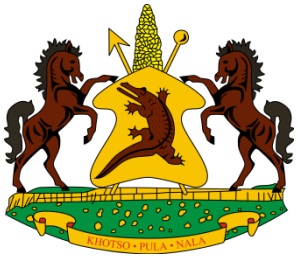

Kingdom of Lesotho
Ministry of Energy and Meteorology

GUIDELINES FOR THE INTEGRATION OF CLIMATE CHANGE IN NATIONAL, SECTORAL AND LOCAL POLICIES, STRATEGIES AND DEVELOPMENT PLANS

20 June 2018

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Conversion

1United States Dollar = 13.73 Lesotho Maloti

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List of Acronyms

ACCF	Africa Climate Change Fund
ADB	African development bank
AIDS	Acquired Immunity Deficiency Syndrome
AF	Adaptation Fund
ATS	Appropriate Technology Section
AU	African Union
BOS	Bureau of Statistics
CBO	Community-Based Organization
CCC	Climate Change Coordinator
CCD	Department of Climate Change
CCS	Carbon Dioxide Capture and Storage
CCTC	Climate Change Technical Committee
CCU	Climate Change Unit
CH_4	Methane
CO_2	Carbon Dioxide
COP	Conference of the Parties to the United Nations Convention on Climate Change
CSA	Climate-Smart Agriculture
DM&E	Department of Monitoring and Evaluation
DMA	Disaster management Authority
DOE	Department of Environment
DoE	Department of Energy
DOT	Department of Tourism
DST	Department of Science and Technology
DPCM	Department of Project Cycle Management
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIS	Environmental Impact Statement
EMP	Environmental management Plan
ESCO	Incentive for Energy Service companies
ESIA	Environmental and Social Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization
FCPF	Forest Carbon Partnership Facility
FDI	Foreign Direct Investment
GCF	Green Climate Fund
GEEREF	Global Energy Efficiency and Renewable Energy Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
HEA	Household Economy Approach
HIV	Human Immunity Virus
IEA	International Energy Agency
IFC	International Finance Corporation
IFCI	International Forest Carbon Initiative (Australia)
IFMIS	Integrated Financial Management Information System

ILO	International Labour Organization
IPCC	International Panel on Climate change
ISS	Integrated Security Safeguards (ADB)
KfW	German Development Agency
LCCCC	Local Climate Change Coordinating Committee
LDCF	Least Developed Countries Fund
LDF	Lesotho Defence Force
LEC	Lesotho Electricity Company
LED	Light Emitting Diode
LHDA	Lesotho Highlands Development Authority
LHWP	Lesotho Highlands Water Project
LMPS	Lesotho Mounted Police Service
LMS	Lesotho Meteorological Services
LNDC	Lesotho National Development Corporation
LREBRE	Lesotho Renewable Energy-Based Rural Electrification Project
LRA	Lesotho Revenue Authority
LRMS	Lesotho Road Management System
LTB	Lesotho Tourism Board
LUCF	Land Use Change and Forestry Sector
LVAC	Lesotho Vulnerability Assessment Authority
M&E	Monitoring and Evaluation
MDP	Ministry of Planning
MFRSC	Ministry of Forestry, Range and Soil Conservation
MOETC	Ministry of Environment, Tourism and Culture
MOF	Ministry of Finance
MOH	Ministry of Health
MoLGC	Ministry of Local Government and Chieftainship
MOM	Ministry of Mines
MoPWT	Ministry of Public Works and Transport
MOTI	Ministry of Trade and Industry
MTEC	Ministry of Tourism, Environment and Culture
MPU	Ministerial Planning Unit
MTI	Ministry of Trade and Industry
MVF	Minimum Vital Flow
NCCCCC	National Climate Change Coordinating Committee
NGO	Non-governmental Organization
N_2O	Nitrous Oxide
NSDP	National Strategic Development Plan
OECD	Organization of Economic Cooperation and Development
PSIC	Public Sector Investment Committee
PSIP	Public Sector Investment Programme
POP	Persistent Organic Pollutant
PRC	Projects Review Committee
PU	Planning Unit
RMA	Range Management Area
RVCC	Reducing Vulnerability from Climate Change Project
RWS	Department of Rural Water Supplies

SADC	Southern African Development Community
SCCF	Special Climate Change Fund
USA	United States of America
UN	United Nations
UNDP	United Nations Development Programme
UNE	United Nations Environment
UNFCCC	United Nations Framework Convention on Climate Change
VA	Vulnerability Assessments
VIP	Ventilated Improved Pit Latrine
VOC	Vehicle Operating Costs
WMO	World Meteorological Organization

Glossary of Terms Used in the Guidelines

Adaptation. Adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit beneficial opportunities (IPCC 2007).

Adaptive capacity. The ability of a system to adjust to climate change (including climate variability and extremes), moderate potential damages, take advantage of opportunities or cope with the consequences (IPCC 2001, 2007).

Adaptation deficit. Failure to adapt adequately to existing climate risks. Controlling and eliminating this deficit in the course of development is a necessary, but not sufficient, step in the longer-term project of adapting to climate change. (World Bank 2010, GN 4).

Adaptation mainstreaming. The iterative process of integrating adaptation considerations into policy-making, budgeting and implementation processes at national, sector and local levels, so as to reduce potential development risks and take advantage of opportunities (OECD 2009).

Adverse effects of climate change. Changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare (UNFCCC 2007).

Climate change. A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (IPCC 2007).

Climate-proofing. Ensuring the sustainability of development investments over their entire lifetime by taking explicit account of a changing climate, or by reducing climate risks to acceptable levels through long-lasting and environmentally sound, economically viable, and socially acceptable changes (ADB 2005).

Climate risk. The result of the interactions between climate-related hazards and vulnerable conditions or exposed systems, i.e., their sensitivity or social vulnerability; or the combination of an event, its likelihood and its consequences, i.e., risk equals the probability of climate hazard multiplied by a given system's vulnerability (UNDP 2004).

Climate Risk Assessment or Screening. A systematic process to determine the nature and extent to which existing policies, frameworks, development projects and programmes consider climate change risks and opportunities so as to identify opportunities for incorporating climate change explicitly into future projects (Klein et al. 2007).

Climate Risk Management. An approach to promote sustainable development by reducing vulnerability associated with climate risks (Hellmuth et al. 2007).

Climate variability. Variations in the mean state and other statistics (standard deviations, statistics of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. (IPCC 2007).

Climate lens. An analytical tool to examine the extent to which a strategy, policy, plan or policy measure under consideration could be vulnerable to risks arising from climate variability or change; the extent to which climate risks have been taken into consideration in the course of the formulation of the strategy, policy, plan or policy measure; the extent to which it could increase vulnerability, leading to mal-adaptation (OECD 2009).

Emissions. The release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time (UNFCCC 2007).

Exposure. The nature and degree of climatic stress upon a system, including long-term changes in climate conditions and changes in climate variability (IPCC 2001).

Extreme weather events. Climate change events such as extreme winds, storms, tornados; extreme precipitations, flooding, flash floods, heat waves, droughts and pollution peaks (UNDP-UNEP: 2011).

Greenhouse gases. Those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation (UNFCCC 2007).

Mainstreaming climate change adaptation. The iterative process of integrating considerations of climate change adaptation into policy-making, budgeting, implementation and monitoring processes at national, sector and sub-national levels. (UNDP-UNEP: 2011).

Mal-adaptation. A situation where an action or process increases vulnerability to climate change–related hazards, e.g. when planned development policies and measures deliver short-term gains or economic benefits, but eventually lead to exacerbated vulnerability in the medium to long term (UNDP 2004).

Mitigation. A human intervention to reduce the sources or enhance the sinks of greenhouse gas emissions with the aim to slow down global warming in the long-run (Alpine Convention 2014).

National adaptation programme of action (NAPA). A national programme of action that provides a process for a developing country to identify priority activities that respond to their urgent and immediate needs with regard to climate change adaptation (UNDP 2011).

National communication. A national report submitted by a signatory country of the United Nations Framework Convention on Climate Change (UNFCCC) to the Conference of the Parties (COP) to the same Convention. The core components of the report include national circumstances; national greenhouse gas inventory; programmes containing measures to facilitate adequate climate change adaptation; programmes containing measures to mitigate climate change; other information relevant to the achievement of UNFCCC objectives; constraints and gaps; and related financial, technical and capacity needs (UNFCCC 2008).

Resilience. The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, capacity for self-organization and capacity to adapt to stress and change (IPCC 2007).

Sensitivity. The degree to which a system is direct or indirect affected, either adversely or beneficially, by climate variability or change. (IPCC 2001, 2007).

Sink. Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.

Vulnerability. The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. (IPCC 2001, 2007).

Preface

Attempts to mainstream climate change into national policies, frameworks and plans are still at an early stage of development worldwide, with many developing countries increasingly requesting the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) for support to mainstream climate change into their policies and plans as part of a broader poverty reduction strategy. Lesotho has joined these sister countries by requesting donor assistance to develop a tool for guiding the mainstreaming of climate change in its national strategic plans and frameworks.

The request for GEF/UNDP assistance mainly focussed on the mainstreaming of climate change in the forthcoming Second National Strategic Development Plan (NSDP II), with the development of Guidelines for Mainstreaming as a by-product. Since NSDP II is almost concluded, these Guidelines will assist the formulation of future policies, strategic plans, frameworks and programmes. In addition to the background, the Guidelines cover a wide range of topics that include the policy and legislative framework for climate change mitigation and adaptation, the rationale for climate change mitigation and adaptation, building a platform for climate change mainstreaming, mainstreaming in policy and other processes, strategy for improved climate change coordination, monitoring and evaluation of mitigation and adaptation measures and climate change policy measures at the local level. Repositories of possible vulnerabilities and mitigation/adaptation measures as well as indicators for monitoring various climate change measures have also been included in the appendices.

These Guidelines for mainstreaming climate change are a simplified version of guidelines that have been prepared by agencies such as UNDP, the United Nations Environment Programme (UNEP), the World Bank, the Organization of Economic Cooperation and Development (OECD), etc. Since this is the first attempt at developing Guidelines for Mainstreaming Climate Change in Lesotho, there is room for further improvement as the wealth of experience accumulates over time. The Guidelines are thus designed to encourage feedbacks from national and other practitioners as to what form subsequent revisions should take in order to strengthen content and make the Guidelines more relevant.

These Guidelines were compiled by Michael L. Mhlanga, an individual consultant. The assignment was funded by the Global Environment Facility (GEF) supported and United Nations Development Programme (UNDP) supervised *Reducing Vulnerability from Climate Change (RVCC) Project* in the Ministry of Forestry, Range and Soil Conservation (MFRSC). Staff from RVCC, UNDP and MFRSC actively participated in the exercise by providing information and arranging validation forums. The Ministry of Development Planning (MDP), the Lesotho Meteorological Services and a number of climate-sensitive line ministries, representatives of some of the adaptation projects, and non-state actors also provided information, with some attending the validation workshops.

Maseru
July 2018

1. Introduction

1.1 Purpose of the Guidelines

The myriad of possible and uncertain future impacts of a changing climate that is predicted over Lesotho (Lesotho's Second National Communication: 2013) poses significant risks and challenges for the achievement of national development goals. Although numerous climate change mitigation and adaptation actions have been implemented and others are in various stages of development, more is still outstanding in the areas of understanding climate change and its predicted impacts, assessing possible vulnerabilities of the population to adverse impacts of climate change and dealing with challenges to the implementation of both mitigation and adaptation measures. As a result, therefore, Lesotho, like many developing countries, has opted for the integration or mainstreaming of climate change, in a cross-cutting approach, into national development planning and decision-making processes.

The mainstreaming or integration of climate change in planning and decision-making processes is a critical tool which ensures that climate change actions and poverty reduction are implemented simultaneously, taking into account risks and opportunities while pursuing mitigation and adaptation measures that are in tandem with long-term development objectives of a country (UNDP-UNEP: 2011). The process assists national and local governments to walk a low-emissions and ecologically sustainable path of development, enabling the country to meet its obligations and commitments under international protocols and agreements on the reduction of GHG emissions. It also assists them to reduce vulnerability to climate change and its associated impacts, to increase the adaptive capacity of communities and national institutions that respond to adverse impacts of climate change and to realise sustainable development.

These guidelines are to be used as a reference document to assist Lesotho to realise the above benefits and strengthen the resilience of climate-vulnerable sectors of the economy and local communities by, amongst others:

- ***Enhancing the capacity of government and non-state institutions, as well as local communities to mainstream climate change risks into policies, plans and programmes;***
- ***Implementing climate-smart and integrated ecosystem rehabilitation and management measures that aim at building community resilience to adverse impacts of climate change;***
- ***Developing and implementing coordination mechanisms to manage climate risks and formulate strategies to deal with adverse threats and impacts of climate change;***
- ***Developing a communication strategy for climate change awareness campaigns and associated resilience building actions for national institutions and local communities;***
- ***Establishing a monitoring and evaluation system to assess the effectiveness of various approaches to climate change mitigation and adaptation in order to reduce greenhouse gas emissions and strengthen adaptive management; and***
- ***Conveying adequate information on predicted climate impacts, mitigation***

strategies and adaptation needs to different sub-national governance levels.

These sector-wide Guidelines include criteria for prioritizing and screening mitigation and adaptation measures, programmes and projects. This will assist practitioners to integrate climate change into government and administrative practices, procedures and systems in support of current and future policy formulation and national development planning.

It should be mentioned that efforts to mainstream climate change into national policies, frameworks and plans are still at an early stage of development worldwide, with many developing countries increasingly requesting the United Nations Development Programme (UNDP) and the United Nations Environment (UNE) for support to mainstream climate change into their policies, frameworks and programmes as part of a broader poverty reduction strategy. Lesotho has therefore joined sister countries in the international community to request donor assistance to develop a tool for guiding the mainstreaming of climate change in national, sectoral and local strategic plans and frameworks.

These Guidelines have been divided into six (6) chapters, including this Introduction. The latter deals with the purpose of and background to the guidelines, while Chapter two deals with the policy and legislative frameworks within which the guidelines were developed. On the other hand, Chapter three deals with the rationale for and steps to be adopted in climate change mainstreaming, while Chapter four addresses approaches to be taken in the climate change mainstreaming process and Chapter five gives a summary of climate change mainstreaming in policy and other processes. On the other hand, Chapter six deals with the strategy for improved coordination of mitigation and adaptation actions, while Chapter 7 deals with the monitoring and evaluation of the same actions in various sectors and at the local level. The last Chapter deals with mitigation and adaptation policy measures at the local level.

1.2 Background to the Guidelines

Scientific evidence that has accumulated since the 1980s has established a strong link between anthropogenic gas emissions (Greenhouse gas emissions - GHGs) and global climate change. The latter has manifested itself in serious disruptions to the world's weather and climate patterns, leading to rising global temperatures, melting ice and associated rising sea levels and increased frequency of extreme weather events such as droughts, flooding, windstorms, etc. The impacts of climate change have been widespread and devastating, encompassing ecosystem degradation, threats to the survival of biological species, human suffering and widespread poverty.

Like the rest of the world, Lesotho has not been spared the negative impacts of climate change. These manifest themselves in an increased frequency of natural disasters (erratic rainfall, droughts, hailstorms, snowstorms, windstorms, floods; etc.). The resultant negative impacts include loss of biodiversity, extreme forms of soil erosion that are induced by frequent torrential rains, accelerated land and environmental degradation and the increased depletion of the country's natural resource base. In the recently published National Climate Change Policy,

the Lesotho Meteorological Services (LMS) acknowledges that "Global climate change is possibly the greatest social, environmental and economic challenge facing the world this century"[1].

A number of international and regional protocols and agreements, as well as national policies and legislative frameworks have identified climate change and its impacts as a crisis that needs both mitigation and adaptive measures to be formulated and implemented as urgent responses in order to avert worsening poverty levels and human suffering. The government of Lesotho has therefore crafted policies and legislative frameworks that are in line with various international and regional protocols that it has signed and ratified. In this respect, there are ongoing initiatives in various sectors of the economy that aim at addressing climate change related ecosystem degradation and at building national and community resilience to negative impacts of climate change.

In implementing climate change responses, it has emerged that the capacity of Lesotho's line ministries and various socio-economic sectors to mainstream climate change issues in their policies, frameworks and programmes, and to plan and implement appropriate mitigation and adaptation interventions, is hindered by the limited availability of technical skills. It is hoped that the current Guidelines will partially relax this constraint and assist the planning and mainstreaming or integration of climate change issues at the national level, in various sectors and at local levels.

1.3 Methodology

The compilation of these Guidelines mainly involved a simplification of international or multilateral mainstreaming guidelines, particularly by UNDP and UNEP, which guidelines provided most of the formats and content (See **table 1** for sources used). Local evidential materials were also gathered from interviews with professionals in various climate sensitive sectors and with staff of focal institutions. Interviews were also conducted with staff of several climate change adaptation projects and with district and local government personnel in the Mohale's Hoek District in Southern Lesotho. It should be noted that for a vulnerable country like Lesotho, climate change related issues are numerous, and therefore it is not possible to make a full and complete coverage of all the issues in vulnerable sectors.

Table 1 Resources Used in the Compilation of the Guidelines

Author and date	Title	Publisher/Place of Publication
Alhassan, S. and Hadwen, W. L (2017)	*Challenges and Opportunities for Mainstreaming Climate Change Adaptation into WaSH Development Planning in Ghana*	***International Journal of Environmental Research and Public health***, Volume 14(7)
Alpine Convention (2014)	***Guidelines for Climate Change Adaptation at the Local Level in the Alps***	Alpine Convention (www.alpconv.org)
Asian Development Bank (2016).	***Guidelines for climate proofing investment in the water sector: Water supply and sanitation,***	Mandaluyong City, Philippines
April 2012	***Climate proofing projects: a map***	New Internationalist

[1] Kingdom of Lesotho (2017), ***National Climate Change Policy,*** p.1

		magazine
Ballarin-Denti, A. et al (2012-2013)	***Guidelines for Climate Change Adaptation at the local level in the Alps***	Alpine Convention
Economics of Climate Adaptation Working Group (2009)	***Shaping Climate-Resilient Development: A Framework for Decision-Making***	Economics of Climate Change Adaptation
Ernst, C. And Blaha, K. (2015)	***Decision support tools for climate change planning***	The Trust for Public Land
Hammill, Anne et al (2014)	***Repository of Adaptation Indicators: Real case examples from national Monitoring and Evaluation Systems***	giz/iisd/German Federal Ministry of Economic Cooperation and Development.
Natural England (2010)	***Climate Change Adaptation Indicators for the Natural Environment (www.naturalengland.org.uk)***	Natural England Commissioned Report NECR038
OECD (April 2009)	***Integrating Climate Change Adaptation into Development Co-operation: Policy Guidance***	OECD
Olhoff, A. and Schaer, C. (2010)	***Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance: A Stocktaking Report***	United Nations Development Programme, N.Y.
Salamat, M. R. (2013)	***Mainstreaming Climate Change into National Development Strategies***	Capacity Development Workshop and Expert Group Meeting held in New York,
Sithole, M. and Khavhagali, V	***Mainstreaming Climate Change Adaptation Responses and Implementation at Provincial and Local Level***,	2nd Southern African Adaptation Colloquium Wits Club and Conference Centre, 08 July 2016
UNDP-UNEP Poverty - Environment Initiative (2009)	***Making the Economic Case: A Primer on the Economic Arguments for Mainstreaming Poverty-Environment Linkages into Development Planning***	UNDP/UNEP
UNDP-UNEP Poverty-Environment Facility (2011)	***Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners***	UNDP/UNEP
UNFCCC (2008)	***Compendium on Methods and Tools to Evaluate Impacts of, Vulnerability and Adaptation to Climate Change***	United Nations, N.Y.
World Bank (2010)	***Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects*: *Assessing Climate Risk, Guidance Note 3***	World Bank
World Bank (2010)	***Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects: Furthering an Enabling Institutional Environment, Guidance Note 5***	World Bank
World Bank (2010)	***Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects: Evaluating Adaptation via Economic Analysis*, *Guidance Note 7***	World Bank

This is the first attempt at developing Guidelines for Mainstreaming Climate Change in Lesotho. The Guidelines are therefore a simplified version that is not cast in stone. There should be room for further improvement through reviews as the wealth of experience accumulates over time. The Guidelines are thus designed to encourage feedbacks from national and other practitioners as to what form subsequent revisions should take in order to strengthen content and make the document more relevant.

1.4 The Target Audience

These Guidelines are designed primarily for use by high level policy-makers, climate scientists, climate change specialists, national planners, energy developers and managers, agricultural production managers, water managers, public health managers, tourism managers, etc. at the national, sectoral and local levels of administration. In terms of institutional interests, the Guidelines are designed to assist the work of coordinating institutions and all those line ministries whose business is concentrated in climate-sensitive sectors of the economy. Specifically, the Guidelines will assist the work of institutions that are mandated to plan, implement and monitor climate change measures. They will also be handy for use by development partners, academics, researchers and various non-state actors.

2. Policy and Legislative Framework

2.1 Introduction

This chapter deals with policy and legislative frameworks that deal either directly or indirectly with climate change or its components, and which give backgrounds within which responses to fundamental causes and negative impacts of climate change can be formulated, implemented and monitored. The frameworks described here therefore include international and regional protocols and agreements, as well as national policies and legislative frameworks within which climate change mitigation and adaptation measures are to be designed, mainstreamed and implemented as part of national programmes.

There are basically five policy and legislative frameworks that should be borne in mind in the design, mainstreaming and implementation of climate change mitigation and adaptation actions: (a) International conventions, protocols and agreements that have been ratified by Lesotho; (b) Regional protocols and agreements; (c) Environmental and social safeguards policies, standards and guidelines of financier institutions; (d) National policies and legislative frameworks; and (e) Corporate responsibilities of private companies.

2.2 International Protocols and Agreements

The first World Climate Conference was organized by the World Meteorological Organization (WMO) in Geneva in February 1979. Proceedings of the same made it clear that there was a causal relationship between global GHG emissions and global warming and associated worldwide climate change. This led to the creation of the Intergovernmental Panel on Climate Change (IPCC) by the WMO and the United Nations Environmental Programme (UNEP) in 1988 to further analyse scientific evidence. The first assessment report of the IPCC unequivocally established the major cause of climate change as GHG emissions induced global warming and called for negotiations towards a global climate treaty to reduce GHG emissions and devise adaptation strategies to reduce the vulnerability of ecosystems to climate change.

The second World Climate Conference was held in Geneva in October-November 1990. This led to the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) by the United Nations at the Earth Summit in Rio de Janeiro in 1992. As a member of the international community, Lesotho signed and ratified the UNFCCC and, amongst others, most of the international protocols and agreements shown on **table 2** below. The protocols and agreements set out a framework within which Lesotho is expected to design and implement national adaptation and mitigation programmes of action, taking into account national circumstances and capacities, and make periodic reports on progress to the Conference of the Parties (COP) to the UNFCCC.

Table 2 Key International Climate Change and Related Frameworks

Convention/Protocol/Charter/Policy	Objectives of the Regulatory framework
Convention on International trade in Endangered Species of Flora and Fauna (1975)	The Convention aims at ensuring that international trade of specimens (flora and fauna) does not threaten their survival.
UN Framework Convention on Climate change (1992)	The Convention aims at limiting human activities that contribute to climate change, and to come up with solutions to curb the negative results of climate change.
United Nations Convention to Combat Desertification (1994)	The Convention aims at improving the living conditions of vulnerable populations living in arid , semi-arid and dry sub-humid areas.
United Nations Convention on Biological Diversity (1994)	The Convention aims at encouraging sustainable development that considers biodiversity by decreasing the rate of loss of natural habitats, establishing conservation areas, restoring degraded areas and protecting environments that are susceptible to human impacts.
The Kyoto Protocol to the UNFCC, 1997	Through this Protocol, developed countries were legally bound to emission reduction targets.
United Nations on Combating Poverty (1997)	The aim is to ensure that all individuals are provided with the opportunity to earn a sustainable livelihood. the UN undertakes to implement policies and strategies to that promote adequate levels of funding and focus on integrated human development.
United Nations Global Compact (2000)	The Global Compact represents a call for businesses to align their strategies and operations with universal principles of human rights, labour, environment and anti-corruption, and to take actions that advance societal goals.
Ramsar Convention on Wetlands (2004)	The Convention aims at international cooperation and national action to protect wetlands and their resources.
The Paris Agreement on Climate Change (2016)	The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C

2.3 Regional Protocols and Agreements

Lesotho is a signatory of various protocols, declarations, frameworks and agreements that have been entered into within the framework of regional bodies of which it is a member such as the African Union (AU) and the Southern African Development Community (SADC). Of particular interest are environmental and social safeguards policies, standards and guidelines offered by some of these regional undertakings. Following the Rio Summit on the Environment, the African Union adopted several protocols with the aim to ensure that all member states of this regional organization should realise a safer and more prosperous future by dealing with environmental protection, economic development and social development issues in a balanced manner; by accelerating the economic and social development of Africa with a better care for the environment and by raising environmental awareness at regional, national and local levels (See **table 3** below for a list of selected protocols).

Table 3 African Union Environmental Regulatory Frameworks

AU Protocol	Objectives of the Protocol
Protocol on Energy (1996)	A Protocol to promote the harmonious development of national energy policies and matters of common interest for the balanced and equitable development of energy throughout the SADC region.
Protocol on Wildlife Conservation and Law Enforcement (1999)	The Protocol aims at establishing a common framework for conservation and sustainable use of wildlife in the region.
Protocol on Shared Watercourses (2000)	The Protocol aims at ensuring that member states that have shared water courses develop in an environmentally sound and equitable manner.
Convention of the African Energy Commission (2001)	The Convention established the African Energy Commission to promote the use of energy to support rapid economic and social development, eradicate poverty, combat desertification, and improve the standard and quality of life; to promote the development and utilization of sustainable and environmentally sound energy; to ensure integrated, coordinated and harmonized development and utilization of energy; to promote research and development and to harmonize standards and procedures.
Protocol on Forestry (2002)	The Protocol aims at promoting the development, conservation, sustainable management and utilization of all types of forests and trees; trade in forest products; achieve effective protection of the environment and safeguard the interests of both the present and future generations.
Revised African Convention on the Conservation of Nature and Natural Resources (2003)	The objectives of the revised Convention include enhancing environmental protection; fostering conversation and sustainable use of natural resources; harmonisation and coordination of policies to achieve ecologically rational, economically sound and socially acceptable development policies and programmes; recognition of the rights of all people to a satisfactory environment that is favourable to their development and meeting development and environmental needs in a sustainable, fair and equitable manner.
The African Agenda 2063	A strategic framework for socio-economic transformation in a 50-year period. It seeks to build on the Continent's initiatives for growth and sustainable development by, amongst others, by adopting environmental sustainability and climate resilience as integral components of this growth.

Several environmental and climate change related protocols have been adopted by SADC since 1996 (**table 4** below). Amongst these is the *Protocol on Environmental Management for Sustainable Development (2014)*, a protocol that aims at protecting the environment for human health, well being and poverty alleviation; at promoting the equitable and sustainable use of natural and cultural resources; at protecting the environment for the present and future generations; at protecting the shared management of trans-boundary environmental and natural resources and at promoting effective management and responses to impacts of climate change and variability. As the founder member of SADC, Lesotho is obliged to diligently implement the regional body's protocols, and the design and implementation of both mitigation and adaptation measures should be seen in this respect. The anticipated actions include regional cooperation projects that aim at augmenting Lesotho's climate change mitigation and adaptation capacity. Lesotho is already benefiting from results of adaptive research of SADC institutions.

Table 4 SADC Environmental and Social Regulatory Frameworks

SADC Protocol	Objectives of the Protocol/Agreement
Protocol on Transport, Communications and Meteorology (1996)	The Protocol aims at promoting economically viable integrated transport services that are compatible with responsible environmental management, including adopting common standards to enhance vehicle pollution control and measures relating to trans-boundary movements of hazardous substances. The Protocol also calls for the provision of adequate legal frameworks and appropriate financial support for regional and national meteorological services.
Protocol on Mining (1997)	The Protocol aims at enhancing the contribution of the mining sector to development and poverty alleviation and advancing internationally accepted regional standards and highlighting environmental and occupational health and safety.
Protocol on Wildlife Conservation and Law Enforcement (1999)	The Protocol advocates for member states to harmonise their legal instruments for wildlife, establish management programmes for wildlife, and create a regional database of wildlife status and management.
Protocol on Health (1999)	The Protocol aims at the coordination of regional efforts on epidemic preparedness, mapping prevention, control and, where possible, the eradication of communicable and non- communicable diseases, education and training, efficient laboratory services and common strategies to address the health needs of women, children and vulnerable groups.
Revised Protocol on shared watercourses (2000)	The Protocol aims to foster closer cooperation among member states for the protection, management, and use of shared watercourses in the region - collaboration on initiatives that balance development of watercourses with conservation of the environment.
Protocol on Forestry (2002)	The Protocol provides guidance on undertaking national forest assessments and drafting national forest policies, programmes and laws. Policies and mechanisms should enable local people and women to effectively participate in forest management activities as well as respect traditional knowledge related to forests.
Declaration on Agriculture and Food Security (2004)	The Declaration on Agriculture and Food Security in the SADC Region sets out SADC Member States' commitment to enhancing agriculture as a means of improving access to food for people in the region.
Protocol on Science, Technology and Innovation (2008)	The Protocol that aims at promoting the development and harmonisation of science, technology, and innovation policies, advocating investment in research and development and promoting public awareness of science and technology.
SADC Environmental Legislation Handbook (2012) (www.dbsa.org)	The Handbook represents a breakaway from fragmented sectoral approaches to environmental management and urges the region to pursue 'a single agenda and strategy' to achieve the consistent integration of environmental impact assessment (EIA) in decision-making.
Protocol on Environmental Management for Sustainable Development (2014)	The protocol aims at protecting the environment for human health, well being and poverty alleviation; to promote equitable and sustainable use of natural and cultural resources and protect the environment for the present and future generations; to protect the shared management of trans-boundary environmental and natural resources and to promote effective management and responses to impacts of climate change and variability.
Regional Framework on Environmental Management for Sustainable Aquaculture (2016)	The Framework seeks to facilitate the implementation of a range of international and regional environmental strategies and guidelines to sustainable aquaculture development and operation in the Southern African Sub-region.

2.4 Development Finance Institutions

Projects that require international funding are bound to comply with specific environmental and social safeguards policies, standards and guidelines of financier institutions. These financing requirements differ from institution to institution. Practitioners will therefore be advised to refer to specific requirements of relevant institutions for direction. A few development finance institutions that are presented here are not the only ones that have a presence in Lesotho but were chosen for illustrative purposes. Although their requirements may not be directly relevant to climate change, they certainly have a bearing on mitigation and adaptation strategies to be adopted.

The World Bank has published a number of safeguard policy manuals that are supposed to guide the design and implementation of bank-supported projects throughout the world. In these Operational Policy manuals (OP4.01 and OP4.11), the Bank requires environmental assessments (EAs) of projects that are proposed for Bank financing to be conducted in order to help ensure that they are environmentally sound and sustainable, and will assist in the protection and enhancement of cultural properties that are encountered in Bank-financed projects, rather than leaving that protection to chance.

The African Development Bank (ADB) has an Integrated Safeguards System (ISS) that it adopted in 2013 to promote growth that is socially inclusive and environmentally sustainable. The ISS is regarded as a powerful tool for identifying risks, reducing development costs and improving project sustainability, thus benefitting affected communities whilst simultaneously preserving the environment. The ADB is therefore well equipped to address emerging environmental and social challenges that emanate from development activities or are associated with climate change.

The European Investment Bank (EIB) is largely driven by the European Union (EU) compendium of principles of sustainable development, public participation and accountability. As a tool for achieving sound environmental and social performance, a lot of emphasis in this compendium is placed on the assessment of environmental and social impacts and on developing and implementing appropriate environmental management plans and programmes. All the projects that are financed by EIB, therefore, must comply with national legislation and international conventions, protocols and agreements that were ratified by the host country, and that meet international best practice for the assessment and management of environmental and social impacts and risks, promote good environmental and social governance and align with relevant EU principles and standards.

The International Finance Corporation (IFC) strictly adheres to its 2006 *Performance Standards on Environmental and Social Sustainability*. Revised in 2012, these cover issues of assessment and management of environmental and social risks and impacts, labour and working conditions, pollution prevention and abatement, community health, safety and security, land acquisition and resettlement, and biodiversity conservation and sustainable management of living natural resources.

KfW Development Bank finances and supports public sector projects in developing countries, from formulation, implementation and monitoring and evaluation, on behalf of the German

Federal Ministry of Economic Cooperation and Development. The latter institution has environmental and social standards that encompass water supply, loss of biodiversity, population explosion, depletion of resources and climate change. These require maintaining a tight link between economic and ecological issues on the one hand and sustainable development on the other. KfW is highly committed to the concept of sustainability, hence the promotion of ecologically sound, social just and economically robust development in partner countries and to drive growth through green development.

There are a number of **climate finance mechanisms** where funds flow through multilateral (both within and outside of UNFCCC financing mechanisms) and bilateral channels. Examples of multilateral climate finance mechanisms are the Global Environment Facility (GEF), the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF), the Adaptation Fund (AF), the Clean Technology Fund, the Strategic Climate Fund, the Forest Carbon Partnership Facility (FCPF), the Bio Carbon Fund, the EU Global Energy Efficiency and Renewable Energy Fund (GEEREF), the Africa Climate Change Fund (ACCF), the International Fund for Agriculture and Development administered Adaptation for Smallholder Agriculture Programme, and the Green Climate Fund (GCF). Examples of bilateral climate change mechanisms are Germany's International Climate Initiative, United Kingdom's International Climate Fund, Norway's International Forest Climate Initiative and Australia's International Forest Carbon Initiative (IFCI).

The proliferation of climate finance mechanisms poses challenges for the coordination of climate finance. However, most of the multilateral funds are administered by established development finance institutions that have been referred to above, while bilateral funds are administered by the relevant donor countries through bilateral agreements that include stringent environmental and social safeguard clauses.

2.5 National Policies and Legislative Frameworks

Lesotho has signed and ratified several UN conventions and protocols that aim at controlling GHG emissions and at formulating and implementing appropriate climate change mitigation and adaptation strategies[2]. Based on provisions of these conventions and many protocols, the country has formulated or updated existing policies and legislative frameworks to address current environmental and climate change challenges in a number of vulnerable sectors of the economy, and set up focal institutions to deal with the challenges holistically.

All key **national policy documents** in Lesotho make reference to environmental challenges that face Lesotho, and advocate for the ratification of international conventions and treaties for sustainable development, the strengthening of institutions that are responsible for natural resources management, the development and effective implementation of land management systems, the strengthening of the Environmental Impact Assessment (EIA) system, the control of the harvesting of natural resources, the improvement of effluent and waste management, improving environmental education and strengthening the legal and policy frameworks.

[2] See **Lesotho Meteorological Services (2017),** *National Climate Change Policy***, Kingdom of Lesotho, table 2**

So far climate change models predict further deterioration of the natural and physical resource base in Lesotho, which deterioration, if not mitigated, could slow-down economic growth and threaten achievements in social development[3]. In general, national policies call for tackling land degradation and protecting water sources, increased biodiversity conservation and promotion of sustainable harvesting, strengthening range management institutions, monitoring range carrying capacities, improvements in national resilience to climate change, promotion of a green economy, improvements in land use/administration and management and improvements in environment and climate change governance. These actions are supported by the following policy and legislative documents:

- Lesotho's **1993 Constitution** - This document advocates for the protection and enhancement of the natural and cultural environment for the benefit of both the present and future generations[4].
- The **1998 National Environmental Policy** - This is the first comprehensive environmental policy in Lesotho. It was largely crafted in line with international conventions and agreements, and laid the foundation for the drafting of the Environment Act of 2008. The policy, amongst others, aims at achieving sustainable development by addressing environmental and socio-economic dimensions of development, through an EIA process.
- The **2017 National Climate Change Policy** - This policy represents the first consolidated climate change policy that is closely aligned with international and regional conventions and protocols. The policy aims at the identification, mainstreaming and implementation of appropriate climate change mitigation and adaptation measures while promoting sustainable development. The climate change policy has called for the following strategic actions:

  - ***The promotion of climate resilient social, economic and environmental development that is compatible with and mainstreamed into national development plans and budgetary processes;***
  - ***The exploration of low carbon development opportunities nationally and internationally in order to promote the sustainable use of resources; and***
  - ***The strengthening of a framework that promotes efficient climate change governance, strong international cooperation; research and systematic observations; clean technology development, transfer and use; education, training and public awareness and financing in a way that also benefits the most vulnerable social groups.***

- Other **sustainable livelihoods policies and analyses** - Many policies that either directly or indirectly impact on the environment and climate change have also been developed in areas such as agriculture, water resources, forestry and biomass energy resources, rangelands, biodiversity and rural livelihoods. What has emerged from these policy statements and analyses is the established link between climate change, on the one hand; and environmental degradation and declining agricultural production and productivity, declining farmer incomes, food deficits and increasing poverty on the other

[3] Ministry of Development Planning (September 2012), ***National Strategic Development Plan 2012/13-2016/17***, Government of Lesotho, p.125.
[4] Government Printer (1993), ***The Constitution of Lesotho***, Clause 36.

hand. Amongst notable policy documents are those shown on **table 5** below. These documents will definitely assist efforts to integrate climate change and design appropriate adaptation responses in respective sectors.

Table 5 Relevant National Policies and Frameworks by Sector

Policy/Framework	Sector
• Livestock and Range Management Policy 1994	Agriculture
• Water Resources Management: Policy and Strategies 1996	Water
• National Forestry Policy 1997	Forestry
• Local Government Act No. 6 of 1997	Local Government
• National Biodiversity Strategy and Action Plan 2000	Environment
• Energy Policy 2003	Energy
• Water and Sanitation Policy 2007	Water
• National Action Plan for Food Security 2007-2017	Agriculture
• The Compensation and Resettlement Policy and Procedures 2010	Construction
• Decade of Action for Road Safety 2011	Transport
• National Range Management Policy 2014	Range/Agriculture
• Interim Long Term Water and Sanitation Strategy 2014	Water

- The **National Environmental Act, 2008** - This is a legal framework that is designed to address a host of issues such as the institutional framework and environmental planning, environmental impact assessments, environmental audits and monitoring, environmental quality standards, pollution control, environmental management (conservation and protection) and environmental restoration. This law forms the basis of ensuring sustainable development, designing appropriate climate change adaptation interventions and promoting community participation.

- **Other Legal Frameworks** - These are legal frameworks that are likely to have a bearing on the design of climate change adaptation actions in various sectors and which will need to be referred to where necessary. They include laws relating to historical monuments, chieftainship, public health, national parks, water resources, town and country planning, forestry, tourism, mining, land and the Lesotho Highlands Development Authority (See **Appendix 1**). Elements of some of these laws have been incorporated into the Environment Act 2008 although the detail remains in the individual Acts.

2.6 Corporate Responsibilities

There is no policy or legal framework defining environmental and social responsibilities of corporate institutions in Lesotho. The Investment Guide of the Lesotho National Development Corporation (LNDC), the company mandated to promote foreign direct investment (FDI) in the country, is silent on the issue. However, although enforcement remains inadequate in Lesotho, the following safeguards are applicable to corporate establishments:

- ***The National Environmental Policy, 1998 (Para 4.21) prescribes a number of measures to ensure sustainable activities, particularly for mining and industrial developments. These include pollution control, safe waste disposal, safe and healthy operational environments and the use of environmentally friendly and energy saving technologies.***
- ***According to the Environment Act, 2008, (Part V:19(1)) the Department of Environment should pursue the objectives of sustainable development by ensuring that either partial or full environmental impact assessments (EIAs) are conducted for all the projects that carry potentially negative impacts on the physical and/or social environment.***
- ***United Nations Global Compact of 2000 has developed comprehensive strategies and actions for business to realize its full potential with respect to environmental challenges and opportunities. Businesses are expected to align their strategies and operations with universal principles of human rights, labour, environment and anti-corruption, and to take actions that advance societal goals.***

According to the United Nations Global Compact of 2000, companies are encouraged to develop a holistic and comprehensive strategy to deal with various environmental risks, and leverage opportunities, recognizing that business operations are tied to the planet earth. Businesses are therefore encouraged to advance the Sustainable Development Goals including the Action Agenda of the Paris Climate Agreement that resulted from COP21.

The **construction sector** in Lesotho, in particular the Roads Directorate and the Lesotho Highlands Development Authority (LHDA), have developed environmental management tools that have become part of construction contracts that are implemented by private companies. These "Special Conditions of Contract" ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of projects are prevented, and that the positive benefits are enhanced. They cover a wide range of environmental management issues that are guided by detailed environmental and social impacts checklists in the areas of biodiversity, community assets, land degradation and other negative social impacts.

The **mining sector** in Lesotho is in the process of introducing strict environmental and social management laws for mining companies in the country. This follows an observation that their operations adversely affect the natural environment's biodiversity and ecosystems, cause air and water pollution, pose threats to occupational health and safety, expose local communities in mine areas to adverse environmental and social consequences, violate human rights, particularly those of women and children, etc. The sector also lacks transparency and accountability guidelines/regulations. The new legislative proposals, contained in a draft Green Paper[5], include environmental protection - land rehabilitation upon closure; occupational health and safety; community participation and human rights.

[5] Ministry of Mining (April 2014), Draft Green Paper on the Mining and Mineral Resources Policy, Kingdom of Lesotho.

3. Climate Change Responses

3.1 Introduction

Like all the countries in Southern Africa, Lesotho has experienced a warming trend for more than three decades, a period that has also witnessed a downward trend in rainfall. Below-normal rainfall as well as delayed rainfall years are becoming more frequent. In fact there has been an increase in the frequency and intensity of El Niño episodes since the early 1980s. These extreme climatic events have increased Lesotho's vulnerability. This is because the country is predominantly dependent on climate sensitive sectors such as agriculture, range, water, energy, forests, etc. It is therefore imperative that climate change should be mainstreamed in national policies and plans in order to direct the programming of adaptation actions in the affected sectors and control Lesotho's contribution to global GHG emissions.

Since Lesotho's contribution to global GHG emissions is infinitesimal in comparison with emissions from developed countries, adaptation actions should take priority over mitigation actions. However, certain mitigation actions such as the adoption of cleaner production technologies, improving energy efficiency, reducing the consumption of fossil fuels, promotion of renewable energy sources, the adoption of sustainable land use practices and reduction of emissions from deforestation are not only important for reducing GHG emissions but also for adaptation objectives in the form of enhancing the resilience and health of local communities.

Since the signing and ratification of the UNFCCC, Lesotho has made significant strides in building its capacity for climate change adaptation although that for mitigation remains inadequate. Notable developments include the establishment of the Disaster Management Authority (DMA) that manages disasters and controls food reserves for relief; the establishment and capacitating of an early warning system within the DMA; the establishment of the Lesotho Vulnerability Assessment Committee (LVAC), also within the DMA; the establishment of a Climate Change Unit (CCU) within the Lesotho Meteorological Services (LMS); the establishment of the National Climate Change Committee (NCCCC) within LMS; and the formulation and implementation of climate change projects in various sectors of the economy.

3.2 Strategies and Objectives

Responses to climate change can only take two complementary forms: (a) Mitigation measures which are defined as human interventions to reduce the sources or enhance the sinks of greenhouse gas emissions with the aim to slow down global warming in the long-run (usually 50 years or more). Examples would include the adoption of more efficient uses of fossil fuels, the conversion to renewable energies such as solar and wind power, and the expansion of forest areas and other sinks to remove greater amounts of carbon dioxide from the atmosphere; and (b) Adaptation measures which are defined as the process of taking actions to increase the resilience of human activities and ecosystems in order to prevent or minimize the unavoidable impacts of climate change in the short-run. Examples here would include the construction of flood walls to protect property from stronger storms and heavier precipitation; and the planting of agricultural crops that are more suited to warmer temperatures and drier soil conditions.

In general, the objectives of mitigation are long-term, taking an estimated 50 years or more. This means that the impacts of climate change will be with humankind for some time in the foreseeable future, with a possibility of lasting longer due to the delayed or lagged impacts of GHG emissions. In the short-run, therefore, climate change impacts and their environmental, economic and social costs will be unavoidable, making adaptation measures a dire necessity. By taking well-thought out, coherent, sufficiently adaptive and participatory measures, it is much cheaper and less disruptive to take early, planned adaptation actions than to pay the price of not adapting. However, undertaking mitigation actions go with opportunities for green development pathways and would assist the country to meet its obligations and commitments in the international platforms such as the UNFCCC, the Kyoto Protocol, the Paris Agreement, the Lesotho NDC, etc, as well as the Lesotho Climate Change Policy, adopted in December 2017.

So far there are three basic objectives of mainstreaming climate change actions (mitigation and adaptation) in Lesotho:

- To provide for the coordinated and integrated response to climate change and its impacts by all tiers of government in accordance with provisions of international and regional conventions and protocols and national policies and legislative frameworks;
- To provide for the effective management of unavoidable climate change impacts through enhancing adaptive capacity, strengthening resilience (social, economic, and environmental resilience), reducing vulnerability and building an adequate national adaptation response within the context of global climate change responses;
- To make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, social and environmental development to proceed in a sustainable manner; and
- To assist the realization of a low carbon and climate resilient economy, sustainable growth and development, climate resilient investments and the creation of new jobs.

The complex and uncertain impacts of a changing climate pose significant risks for the achievement of national development goals and objectives worldwide. The previous Chapter of this report indicated that there were numerous international and regional initiatives, as well as financing mechanisms that aim at assisting countries with climate change mitigation and adaptation. Many countries have now come to acknowledge that, to realise long term benefits, climate change mitigation and adaptation need to be mainstreamed in national policies and development plans as part of a broader poverty-environment mainstreaming process.

3.3 Climate Change Mitigation

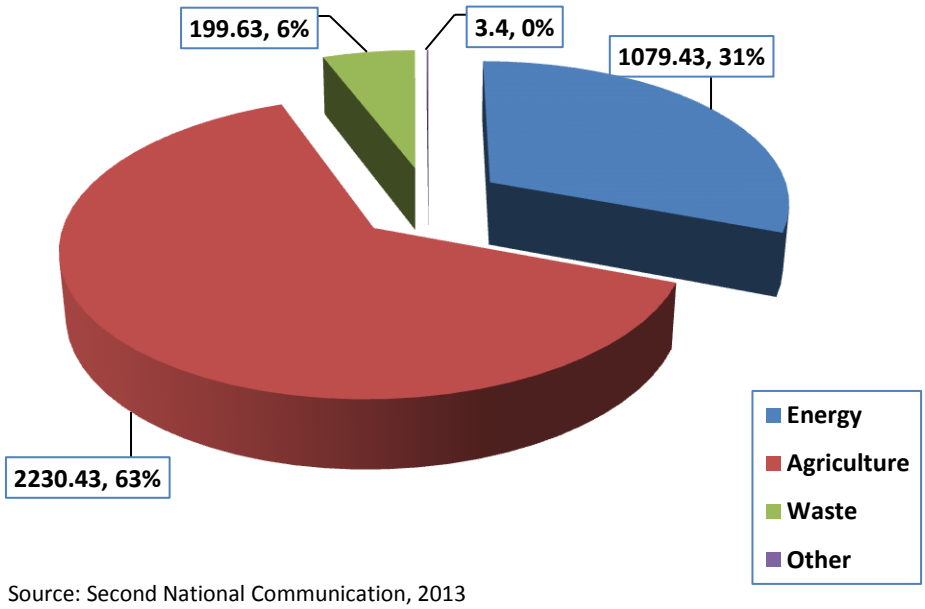
According to the Second National Communication to the COP, in 2013 Lesotho released a total of 3,512.89 Gigagrams[6] of CO_2 equivalent emissions in all sectors other than in Land Use Change and Forestry (LUCF)[7]. The bulk of this, 63%, comes from the agricultural sector, while 31%

[6] One Gigagram = 1,000 tonnes

[7] Ministry of Energy, Meteorology and Water Affairs (2013), ***Lesotho's Second National Communication to the Conference of the Parties to the United Nations Framework Convention on Climate Change***, p.57.

comes from the energy sector and 6% from waste (See **Figure 1** below). Land Use Change and Forestry had a net sink of 1,377.98 Gigagrams of CO_2 equivalent emissions. This resulted in total net emissions of 2,134.91 Gigagrams of CO_2 equivalent, a figure that is proof that Lesotho, like many developing countries, is a negligible emitter of GHGs. In this respect, the country is not obliged to implement internationally agreed GHG mitigations targets. However, as a signatory to the UNFCCC, the country is morally bound to take voluntary actions to mitigate GHG emissions[8] since this can also deliver immediate health impacts on the population. However, despite acknowledging that adverse climate change impacts have reached crisis proportion worldwide, the issue mitigation has not been adequately mainstreamed in framework policies in Lesotho.

Figure 1 Value (Gg CO_2e) and Percent GHG Emissions Contribution by Sector, 2013



Source: Second National Communication, 2013

Lesotho signed and ratified the 2016 Paris Agreement on Climate Change, an agreement that sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. In its September 2015 report to the COP, Lesotho pledged to reduce GHG emissions in the country by 10%-35% by 2030, depending on the flow of resources to support its mitigation programme[9].

Mitigation efforts have largely focused on 3 sectors that account for most of the emissions burden of the country: energy, forestry and agriculture. However, emissions in other sectors will be monitored and opportunities explored. **Table 6** below details out possible mitigation possibilities in some of the sectors in Lesotho. These could be more specifically summarised as follows:

[8]Ministry of Energy, Meteorology and Water Affairs (2013), ***Lesotho's Second National Communication to the Conference of the Parties to the United Nations Framework Convention on Climate Change***, p.25.

[9] Ministry of Energy and Meteorology (2015), ***Lesotho's Intended Nationally Determined Contribution***, Para 5.4.

- Investments in energy-efficient equipment, electricity grid extension and rural electrification projects (off-grid and mini-grids), and promotion of the use of energy saving Compact Fluorescent Lamps;
- Promotion of a modal shift from private to public transportation, investments in fuel-efficient vehicles, control of imports of used vehicles and the imposition of a carbon tax on the same;
- Investment in infrastructure for non-motorized transport and pedestrian traffic;
- Expansion of carbon sinks through tree planting in degraded lands - to increase tree cover from around 1% to at least 5% (152,000 ha) by the year 2020[10];
- Increasing investment in the renewable energy programme in electricity, buildings (residential, commercial and institutional) solar, wind and waste management (effluent and waste management);
- Destocking the range in order to reduce methane (CH_4) emissions through enteric fermentation;
- Recovery of methane from cattle kraals and VIP latrines;
- Enacting legislation to control transport (passenger and commercial) and industrial emissions; and
- Investments in the development and dissemination of clean and energy efficient technologies.

The above actions reveal that mitigation offers ample opportunities for private sector participation in Lesotho. These could deliver short-term benefits within long-term objectives. Some of the above mitigation options are listed in **Appendix 2** under relevant sectors. However, the absence of appropriate legislative frameworks, weaknesses of institutions, data weaknesses, lack of appropriate equipment for assessments and weak enforcement mechanisms will continue to present challenges to the mitigation programme. On the other hand, the mainstreaming of climate change mitigation will assist the relaxation of some of these challenges over time.

[10] National Forest Policy, 1997.

Table 6 Key Mitigation Technologies and Practices that could be Appropriate for Lesotho

Sector	Key mitigation technologies and practices currently commercially available	Policies, measures and instruments shown to be environmentally effective	Key constraints or opportunities (Normal font = constraints; *italics = opportunities*)
Energy	Improved supply and distribution efficiency; fuel switching from coal to gas; renewable heat and power (hydropower, solar, wind, geothermal and bio-energy); combined heat and power; industrial carbon dioxide capture and storage (CCS).	Reduction of fossil fuel demand; taxes or carbon levies on fossil fuels	Resistance by vested interests may make them difficult to implement
		Feed-in tariffs for renewable energy technologies; renewable energy obligations; producer subsidies	*May be appropriate to create markets for low- emissions technologies*
Transport	More fuel-efficient vehicles; hybrid and electrical vehicles; cleaner diesel vehicles; bio-fuels; modal shifts from private transport to public transport systems; non-motorised transport (cycling, walking); land-use and integrated urban planning; transit-oriented development.	Mandatory fuel economy; bio-fuel blending and CO_2 standards for used vehicles	Partial coverage of vehicle fleet may limit effectiveness
		Carbon taxes and levies on used vehicle purchases, registration, use and motor fuels; road and parking pricing.	Regulation may be difficult to enforce. Effectiveness may drop with higher incomes Resistance by vested interests may make them difficult to implement
		Influence mobility needs through land-use regulations and infrastructure planning; investment in attractive public transport facilities and non-motorised forms of transport	*Particularly appropriate for countries that are building up their transportation systems such as Lesotho*
Buildings	Efficient lighting and day-lighting; more efficient electrical appliances and heating and cooling devices; improved cook stoves, improved insulation; passive and active solar design for heating and cooling; alternative refrigeration fluids, recovery and recycling of fluorinated gases; introduction of green building standards; climate proofing existing buildings.	Appliance standards and labelling	Periodic revision of standards needed
		Building codes and certification	Attractive for new buildings. Enforcement can be difficult
		Demand-side management programmes	Need for regulations so that utilities may profit
		Public sector leadership programmes, including procurement	*Government purchasing can expand demand for energy-efficient products*
		Incentives for energy service companies (ESCOs)	*Success factor: Access to third party financing*
Industry	More efficient end-use electrical equipment; heat and power recovery; material recycling and substitution; control of non-CO_2 gas emissions; and a wide array of process-specific technologies; use of more-efficient motors; elimination of air	Provision of benchmark information; performance standards; subsidies; tax credits	May be appropriate to stimulate technology uptake. Stability of national policy important in view of international competitiveness

	and steam leaks; utilization of waste heat or energy recovery, solid waste is recycling.	Tradable permits	Predictable allocation mechanisms and stable price signals important for investments
		Voluntary agreements	Success factors include: clear targets, a baseline scenario, third-party involvement in design and review and formal provisions of monitoring, close cooperation between government and industry
Agriculture	Improved crop and grazing land management to increase soil carbon storage; restoration of cultivated organic soils and degraded lands; improved cultivation techniques and livestock and manure management to reduce CH_4 emissions; improved nitrogen fertiliser application techniques to reduce N_2O emissions; dedicated energy crops to replace fossil fuel use; improved energy efficiency	Financial incentives and regulations for improved land management; maintaining soil carbon content; efficient use of fertilisers and irrigation	*May encourage synergy with sustainable development and with reducing vulnerability to climate change, thereby overcoming barriers to implementation*
Forestry/ forests	Afforestation; reforestation; forest management; reduced deforestation; harvested wood product management; use of forestry products for bio-energy to replace fossil fuel use; tree species improvement to increase biomass productivity and carbon sequestration; improved remote sensing technologies for analysis of vegetation/soil carbon sequestration potential and mapping land-use change	Financial incentives (national and international) to increase forest area, to reduce deforestation and to maintain and manage forests; land-use regulations and enforcement.	Constraints include lack of investment capital and land tenure issues. *Can help poverty alleviation*
Waste and effluent	Landfill CH_4 recovery; waste incineration with energy recovery; composting of organic waste; controlled wastewater treatment; recycling and waste minimisation; bio-covers and bio-filters to optimise CH_4 oxidation, CH_4 recovery from cattle kraals and ventilated improved pit (VIP) latrines	Financial incentives for improved waste and wastewater management	*May stimulate technology diffusion*
		Renewable energy incentives or obligations	Local availability of low-cost fuel
		Waste management regulations	Most effectively applied at national level with enforcement strategies

Source: Adapted from the IPCC Fourth Assessment Report: Climate Change 2007 - Synthesis Report

3.4 Climate Change Adaptation

3.4.1 Introduction

Climate change adaptation is a climate change strategy that is directed at economic sectors that are either directly or indirectly sensitive to climate variability. Adaptation measures should be planned and implemented at all levels, from national, sectoral to regional and local levels because of the wide-ranging nature of adverse climate change impacts. The attributes of a well thought-out adaptation strategy should include one or more of the following:

- ***Minimizing the risks that are associated with climate change,***
- ***Protecting public health and safety,***
- ***Improving the quality of life and properties;***
- ***Preserving nature by improving the adaptation capabilities of natural ecosystems,***
- ***Improving the economic and social systems; and***
- ***Realizing benefits from exploiting advantages and opportunities that are associated with climate change, e. g. by developing climate-resilient technologies, products and services.***

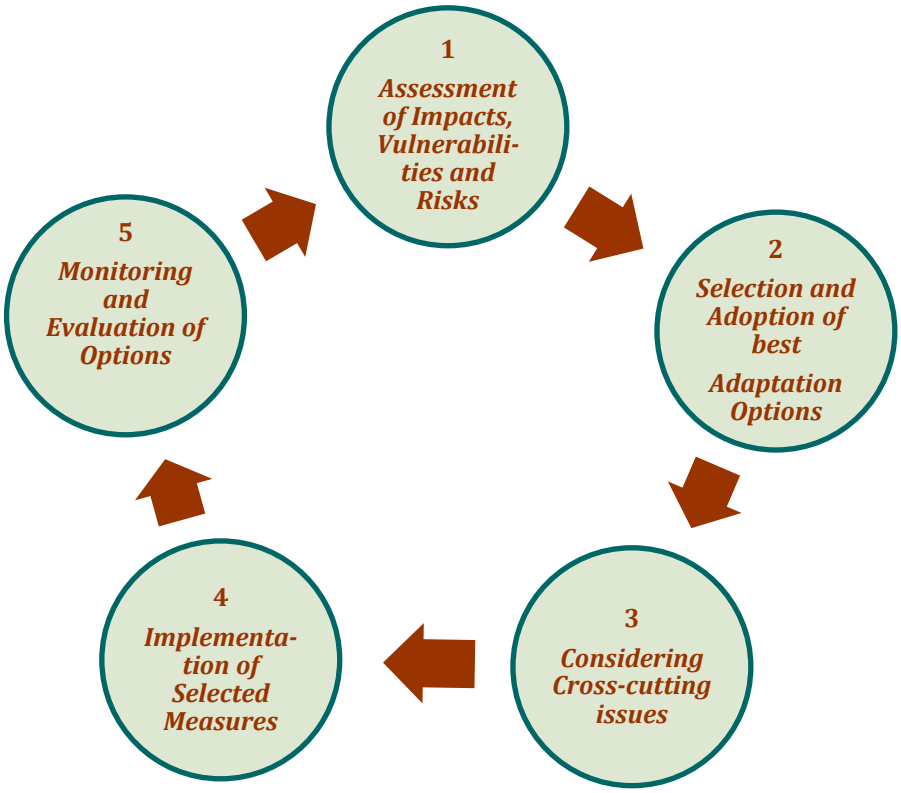
Currently several state and non-state institutions carry adaptation programmes across close to 14 sectors of the economy's climate sensitive sectors. There are also numerous donor supported adaptation initiatives which have produced positive results, a good example being adaptive research trials in the agricultural sector, rural water supply and sanitation solutions, etc.

3.4.2 The Development of Adaptation Measures[11]

There are five steps in the formulation of effective adaptation measures: (a) The assessment of climate change impacts, vulnerabilities and risks that go with it; (b) The selection and adoption of the best adaptation options; (c) The integration of cross-cutting issues to be attended to (Finance, gender issues, vulnerable groups, participatory arrangements, governance issues, etc.), (d) The implementation stage, and (e) Monitoring and evaluation (see **Figure 2** below). The sequencing may vary from time to time, depending on circumstances. Some activities could take place parallel to each other or assume a different order altogether.

[11] The development of mitigation measures follows the same conceptual framework except that analyses mainly focus on GHG emissions, future socio-economic developments and future forecasts of such emissions and the effectiveness of future control mechanisms and instruments.

Figure 2 Steps in the Development of an Adaptation Measure



3.4.2.1 Assessment of Impacts, Vulnerabilities and Risks

The first stage in the assessment involves the choice of indicators to assist the assessment of current climate trends and associated hazards/potential hazards, and making predictions about expected future changes. The next step is to analyse the levels of exposure and sensitivity of ecosystems and humans to the predicted future changes in climate. This should be followed by an analysis of current and future impacts of these climate change hazards and the resilience capacity of natural ecosystems, humans, assets and institutions to withstand the predicted impacts. The final stage is the specification and/or quantification and analysis of the vulnerability of these natural ecosystems and human populations to future climate change. This analysis should include a close examination of development trends and other socio-economic factors that may change future vulnerabilities and that have either positive or adverse projected future impacts. The following is a suggested template for vulnerability assessment reports:

Executive Summary

1. Introduction (Climate change exposure, sensitivity and vulnerability)

2. Exposure: Climate change and variability in Lesotho

- **2.1 Climate of Lesotho**
- **2.2 Climate trends, variability and hazards**
- **2.3 Climate forecasts and projections**
- **2.4 Summary of potential climate risks**

3. Sensitivity: Coping with climate change in Lesotho

- **3.1 Sensitivity in different sectors (agriculture, food security, human health, energy, biodiversity, water resources, forestry, gender, etc.)**
- **3.2 National Adaptation Plan of Action**

3.3 Potential climate change impacts
4. Vulnerability: Adaptation to climate change variability in Lesotho
4.1 Resilience Capacity (A driver-pressure-state-impacts-response framework to vulnerability and adaptation)
4.2 Disaster risk reduction and climate change adaptation
4.3 Conclusions and Recommendations
Annexes

3.4.2.2 Selection of Best Adaptation Options

This step of formulating and selecting effective adaptation measures involves a review of the currently appropriate strategies to manage risks that arise from climate change related hazards and testing their technical viability and effectiveness under future scenarios (See **Appendix 2** for possible adaptation options per sector). The step also involves determining if there are alternative adaptation measures that could be used to reduce current and predicted impacts and improve resilience. The selection procedure, on the other hand, involves some comparison of technical viabilities of identified adaptation measures. This development step also requires determining if there is consistency between each proposed adaptation measure with national, regional and local development objectives. Also to be considered are any current barriers or opportunities for integrating climate change risks and the proposed adaptation measures into national, sectoral and local policies and plans. The final product of this step is a short list of technically viable adaptation proposals.

3.4.2.3 Considering Cross-cutting Issues

With a short list of candidate adaptation measures, the next step in the development of effective adaptation measures is to identify cross-cutting issues that are associated with each measure. This involves an analysis of gender issues, impacts on other vulnerable groups, secondary environmental impacts, community participatory frameworks and governance issues, including coordination structures and reporting systems. Where possible, the costs and benefits that are associated with each candidate adaptation measure should be quantified to enable a determination of the social viability and the ranking of the option under consideration.

3.4.2.4 Implementation of adaptation measures

In implementing the selected adaptation measures, the roles of each of the parties, including communities, should be clearly defined. A lot of emphasis should be placed on local ownership and sustainability of the measures. The measures must either avoid or minimize all or part of the observed or expected adverse impacts and restore the levels of human well-being to pre-climate change levels. The objective should be to maintain prevailing or current levels of risk, or reduce them cost-effectively either within agreed budgets or within pre-defined levels.

3.4.2.5 Monitoring and evaluation of adaptation measures

The development of an effective climate change adaptation process should be seen as an indicators-based system that seeks to realise measurable, achievable, realistic and time-framed targets whose baseline values will facilitate the monitoring of progress. The monitoring process should begin with a review of the objectives and preferred tools for implementing the selected climate change adaptation measure, and then move on to consideration of the flow of resources to realise the targets and the level of achievement of the targets. The feedback from the

monitoring process should facilitate revisions in actions, targets and methods used to implement the adaptation measures, if necessary.

3.5 Challenges Facing Climate Change Responses in Lesotho

Despite selective progress that has been registered in the planning and implementation of climate change measures in Lesotho, the country still faces a number of challenges amongst which are the following:

3.5.1 The Absence of institutional and Constitutional Support

Currently, the mainstreaming of climate change issues in sector or local government policies and strategic planning in Lesotho remains a choice for development practitioners at those levels of governance. Despite the adoption of the National Decentralization Policy in 2014, one of its provisions being the devolution of the management of environmental resources to local government, there is as yet no statutory requirement that compels each sector/line ministry or local government to commit a percentage of its budget to fund climate change activities. Without such a law, therefore, climate change will largely remain an issue for discussion without concrete actions on the ground, most of the actions being limited to donor funded projects. This challenge could be overcome by placing Climate Change Coordinators to promote and coordinate climate change issues at the sectoral and local levels.

3.5.2 Inadequate Coordination and Collaboration

At the present moment, different institutions are responsible for different aspects of climate change issues without proper institutional coordination at the decision-making and policy implementation levels, resulting in limited effectiveness of development programs and projects. A multi-sectoral National Climate Change Committee (NCCCC) was established in Lesotho in 2013[12] with LMS, the climate change focal point, acting as its Secretariat. There have also been a series of inter-institutional dialogues and discussions on climate change, often organized with support from donors and donor funded projects. However, coordination remains weak as many institutions continue to work in silos. To enhance effective coordination and dialogues amongst stakeholders on issues of climate change, it will be necessary to build capacity in the Climate Change Unit (CCU) of LMS so that it can have a presence in every climate sensitive sector through Climate Change Coordinators (CCCs). In addition to working with line ministries, CCCs will also work with local governments and non-state actors (organizations representing non-governmental organizations (NGOs), research institutions, faith-based organizations and the private sector).

3.5.3 Inadequate Information on Vulnerability and GHG Emissions

Although climate change hazards such as flooding, droughts, hailstorms, thunderstorms, etc. are now perennial issues in Lesotho, there have not been any scientific vulnerability assessments in the affected areas, often in the remote Mountain Districts. The prediction of the future intensity and frequency of these climate change-driven extreme events is also unknown. Similarly, Lesotho does not have accurate and updated data to feed into GHG emissions calculation models and to enable a detailed sectoral disaggregation, with the result that it is not easy to establish

[12] Ministry of Energy and Meteorology (2015), ***Lesotho's Intended Nationally Determined Contribution***, Para 5.9

baselines to assess the impacts of mitigation actions. Scientific risk assessments of current and future impacts of climate change and vulnerability conditions at the local level are critical for the formulation of robust adaptation programmes and for building the necessary resilience. Without this scientific information, climate change adaptation actions necessarily become reactive and not easy to mainstream.

3.5.4 Inadequate Early Warning Systems

It is very important to share meteorological data, including climate change projections, in order to communicate reliable information on weather conditions and threats. This is necessary in order to build readiness and resilience amongst affected districts and local communities, and for the monitoring of specific climate change stressors such as hailstorms, thunderstorms, floods, droughts, etc. LMS carries some limited weather reports that are disseminated through television and radio broadcasts. Detailed weather forecasts are also available on their climate change portal (http://www.lesmet.org.ls/climate change) that was developed by the Japan/UNDP supported Africa Adaptation Programme which has since been phased out. However, only agriculture is covered under Climate Change by Sector, a section that was designed to show sector vulnerabilities and possible, ongoing and completed adaptation activities. Recent events have shown that remote Mountain communities are usually taken by surprise as they are not always able to determine the timing and severity of extreme weather events.

3.5.5 The absence of Legislative and Regulatory Frameworks

There is no legislative or regulatory framework that directly deals with climate change issues in Lesotho. The current framework is made up of innumerable pieces of legislation and regulations several of which are obsolete and around which law enforcement is non-existent. A legislative and regulatory framework will be required for the definition of standards and control of GHG emissions in various sectors. On the other hand, overgrazing, poaching and over-harvesting for fuel wood and traditional medicine continue to undermine the resilience and sustainability of endemic natural resources with the probability of propelling some of them to extinction. Law enforcement to guard against loss of biodiversity remains very weak since the legislative framework lacks institutional specificity.

3.5.6 The Trivialization of Climate Change Issues.

From the interviews with staff of various line ministries and non-state actors, it could be inferred that for many stakeholders, climate change adaptation issues were viewed as someone else's responsibility. This could be a result of inadequate mainstreaming of these issues by sector. It could also be a result of poor coordination and collaboration amongst these line ministries and stakeholders. This underlines the need to mainstream climate change in every climate change sensitive sector and at local levels, and to build effective collaboration, especially with key stakeholders in their operational areas.

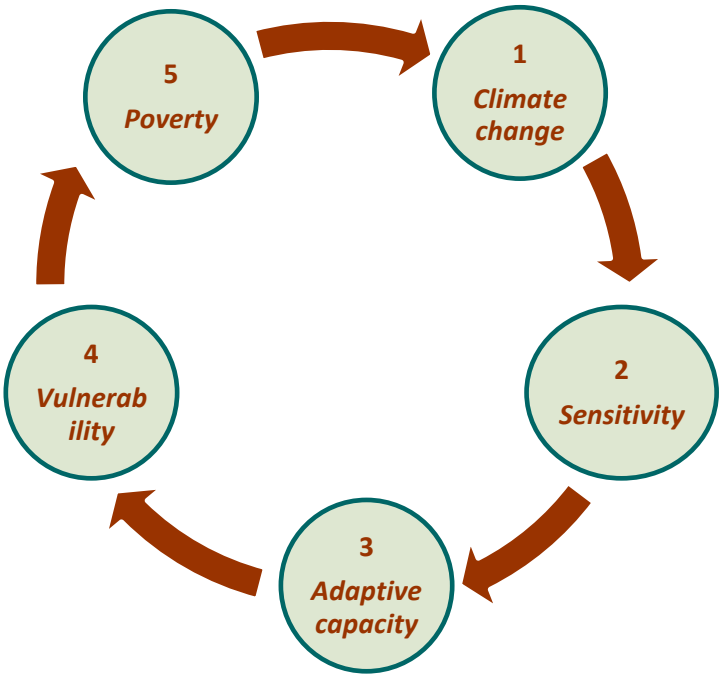
4. Building a Platform for Climate Change Mainstreaming

4.1 Approach to Mainstreaming

Symptoms of a changing climate bear serious implications for a country's environmental and socio-economic development. As a result of dependence on climate sensitive sectors, poor households in Lesotho are highly vulnerable to climate related external shocks such as droughts, storms and floods that can destroy crops, kill livestock, damage homes, threaten health, etc. By impacting directly on agriculture, natural resources, water resources, health and infrastructure, therefore, climate change has a pervasive impact on the livelihoods, resilience and health of the poor. Poverty alleviation strategies, therefore, can build the resilience of the poor to these shocks or adverse effects of extreme weather.

The vulnerability of any country or community to the adverse impacts of climate change depends both on the magnitude of climate change related stress and the sensitivity and capacity of the affected communities to adapt to or cope with that stress. Sensitivity is generally higher for activities that are directly dependent on natural resources such as agriculture. On the other hand, the capacity to adapt or cope depends on a range of factors that include income levels, education, technology, institutions, information, skills and access to resources, which are generally scarce in poor countries or communities (UNDP-UNEP: 2011). Socio-economic conditions, therefore, play a critical role in either moderating or amplifying the impacts of climate change on any community. There is therefore a close link amongst sensitivity to climate change, adaptive capacity of communities, vulnerability and poverty (See **Figure 3** below).

Figure 3 The Linkage amongst Sensitivity, Adaptive Capacity, Vulnerability and Poverty



Climate change impacts cut across economic sectors, geographic and administrative boundaries, and time scales. As a result, climate change policies or strategies should be formulated as part of

broader development policies. Implementing specific adaptation measures (geared towards specific problems, sectors or population groups) may be effective in certain circumstances, but in the long run, a project-based approach to climate change planning and financing may not produce the scale of results that is desired. In this respect, efforts to formulate national climate change policies and strategies will need to be supported by a cross-cutting, integrated policy approach (UNDP-UNEP: 2011). The cross-cutting nature of climate change is amply demonstrated by the relationship between poverty conditions and climate change risks that is shown on **table 7** below.

Table 7 The Relationship between Poverty Conditions and Climate Change Risks

Socio-economic Condition	Linkages with Climate Change
Extreme Poverty and hunger	• Reduction of the value of assets and degradation of livelihoods in the form of health, access to water, homes and infrastructure; • Alteration of the path and rate of economic growth due to changes in natural ecosystems and resources, infrastructure and labour productivity, leading to increased income opportunities for some and increased poverty for others; • Adverse impacts on food security, increased hunger and malnutrition and poor health.
Gender inequality	• Basotho women are disproportionately involved in natural resource–dependent activities such as agriculture, energy, water, etc. which are particularly vulnerable to climate change; • Women's traditional roles as primary users and managers of natural resources, primary caregivers and labourers engaged in unpaid family labour (e.g. in subsistence farming) translate to dependence on livelihoods and resources that are at risk of climate change.
Child mortality	• Increases in heat-related mortality and illnesses due to a higher frequency of heat waves and freezing winter temperatures.
Maternal health	• Increases in the prevalence of some vector-borne diseases and in vulnerability to water-borne, food-borne or infectious diseases (e.g. cholera and dysentery).
Major disease outbreaks	• Increased prevalence of vector- and water-borne diseases and anaemia amongst pregnant women; • Climate change induced reduction in natural resource productivity, threatened food security, declining quantity and quality of drinking water in many locations, exacerbated malnutrition and associated ill-health among children.
Environmental degradation	• Adverse impacts on the quality and productivity of natural resources and ecosystems, some being irreversibly damaged, and decrease in biological diversity and compounding of existing environmental degradation.

In adapting UNDP-UNEP (2011) recommendations, climate change mainstreaming should adopt the following steps:

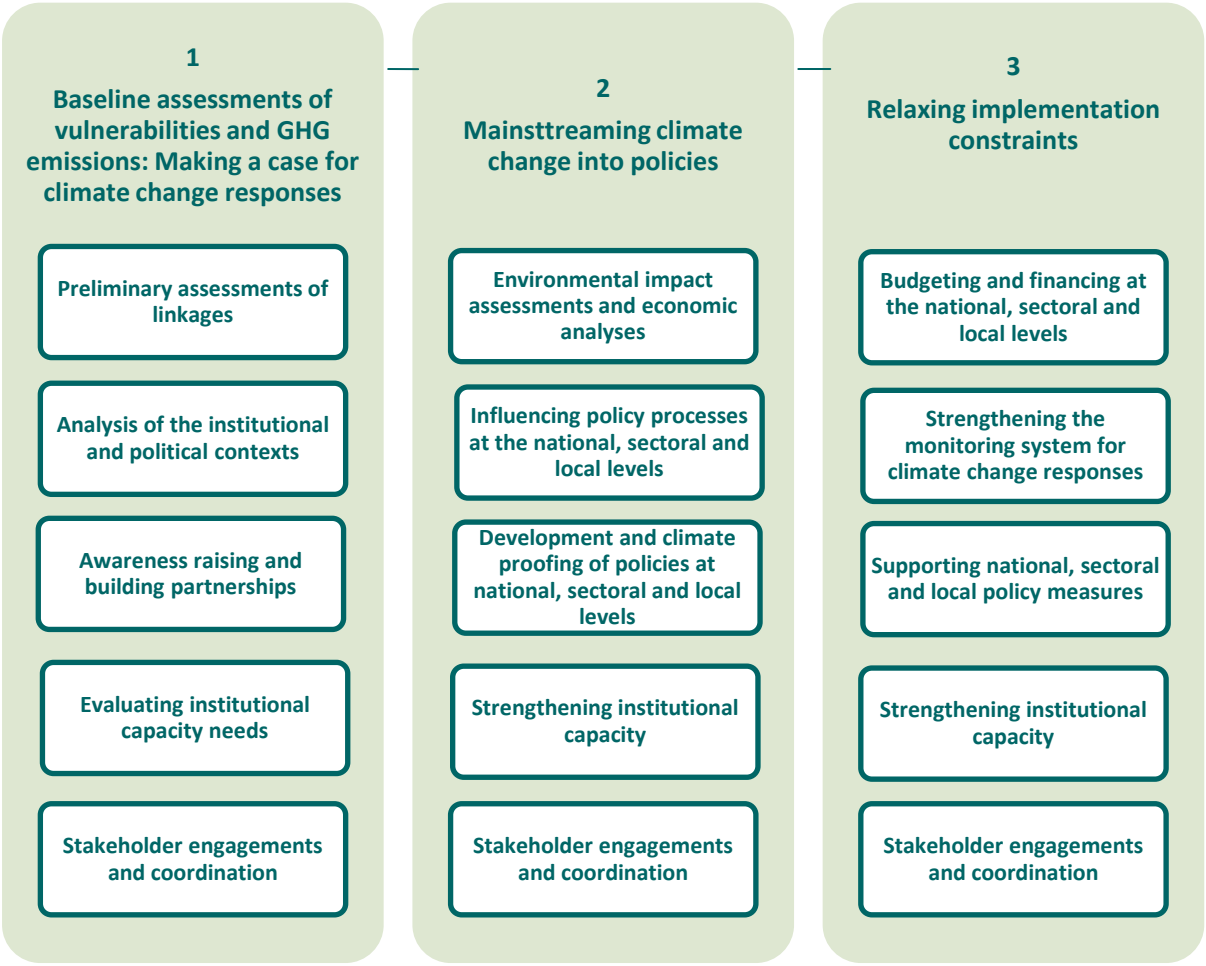
Step 1 - Strengthening the base for either mitigation or adaptation by addressing the mitigation or adaptation deficit and increasing the overall resilience of the country and population to climate change;

Step 2 - Climate-proofing policies - ensuring that climate change is considered in the decision-making processes of relevant government agencies so that policy measures catering for climate change are developed and mainstreamed; and

Step 3 - Development and implementation **of s**pecific mitigation and adaptation policy measures targeting issues that the first two steps have not yet tackled.

The main objective of mainstreaming climate change is to ensure a coherent response across all sectors of the economy, and ultimately, to have full integration of climate change as standard development practice across these sectors and at all levels of administration, from national to sectoral and local levels. The above 3 steps (See **Figure 4** below) should therefore be consolidated into policy-making, budgeting, implementation and monitoring at these administrative levels.

Figure 4 Elements of the Approach to Climate Change Mainstreaming



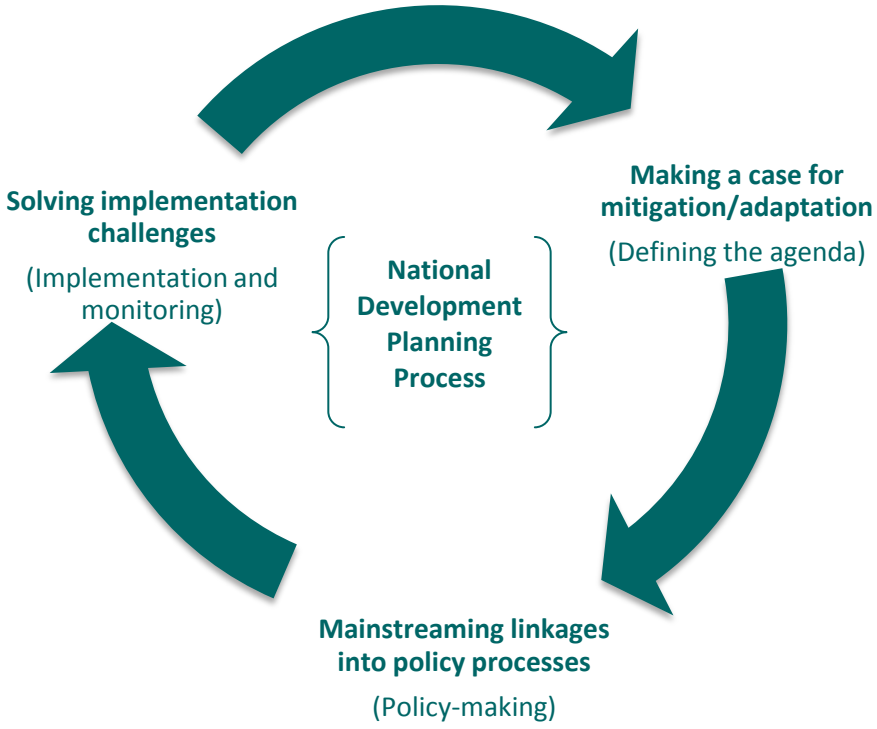
The diagram above summarises stages in the mainstreaming of climate change. The **first stage** involves setting up groundwork for mainstreaming by seeking to understand the linkages between climate change, development and poverty; and defining governmental, political and institutional contexts that are relevant to climate change responses (e.g. climate change policies, plans and programmes; current levels of mainstreaming; roles and mandates; coordination

mechanisms, etc.). The stage also involves raising specific awareness and partnerships, particularly amongst climate change specialists, planners and financiers.

The **second stage** involves mainstreaming climate change into ongoing policy processes. This means gathering country-specific evidence for the purpose of assessing levels of GHG emissions and mitigation capacities, impacts, vulnerabilities and adaptation capacities; instituting socio-economic analyses of the costs and benefits of various mitigation or adaptation options; and documenting the lessons drawn from mitigation and adaptation demonstration projects. The results should lead to climate-proofing of policy documents and measures in light of climate change, and to the introduction of additional priority interventions, if need be.

The **third stage** involves overcoming implementation challenges by ensuring climate change mainstreaming into budgeting, financing, implementation and monitoring. Not only should adaptation measures be integrated into national systems, but special funding sources and modalities should be leveraged and policy and mitigation/adaptation-specific measures should be revisited with a climate lens.

Figure 5 Mainstreaming and the National Development Planning Cycle



The three stages described above conclude with institutional and capacity strengthening for climate change mitigation/adaptation which focuses on adopting the mainstreaming of climate change as a standard development planning practice where climate science is made to interface with policy-making. These activities may not necessarily follow any specific sequence, and they should build on existing climate change responses. The linkages of the three stages described here are shown on **figure 5** above as integral parts of the national development planning process.

4.2 Key Preparatory Activities for Mainstreaming

Key components of a mainstreaming process are shown on **table 8** below. On the whole, the successful integration or mainstreaming of climate change adaptation should be paired with the implementation of vulnerability assessments, environmental impact assessments, socio-economic impact assessments, and capacity building programmes.

Table 8 Checklist for Mainstreaming Climate Change Measures

No.	√	Item
1		***Baseline Conditions and Vulnerabilities***
1.1		• Baseline conditions and work plan for CC mainstreaming agreed on
1.2		• Key players brought on board the CC mainstreaming exercise:
1.2.1		- Main government ministries
1.2.2		- Local government representatives
1.2.3		- Non-governmental institutions
1.2.4		- The private sector
1.2.5		- Community-based organizations
1.3		• Engagement of in-country donor coordination mechanisms
1.4		• Awareness campaigns that:
1.4.1		- Poor people are likely to be the most affected by climate change
1,4.2		- National development goals and key sectors (e.g. agriculture, health, energy, tourism) can be affected by climate change
1.4.3		- National and sector development can in turn affect the vulnerability of the country and the poor
1.4.4		- There should be specification of activities to be implemented in collaboration with relevant sector ministries
2		***Mainstreaming Climate Change into Policy Processes***
2.1		• Collection of scientific data, updating CC scenarios and making predictions
2.1.1		• Collection of evidence on the costs and benefits of climate change
2.1.2		• Impact assessments/Assessments of GHG inventories
2.1.3		• Vulnerability assessments/Assessments of impacts of mitigation strategies
2.1.4		• Socio-economic analysis
2.1.5		• Evidence from demonstration projects
2.2		• Analysis of linkages with development and poverty at the national, sector and local levels
2.3		• Integration of mitigation and adaptation as priorities in completed policy documents (e.g. National Strategic Development Plan, Sectoral Strategic Plan, sectoral policy, etc.)
2.4		• Costing of mitigation and climate-proofed adaptation policy measures
3		***Dealing with Implementation Challenges***
3.1		• CC-related indicators integrated into the national monitoring system
3.2		• Increased budget allocations for non-environment ministries, local authorities and non-governmental organizations
3.3		• Establishment of CC mainstreaming as standard practice in government and administrative processes, procedures and systems
3.3.1		- Budget call circulars
3.3.2		- Public expenditure reviews
3.3.3		- Coordination mechanisms
3.3.4		- Systematic climate-proofing
3.3.5		- Monitoring (For mitigation, the indicators will be the level of GHG emissions)
4		***Long-term planning***
4.1		• Strengthening of institutions and capacities for long-term CC mainstreaming
4.2		• Enhancement of conditions for simultaneous improvement of CC (particularly adaptation) and poverty reduction

4.2.1 Baseline and Vulnerability Assessments

Despite the widespread recognition of the increased frequency of extreme events and the threats posed by climate change to human livelihoods worldwide in general, and in Lesotho in particular, it is clear that other than in the area of food security, very few sectors, if any, have undertaken emissions assessments, vulnerability analyses or disaster risk assessments to guide planning in Lesotho. Most of the key informants who were interviewed underlined the importance of carrying out thorough GHG emissions assessments and vulnerability or disaster risk assessments ahead of developing strategies to mainstream climate change into their plans and framework documents. The results of these assessments should underpin the design of policies, plans and programmes that would build the resilience of communities and reduce the impacts of disasters and destruction of facilities and assets.

4.2.2 Environmental Impact Assessments

The Department of Environment (DOE) pursues the objectives of sustainable development by ensuring that either partial or full environmental impact assessments (EIAs) are conducted for all sectoral development activities that carry potentially negative impacts on the physical and social environment. The EIA process is described in detail in **Appendix 3** of this document, and conducting EIAs is now a precondition for the approval of large-scale projects. Some of the institutions such as the Roads Directorate have conducted sector environmental assessments[13] out of which they developed an environmental management tool that is used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented, and that the positive benefits of the project are enhanced[14]. This approach could be replicated in every high GHG emissions or climate sensitive sector. The approach should include an assessment of climate change emissions/vulnerabilities and the proposed mitigation/adaptation measures, including the application of climate-proof technologies and innovations.

4.2.3 Socio-economic Analyses

The Ministry of Development Planning (MDP) carries the mandate to rank development proposals in accordance with a set of socio-economic criteria; to recommend funding for priority proposals either to the Ministry of Finance (MOF) or to potential donors; to coordinate donor assistance and to monitor the implementation of the development programme. To effectively achieve its objectives, MDP is decentralised to line ministries through planning units whose activities are guided by the project approval cycle, a process that is spearheaded by the Department of Project Cycle Management (DPCM) (See **Appendix 4** for a full description). The latter works closely with line ministries to ensure that any development proposal in the country is closely scrutinized for consistency with the country's development objectives, and those proposals found to be having the greatest contribution to these objectives are given higher priority in terms of funding. The project proposals should include analyses of climate change emissions/vulnerabilities and mitigation/adaptation proposals as some of the criteria that are used in the project ranking process.

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[13] Ministry of Public Works and Transport (2006), ***Sectoral Environmental Assessment for the Lesotho Transport Sector Programme***.

[14] Lochner, P. (2005), ***Guideline for Environmental Management Plans***. CSIR Report No ENV-S-C 2005-053 H. Western Cape Department of Environmental Affairs and Development Planning.

4.2.4 Capacity Building

The understanding of climate change issues by both practitioners and policy makers is a prerequisite for the mainstreaming of these issues in policies, plans and programmes. This understanding can come about through training and awareness campaigns. Training programmes are required to build the capacity of staff of various climate-sensitive line ministries and their stakeholders not only on issues relating to climate change but also around how to effectively integrate climate change into development planning. Similar training programmes could be designed for policy makers. On the other hand, both electronic and print media should be used to promote communities' understanding of climate change and how it could be mainstreamed in national and local level planning processes.

The lack of administrative and governance structures to support climate change responses at the sectoral and local levels makes it difficult for climate issues to be considered in policy discourses. Both line ministries and local governments need to have CCCs who will advocate for and coordinate climate change responses at those levels.

4.3 Challenges to Climate Change Mainstreaming

Several challenges can be anticipated in the process of mainstreaming climate change in Lesotho. These include, but are not limited to, the following (UNDP-UNEP: 2011):

- ***Inadequate awareness and knowledge about climate change*** - As a cross-cutting issue, climate change is intricately related to several development issues and many decision makers are not aware of the linkages with inclusive growth and poverty. As a result, they are not aware of the potential economic costs of climate change as well as the benefits of taking action to enhance mitigation/adaptive capacity.

- ***Marginalization of climate change issues*** - Climate change is still largely perceived as an issue of the Lesotho Meteorological Services, as a focal institution. Issues of climate change are implemented in silos by both state and non-state actors. For effectiveness, strengthened coordination efforts are needed since climate change is an economy-wide issue.

- ***Limited participation by major sectors and local authorities*** - Sustainable climate change responses require active participation by key climate-sensitive sectors such as agriculture, forestry, water, etc. and by local authorities. This is generally not the case in Lesotho.

- ***Failure to link local-level impacts with national-level responses*** - Climate change impacts are generally felt more at the local level, affecting the livelihoods, health and vulnerabilities of local populations, particularly the poorest. The responses put forward at the national level should therefore be buttressed in local conditions.

- ***Implementation challenges*** - The review of the implementation of the National Strategic Development Plan 2012/13-2016/17 during the current assignment revealed that even in cases where climate change issues were integrated into policy statements,

there was a challenge of translating these into concrete actions in terms of budget allocations and monitoring performances and impacts.

- ***Institutional capacity weaknesses*** - For sustainability, the mainstreaming of climate change adaptation needs to be institutionalised as a standardized practice from the national through local levels. This is currently not happening.

- ***Lack of political will*** - Because climate change takes place in a long time frame and requires managing risks and taking decisions in an environment of considerable uncertainty, it is not a priority for decision-making by political leaders or government officials whose mandates and terms are shorter, and who are mainly concerned with political cycles.

- ***Adoption rigidities*** - Adoption has been a challenge in Lesotho due to a number of reasons that include low incomes to afford new technologies, low educational attainments for the operation of new devices, cultural rigidities (e.g. in the case of biogas digesters), inadequate extension services and fear to venture into the unknown in the case of adapted crop varieties.

5. Mainstreaming in Policy and Other Processes

5.1 Establishing a Case for Mainstreaming

The first step in mainstreaming climate change is to make a strong case for the importance of mainstreaming by: (a) identifying the linkages between climate change and development in Lesotho; (b) establishing related governmental, institutional and political contexts; (c) identifying the starting points in the development planning process; (d) raising the level of awareness of climate change and its relevance for national development priorities and the development of partnerships; and (e) evaluating the institutional and capacity requirements.

5.1.1 Preliminary Assessments

It is critical to understand climate-development-poverty linkages in order to establish GHG emission levels of different sectors, the needs of vulnerable groups as well as existing deficits in meeting those needs. This will enable practitioners to define a set of mitigation options and pro-poor adaptation outcomes that should be targeted for the mainstreaming of climate change mitigation and/or adaptation. There has to be a clear understanding of how to address the needs of the poor in the face of a changing climate.

At this point, the mainstreaming process should particularly focus on the institutional and policy dimensions of climate change (e.g. institutions involved, coordination mechanisms needed) from the national to the local levels, and how mainstreaming can play a critical role in creating the enabling environment that is needed to achieve the intended control of GHG emissions to predefined levels (standards) or desired pro-poor outcomes. It is important to identify national development priorities that are relevant to climate change and this should pave the path for the initiation of a dialogue on climate change impacts and mitigation/adaptation and open up fruitful collaborations.

Some of the questions to be answered at this stage include the following:

- ***What is the climate situation in Lesotho (baseline)? What is Lesotho's contribution to global GHG emissions? What is the current situation with respect to climate change mitigation and adaptation (e.g. is there a mitigation/adaptation deficit)?***
- ***What population groups, sectors and regions are most vulnerable to the impacts of climate change or current climate variability? Why are they at greatest risk (e.g. bad location, poor development, poverty, degraded natural resources)?***
- ***Will future climate change exacerbate existing vulnerabilities? What are the links between the impacts of climate change and vulnerability?***
- ***What are the links between current and future climate and national development priorities/key sectors?***

5.1.2 Understanding Governmental, Institutional and Political Contexts

As a preparatory measure, governmental, political and institutional settings should be carefully assessed, covering issues such as: planning processes, institutions and actors, mandates and decision-making processes, existing policies and initiatives, existing legislative and regulatory frameworks and governance and political situation. These reviews can help increase the

understanding and highlight the need to improve existing institutional settings to better integrate climate change. The review should cover official documents such as policies and legislation, and sector and local level studies that include institutional analyses and mapping, budgeting and staffing information. They could also rely on interviews with officials and staff of different government and other institutions at the national, sector and local levels. The review should assess the capacity of relevant institutions at different administrative levels.

Some of the questions to be answered at this stage include the following:

- ***Is climate science utilised in understanding the impacts of climate change, assessing GHG emission levels and in assessing vulnerabilities?***
- ***Is climate change mitigation integrated into environmental and other policies?***
- ***Is climate change adaptation integrated into disaster risk reduction and/or environmental policies?***
- ***How effective is the National Climate Change Committee as a collaborative institution at the national and sectoral levels?***
- ***How do the Disaster Management Authority, the Lesotho Meteorological Services and Department of Environment collaborate on climate change issues?***
- ***In light of other preliminary assessments (e.g. for poverty-environment mainstreaming), what are the institutional gaps and opportunities and possible entry points for climate change mainstreaming?***
- ***What are the capacity building and institutional strengthening requirements for successful climate change mainstreaming and who are the potential beneficiaries?***

5.1.3 Raising Awareness and Building Partnerships

Lack of awareness and knowledge among policy makers and development practitioners about the risks posed by climate change has been identified as one of the challenges facing mainstreaming. Climate change and its potential impacts should therefore be featured in discussions on poverty reduction and development in order to emphasize linkages. This should lead to a consensus on the sectors of the economy whose GHG emissions need attention or that are most vulnerable to current and future climate change, integrating mitigation and adaptation into policies, and strengthening institutions and capacities. The Dialogue on mainstreaming should include representatives from:

- Finance (Budget) and Planning ministries;
- Coordinating institutions (Meteorology, Environment and Disaster Management Authority);
- Climate sensitive sectors;
- Local Government;
- Non-governmental actors (e.g. civil society, academia, business and industry);
- Local communities;
- Development practitioners; and
- The print and electronic media.

Ideal candidates to engage as **Dialogue Facilitators** are practitioners who can relate global climate change issues to the national context, or who can build bridges between climate science (including socio-economics) and policy-making.

5.1.4 Evaluating Institutional and Capacity Needs

This important step in designing an effective mainstreaming effort calls for addressing both the need to build individual capacities (e.g. through training) and the need for institutional strengthening (e.g. through coordination and collaborative mechanisms). The evaluation should involve assessments of the level of understanding amongst national actors of the links amongst climate change, development and poverty reduction.

The evaluation should establish baseline conditions and include assessing technical capacities as well as the capacity of the institutions to develop, disseminate and communicate knowledge on climate impacts, mitigation and adaptation. It should also include the analysis of institutional mandates, institutional mechanisms and technical capacities. Starting with existing documentation such as the UNDP supported National Capacity Self-Assessment, the assessment should cover the national, sectoral and local levels and should include state as well as non-state actors. Based on the findings, the needs assessment should highlight options for the strengthening of institutions and capacities so that they can deal with issues of climate change effectively.

Questions to answer:

- ***What government institutions are relevant to mainstreaming climate change mitigation and adaptation? What are their mandates?***
- ***Are there overlapping mandates? Are there any specific mandates that are missing (e.g. in areas such as emissions assessments, flood risk management)?***
- ***How do the government institutions coordinate and make decisions on the issue of mitigation/adaptation? Are there any coordination gaps? Do the mechanisms in place need to be strengthened? How?***
- ***Have there been (recent) institutional changes? Are institutional changes necessary in the context of mainstreaming climate change mitigation/adaptation? How can such changes be fostered?***
- ***What are the planning and programming mechanisms in place? What are the operating procedures of government institutions? Do the mechanisms and procedures need to be strengthened? How?***
- ***What are the needs in terms of technical capacities (e.g. for monitoring or for sector-relevant analyses)?***
- ***What are the climate change budget allocations of these institutions?***

5.2 Mainstreaming into Policy Processes

The second component of mainstreaming involves integrating climate change into policy documents (Such as the National Strategic Development Plan, sector strategic plans, etc.) and associated policy measures. The mainstreaming is guided by (a) information gathered from preliminary assessments, particularly of GHG emissions, climate change impacts, vulnerabilities and risks; economic analyses of various climate change responses; experiences from demonstration projects; (b) targeted policy documents to be influenced or climate-proofed, and by (c) policy measures developed to be mainstreamed.

5.2.1 GHG Emissions, Impacts, Vulnerabilities and Other Assessments

It has already been demonstrated that current climate shocks and stresses over Lesotho are already adversely impacting on the well-being of the population, particularly the poor. The predicted increasing frequency and intensity of extreme weather events, as well as gradual changes in prevailing average temperatures, therefore, will exacerbate these impacts. Climate change demands an urgent need to reduce global warming, to understand and address the vulnerability of the poor to current and future climate variability and to re-evaluate the relevance of policies and programmes in reducing this vulnerability and global warming in general.

Assessments will help practitioners to identify sectors that are GHG emissions culprits, population groups, regions and sectors that are currently the most vulnerable as a result of the present climate risks, the state of development and levels of poverty and/or natural resource endowments. In this respect, sectors that were identified in the Lesotho's Second National Communication as the highest emitters of GHG emissions should be targeted. Similarly, areas that are already suffering drought conditions, like the Southern Lowlands, areas that are exposed to flooding or are dominated by resource-poor smallholder farmers, and women and children as population groups, should be considered vulnerable. Assessments are also important for the building of future climate change scenarios and prediction of future impacts and vulnerabilities, and to establish future mitigation and adaptation needs. On the whole, therefore, the assessment should cover the following:

- Current GHG emissions trends and projected future trends;
- Current climatic trends and projected future climate change;
- Vulnerabilities of local natural ecosystems and communities to current or projected climate-related impacts;
- Climate-related risks in specific sectors and geographical areas; and
- Possible mitigation/adaptation measures.

Mainstreaming should rely on existing assessments as much as possible although commissioning complementary studies may be necessary. A climate risk assessment should analyse risks resulting from both current climate conditions and projected, long-term climate changes. In Lesotho, like in many developing countries, a mitigation/adaptation deficit to current climate conditions already exists, and many communities are highly vulnerable. On the other hand, the success of mitigation/adaptation measures also requires addressing non-climatic issues and drivers of GHG emissions and vulnerabilities at the local level since the control of emissions usually interferes with private interests and climate risks are usually part of a wider set of vulnerabilities that affect a community or area.

In conducting assessments, the aim should be to gather sufficient information to enable thoughtful consideration of possible policy reforms or measures although targeted studies may still be required to cover information deficits. The assessments may be either quantitative or qualitative, depending on the nature of available information. It is advisable to use vulnerability maps to show the areas where the population is most likely to be affected by climate variability or disaster risk in order to enhance communication. Where climate change scenarios and projections are used in the analysis, uncertainty should be clearly and properly communicated by providing ranges of estimates or specifying confidence levels.

A number of tools have been developed to improve decision-making in climate change with the aim to reduce vulnerability and create opportunities. Some of these tools are listed in **Appendix 5**.

5.2.2 Economic Analyses

This area of mainstreaming climate change involves the collection of evidence of the potential economic costs of climate change impacts[15] and the benefits of investing in mitigation and adaptation activities[16]. The demonstration that climate change has economic implications that may make the achievement of development objectives more difficult is bound to make decision-makers more likely to factor climate change mitigation and adaptation into decision-making processes, ensure the allocation of sufficient financial resources for policy measures in support of the relevant climate change responses, necessitate the revision of existing or planned measures to factor in climate change, and lead to the implementation of new measures specifically targeted at climate change mitigation and adaptation. The following points need to be noted:

- A simple data analysis may, in some cases, suffice to convey a sense of how the situation might worsen in future if the climate change measures are not implemented, e.g. a simple comparison of rainfall figures with trends in crop production;
- If comprehensive analyses have already been carried out, particularly in climate-sensitive sectors, they should be used in the mainstreaming process, otherwise new assessments should be commissioned;
- Economic evaluation with uncertainty should take the form of considering a set of future scenarios assumed to have various degrees of likelihood, with implied distribution of results in terms of net present value;
- Quantitative evidence and economic estimates of the impacts of climate variability and climate change on key poverty and economic indicators can be very effective if summarised in terms of discounted cash flow measures (See **Appendix 4**); and
- The economic benefits of mitigation measures should be evaluated using the international price of CO_2 equivalent units. However, these also carry adaptation benefits that should be evaluated and included in the analysis.

5.2.3 Climate Change Adaptation Demonstration Projects

Evidence from local projects that are designed to demonstrate the relevance and effectiveness of mitigation or adaptation measures could be a powerful tool to mobilize interest and commitment to climate change issues at the local, sectoral and national levels. Examples of these projects are: the *Reducing vulnerability from climate change (RVCC) Project,* a five-year (2015-2020) project that is implemented by Ministry of Forestry, Range and Soil Conservation (MFRSC) and UNDP in the Mohale's Hoek District; the FAO supported *Strengthening Capacity for Climate Change Adaptation through Support to Integrated Watershed Management Project* (2015-2019) in the Mafeteng District; and the GEF funded *Lesotho Renewable Energy-Based Rural Electrification Project* (LREBRE) which aims at reducing Lesotho's energy related CO_2 emissions.

[15] Note that the valuation of physical or ecological changes (biodiversity loss, loss of critical environmental services, etc.) and that of GHG emissions in monetary terms remain a challenge.
[16] The difference between the projected cost of climate change–induced damages without adaptation and the projected cost of such damages with adaptation.

The important issues in planning for successful demonstration projects should include the following:

- Establishing local communities' understanding of climate variability and climate change impacts;
- Identifying local communities' adaptive capacity - needs, vulnerabilities and coping strategies;
- Establishing limiting factors that could constrain the adoption of adaptation measures;
- Assessing local level organizational preparedness;
- Providing local communities with information that they can use for decision-making and action;
- Identifying several mitigation and adaptation options (including using clean technologies and avoiding indiscriminate veldt burning) with local communities;
- Explaining to communities the possible economic benefits of shifting towards more sustainable livelihoods, e.g. food-secure and climate-resilient livelihoods;
- Emphasizing solutions that enable communities to attain multiple objectives, including non-climatic concerns;
- To overcome risk aversion in trying out new approaches, provision of incentives for local communities to take on mitigation/adaptation measures;
- Provision for eventual easy scale-up in order to build on local successes that are achieved by the project, e.g. dealing with policy barriers, financing needs, institutional and capacity needs, and support services required;
- Working with local institutions, communities and the private sector to demonstrate good practice such as planting trees and adopting organic and conservation agriculture; and
- Collaboration with both higher level government and non-governmental actors in order to convince policy makers and planners of the relevance of climate change and ensure that the lessons of demonstration projects are applied more broadly.

5.3 Influencing Policy Processes

Influencing policy processes refers to integrating climate change-relevant objectives within long-term development visions, strategic development plans or their equivalent, and sector and local strategic plans and other policy documents (UNDP-UNEP:2011). This requires alignment with governance mechanisms shaping the targeted policy processes and using existing development planning processes rather than creating new ones.

Ideally, mainstreaming of climate change should be coordinated by central coordination ministries, such as the Ministry of Finance (MOF) or the Ministry of Development Planning (MDP). If a line ministry is chosen, then strong communication lines should be open between that line ministry and these central coordination institutions, e.g. through a multi-stakeholder committee. The final product of influencing policy processes should be setting up strategic and sectoral goals and targets, supported by implementation strategies that are relevant to the adopted mitigation or adaptation strategies.

5.3.1 Applying the Climate Lens

According to the OECD (2009), a climate lens is an analytical tool to examine a strategy, policy, plan or policy measure (e.g. law and regulation) during its formulation or review stage. It involves examining the following:

- The extent to which a strategy, policy, plan or policy measure under consideration could be vulnerable to risks arising from climate variability or change;
- The extent to which climate risks have been taken into consideration in the course of formulating the strategy, policy, plan or policy measure;
- The extent to which the strategy, policy, plan or policy measure could increase vulnerability, leading to mal-adaptation (e.g. for certain population groups, municipalities or sectors); and
- What amendments might be warranted in order to address identified climate risks.

As a result of applying a climate lens, a strategy or policy becomes more effective at achieving its original objectives in the face of a changing climate. The formulation or review of a planned or existing policy can point out either to elements that negatively affect the objective of pursuing climate change mitigation and/or adaptation, or to opportunities that would more directly support climate change mitigation and/or adaptation. The recalibration of a policy or strategy could follow the following steps:

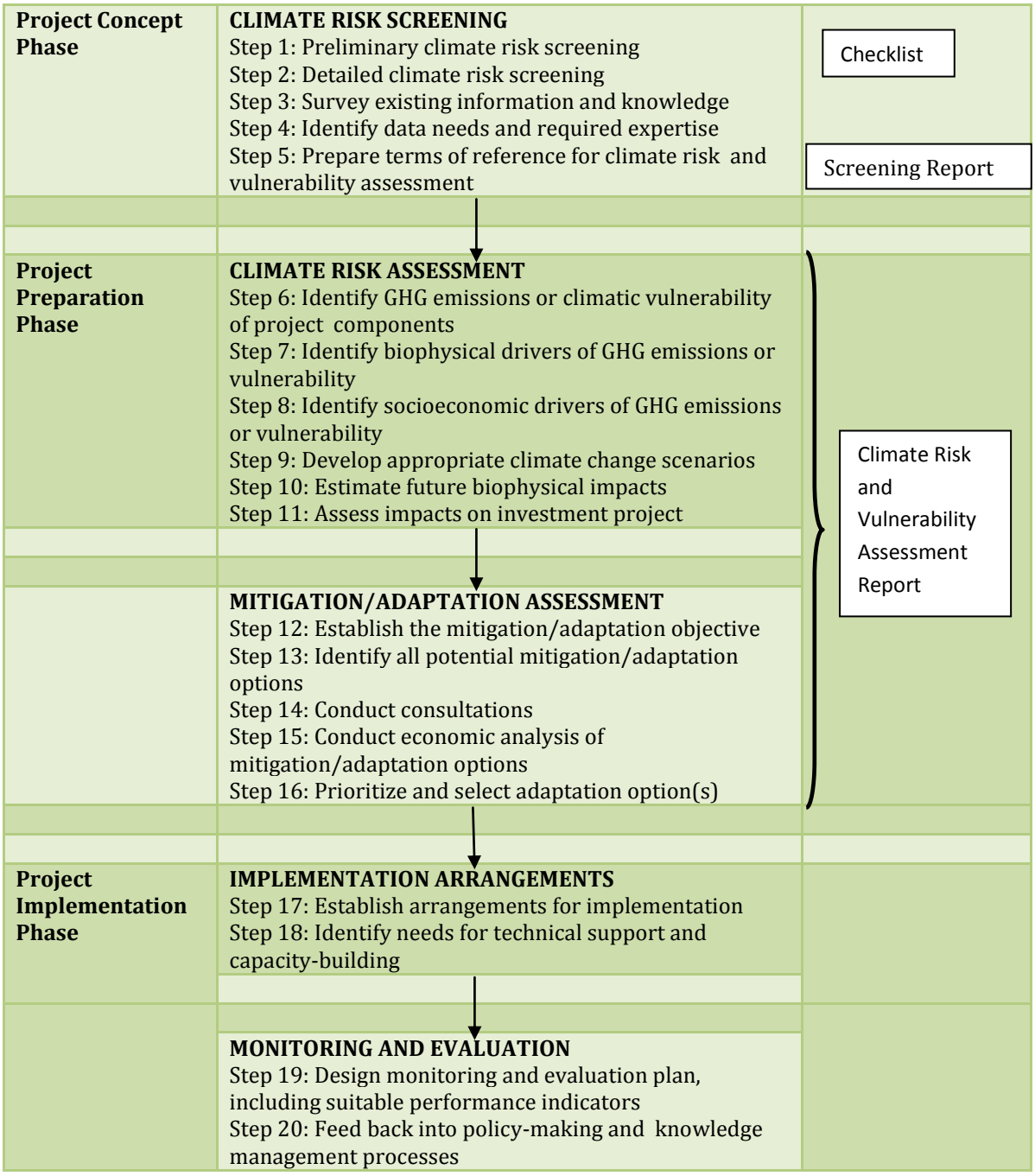
- Defining the policy or strategy goals and/or time scales;
- Provision of regular revisions in order to adjust the policy or strategy in accordance with new information on GHG emissions, climate impacts, vulnerability and mitigation and adaptation needs;
- Engaging multi-stakeholders in the policy or strategy formulation process in order to enlist a broad consensus on mitigation and/or adaptation measures;
- Providing formal support for mainstreaming climate change in development planning; and
- Avoiding specific policy measures that would exacerbate GHG emissions or lead to mal-adaptation.

5.3.2 Developing and Climate-Proofing Policy Measures

Climate proofing for development is a tool that is designed to support the integration of climate change impacts, as well as awareness of the challenges and opportunities, in development planning at the national, sectoral and local levels, with a view to make development measures more efficient and resilient (Vocatpedia.net). This tool can be applied at the ownset of the development planning process or during the revision stage. Climate proofing is based on 3 principles:

- The planning process is the basis of change, involving a time frame within which there is a sensitive facilitation and stepwise approach;
- Climate proofing must be flexible to be adapted to each specific context and institutional framework; and
- Climate proofing is enriched by a mix of perspectives - technical options, methodological expertise, and process management experience.

Figure 6 Detailed Steps in the Climate Proofing Process



Source: Asian Development Bank: 2016

Detailed steps in climate proofing development activities are shown on **Figure 6** above. The first step is to establish current and future climatic trends and the baseline values of possible impacts. The next step is to decide which development plans may be affected by these trends over time, across vulnerable groups and municipalities. After this follows an analysis of biophysical and socio-economic impacts of climatic trends on each exposure and develop probable chains of impacts. The probability of occurrence and the impacts of these trends as well as the ability of institutions and affected people to adapt to the changes is then assessed. Options for action are then developed for the most significant effects. These options are further prioritized by their urgency, side effects, flexibility, political and social acceptability and

financial viability. Finally, the chosen actions are integrated into the planning and other policy documents and into monitoring and evaluation cycles. It should be clear which planning and other policy documents are to be modified and what skills and finances are needed for the implementation of the actions.

Climate proofing at the local level carries a number of advantages. Both climate variability and adaptation are experienced more at the local level. On the other hand, although GHG emissions are mainly concentrated in urban areas, enteric fermentation and agricultural emissions are more likely to be higher in rural areas where livestock and VIP latrines are dominant features, and where chemical fertilizers are more likely to be used. Some options for action, particularly adaptation actions and destocking the range, therefore, are best identified at this level, leading to awareness raising and fostering ownership of the process. In general, the following are preconditions for successful climate proofing at all levels:

- Development of the principal terms used in climate discussions;
- A careful identification of stakeholders;
- Presentation of climate data in an appropriate way;
- Adequate allocation of time and finances; and
- Integration of climate proofing into monitoring and evaluation cycles.

(**NOTE:** *In presentations to policy-makers, practitioners should show how current climatic variability is already influencing fundamental poverty indicators, and then suggest how future climate change will exacerbate these impacts. There should also be a demonstration of how climate change will make existing development challenges more costly to address over time*.)

5.3.3 Key Factual Issues on Climate Change Mitigation and Adaptation

(UNDP-UNEP: 2011)

- ***Climate change poses a risk to development and achievement of development objectives. It affects livelihoods, health and economic development;***
- ***Development affects a country's vulnerability to the adverse effects of climatic instability as well as its capacity to mitigate, adjust and adapt;***
- ***A country's mitigation and adaptation response should be formulated as part of broader policies for development, including areas not directly related to climate change;***
- ***Mainstreaming climate change can be defined as the process of integrating mitigation and adaptation considerations into policy-making, budgeting and implementation processes at the national, sector and sub-national levels;***
- ***Lesotho, like many poor countries, suffers from a mitigation and adaptation deficit which has the potential to rise rapidly unless a robust programme is formulated and implemented;***
- ***Climate change is likely to have a negative impact on the poor by affecting livelihoods, increasing vulnerabilities, threatening health, and holding back economic development through the diversion of development finances.***
- ***The vulnerability of a country or community to the impacts of climate change depends not only on the magnitude of climatic stress, but also on the sensitivity and capacity of affected communities to adapt to or cope with such stress.***

5.4 Mainstreaming at the National Level

5.4.1 Why Mainstream Climate Change in National Policies and Plans?

- ***To build synergies between national, sectoral and local level institutions in order to mainstream climate change risks into policies, strategic plans and programmes;***
- ***To provide a framework for the coordination of the development, implementation and monitoring of plans and programmes to minimise climate risks and deal with adverse threats and impacts of climate change at all levels;***
- ***To facilitate the formulation of the legislative and regulatory framework to control GHG emissions and design, implement and monitor mitigation strategies;***
- ***To facilitate the development and implementation of coherent policies on climate change and development in an integrated manner and sustainable development context;***
- ***To create a framework within which to Implement climate-smart and integrated ecosystem rehabilitation and management that aims at building community resilience to adverse impacts of climate change;***
- ***To develop a national communication strategy for climate change awareness campaigns and associated resilience building actions for national institutions;***
- ***To provide a framework for climate change resource allocations, particularly funding, and capacity-building interventions;***
- ***To establish a monitoring and evaluation system to assess the effectiveness of various approaches to climate change mitigation and adaptation in order to strengthen mitigation strategies and adaptive management nationwide; and***
- ***To convey adequate information on predicted climate impacts and mitigation and adaptation needs to different sub-national governance levels.***

It is at the national level that climate data is processed, trends established, future predictions made under various scenarios, and assessments of GHG emissions are made. It is also at the national level that the future impacts of these climate change scenarios are determined, early warnings are disseminated to various sectors to build the required preparedness, regulations are made limiting the levels of GHG emissions, and at which responses are coordinated. National policies and strategic plans should therefore mainstream climate change to give guidance on various aspects of climate change - from containing GHG emissions, predicted future scenarios, analysing possible vulnerabilities and determining the required levels of preparedness and capacity-building to be considered - to lower tiers of the administration.

5.4.2 Targeted Institutions

The mainstreaming of climate change at the national level requires the involvement of key players at this level. These include the Cabinet, the Ministries of Development Planning (MDP) and Finance, coordination bodies such as the Projects Review Committee (PRC) of the Ministry of MDP, the Department of Project Cycle Management (DPCM) of MDP, the Disaster Management Authority (DMA), the National Climate Change Committee (NCCCC) and the relevant Portfolio Committee of the Parliament of the Kingdom of Lesotho. Other important

players include development practitioners (e.g. donors), representatives of civil society, academia, business and industry, the general public and the media.

5.4.3 Policy Instruments and Frameworks to Target

Overall national priorities and guiding policy frameworks are contained in the national documents such as the following:

- National Strategic Development Plan (NSDP);
- National Strategic Development Plan: Implementation Plans for All Ministries**,**
- The Monitoring and Evaluation Framework; and
- The Lesotho National Strategic Resilience Framework.

These documents provide frameworks within which lower tiers of the Administration (Sector and sub-national levels) develop and implement their relevant policies and programmes. The mainstreaming of climate change mitigation and adaptation in these documents should therefore encourage the lower tiers to recognise the significance of climate change and its impacts, and the need to participate in the mitigation of climate change and adapt to its adverse impacts. In this way, climate change issues will filter through to all levels of decision-making, and create capacity to systematically consider climate risks, the need to mitigate and to adapt, and to allocate the necessary resources at all of these levels.

So far in Lesotho multi-year national strategic development plans have been based both on top-down inputs from national policies and bottom-up inputs from sector-level development plans. Unfortunately. there are currently no strategic development plans for district and community councils. However, if the national policies and plans have mainstreamed climate change and have been widely canvassed to lower levels, then the bottom-up inputs into multi-year plans could be climate-proofed. If not, then the sustainability of development plans of local level institutions should be screened against risks that come with a changing climate.

5.5 Mainstreaming at the Sectoral Level

5.5.1 Why Mainstream at the Sectoral Level?

The mainstreaming of climate change adaptation in sector level policies and plans enables the application of expertise from sector specialists who enrich the analyses and are familiar with mitigation and alternative adaptation strategies. It also enables specialized adaptive research and an active participation in mitigation and adaptation programmes by sector stakeholders who establish the base for sustainability. The mainstreaming also makes it easy for the local structures to obtain specialised sectoral advice on climate change. It also facilitates smooth planning, implementation and monitoring of mitigation and adaptation programmes and projects, and provides a framework for expedient feedback where corrective actions are required.

5.5.2 Which Sectors?

The shift to the sectoral level in the mainstreaming of climate change aims at the realization of better informed decision-making. It should be emphasized that climate change impacts on vulnerable sectors differently, depending on what resources their activities are reliant on, the type of activities each sector is involved in and the areas of coverage of such activities. In other words, an economy's sectors carry different vulnerability profiles and therefore the sensitivity

of the systems that they apply in their operations are bound to have different levels of resilience to climate-induced changes. Similarly, these sectors carry different GHG emissions profiles depending on their production inputs, the type of energy they use and production processes that they use in their operations

The levels of GHG emissions and climate change vulnerability will differ from sector to sector, respectively depending on production processes used and the adaptive capacity of each sector (Availability of financial resources for protection or cover, accessibility to infrastructure or public services, availability of skilled human resources, etc.) and strategies that may provide different decisions. In Lesotho, about 21 sectors and development themes were found to be sensitive to climate change, and of these, two-thirds endured direct impacts and the rest indirect impacts (**table 9**). For example, while a drought directly resulted in poor agricultural output, a direct impact on the agricultural sector, it could cause a drying out of the spout at the Maletsunyane Falls, leading to a drop in tourism figures, an indirect impact.

Table 9 Lesotho Climate Sensitive Sectors and Themes by Type of Impacts

Climate Sensitive Sector/Theme	Impact	Climate Sensitive Sector/Theme	Impact Type
Agriculture	Direct	Mining	Indirect
Forestry	Direct	Trade/Commerce	Indirect
Health	Indirect	Manufacturing	Indirect
Energy	Direct	Water Resources	Direct
Tourism	Indirect	Sanitation	Indirect
Infrastructure	Direct	Shelter	Direct
Range	Direct	Gender Equality	Direct
Biodiversity	Direct	Vulnerable Groups	Direct
Culture	Indirect	Food Security and Nutrition	Direct
Poverty Alleviation	Direct	Transport (Road and aviation)	Direct
Transport (Road and aviation)	Direct	-	-

Source: Consultant's Assessment, March 2018

5.5.3 Target Policies/Plans and Audiences

Sector strategic plans, blueprints and frameworks are the most appropriate documents in which to highlight the impacts of climate change, set sector-specific priorities, translate these priorities into concrete measures, get a fair share of the budget for climate change interventions and promote investments to reduce climate-related impacts and vulnerabilities as part of sectoral interventions. Sector strategic plans also need to include clear and measurable indicators to enable the effective assessment of mitigation and adaptation progress over time.

The main players to target include line ministries and their Planning Units (PUs), sector-specific committees, relevant parliamentary sector portfolio committees, development partners, national research institutions, regional bodies and research institutions and sector civil organizations.

5.6 Mainstreaming at the Local Level

5.6.1 Why mainstream at the Local Level?

The livelihoods of the majority of the population of Lesotho are directly dependent on climate sensitive sectors of the economy. About 77% of the households live in rural areas[17] where agriculture provides employment to 85% of the employed labour force[18]. Recent studies estimate that about 66% of rural households live on degraded lands[19], while 60% depend on biomass for heating and cooking[20]. The rural population, in particular, is very vulnerable to the impacts of climate because of heavy dependence on rain fed agriculture, on extensive livestock production, on biomass energy sources, on rain fed ground water sources and on wild vegetables and herbal medicines. In addition, rural women play a critical role in agricultural production, household nutrition, family health, children's education, rural infrastructure and resource management. They therefore experience more direct and greater impacts from climate change than men.

Lesotho's decentralization policy has listed 27 functions that are supposed to be competences for local authorities[21]. These include, amongst others, climate change sensitive activities such as control over natural resources, environmental protection, public health, grazing control, water supply, parks and gardens, agricultural development and forest development and conservation. In this policy document, local governments (district, city and municipal councils (p.15)), will be given full autonomy to exercise these functions over their defined territories, and all development planning will be integrated, participatory, evidence-based, and focused on addressing the priority needs of citizens, taking into consideration the national strategic priorities and local specific needs and priorities (p.17). Integrating climate change mitigation and adaptation issues at these levels, therefore, paves the path for direct and sustainable impacts.

5.6.2 Target Policies and Plans

The Decentralization policy of 2014 calls for the need to improve coordination between local and national planning in order to efficiently utilise the scarce resources and deliver services for all citizens (Para 3.3). To attain faster poverty reduction and equitable local development, the policy calls for the incorporation of all the stakeholders' needs, priorities and views in the formulation and implementation of local development plans. To this extent, therefore, each district or local community/municipality is expected to embark on area-based planning that should reflect baseline conditions, and develop its own local vision within the wider national context.

Currently there is very weak capacity for local level planning in Lesotho. However, local authorities engage in the development of simple prioritised action plans that are incorporated into national plans. This is where issues of climate change should be mainstreamed. In the same

[17] Bureau of Statistics (April 20112) ***2006 Lesotho Population and Housing Census***, Vol. II, Census Tables Report, table 1.3a
[18] Ministry of Agriculture and Food Security (October, 2006) ***Sector-wide Action Plan for Food Security***, p.11
[19] Ministry of Development Planning (Undated), ***Kingdom of Lesotho: Country Diagnostic Report*** (Draft), p.49
[20] Lesotho Meteorological Services (September 2017), ***Lesotho's Nationally Determined Contribution to the UNFCCC***, Ministry of Energy and Meteorology, p.7.
[21] Ministry of Local Government, Chieftainship and Parliamentary Affairs (2014), ***National Decentralization Policy***, Kingdom of Lesotho, First Schedule.

vein, amendments to the framework legislation (Local Government Act 1997) and framework policy (the National Decentralization Policy 2014) should be revisited to similarly mainstream climate change in a bottom up approach. In future, as the capacity of local authorities improves, climate change will be mainstreamed in district and other local plans.

5.6.3 Target Audiences

The dissemination of climate change information to the rural structures and communities should be one of the mandates of climate change focal institutions and climate sensitive sectors. This information should assist the planning and implementation of development interventions amongst local communities. The target audiences should be district councils, district secretaries and their technical departments, district resource planners, agricultural resource centres, community councillors, community council secretaries, traditional authorities and local communities.

5.7 Strategy for Improved Coordination

5.7.1 Introduction

The successful mainstreaming of climate change requires that there should be a long-term strategy to strengthen capacities across focal, line, sectoral and local level institutions. By so doing, the mainstreaming of climate change becomes a standard practice in administrative procedures, systems and tools at all levels, from national, sectoral to local levels. Currently coordination amongst these administrative levels remains too weak to effectively address issues related to climate change in the country. In fact, the cross-cutting nature of climate change calls for tackling the issue from different angles, in a synergistic and coordinated way, at various institutional levels from national to local (UNDP-UNEP: 2011).

Far-reaching and long-term climate change measures that are promoted through the mainstreaming of climate change in the policies, development plans and other frameworks can only be undertaken if there is a conducive institutional framework to plan and implement these measures. Institutions may also have to change their operating and decision-making procedures. An enabling institutional environment is thus crucial in promoting efficient climate change measures and ensuring sustenance over the long run. Currently, there is no coordinated approach to the planning of climate change mitigation and adaptation programmes and for mobilizing both domestic and international resources for the same. Often times institutions work in silos without a clear monitoring and reporting responsibility.

5.7.2 Current Coordination Mechanisms

The **Lesotho Meteorological Services** (LMS), a department of the Ministry of Energy and Meteorology, is mandated to collect and analyse climate data, and forecast climatic conditions over Lesotho with the objective to harmonize development and other activities in all sectors of the economy with these expected weather and climatic conditions. As a focal point for several international conventions, protocols and agreements on climate and the ozone layer, including the UNFCCC, the Kyoto Protocol and the Paris Agreement, LMS maintains active coordination with several multilateral organizations such as the WMO, UNEP, UNDP, etc. on climate change and related issues. LMS is also mandated to coordinate national climate change programmes, with activities that encompasses the following:

- **Promotion of the implementation of the Clean Development Mechanism (CDM) projects in Lesotho;**
- **Coordination of the identification of appropriate climate change mitigation and adaptation policies and measures;**
- **Assessments of climate change vulnerabilities and of adaptation and mitigation impacts across climate-sensitive sectors of the economy;**
- **Reporting to multilateral organizations on national progress in climate change mitigation and adaptation through periodic National Communications and other reports; and**
- **Promotion and coordination of mitigation and adaptation projects with relevant line ministries and other stakeholders with the aim to building the resilience of Basotho to climate change**

To make its climate change coordination role more effective, in 2013 LMS established a **National Climate Change Committee** (NCCCC), an advisory body that is composed of representatives from governmental and non-state stakeholder institutions (civil society, the private sector, academia and development partners). In addition to the validation of information and monitoring climate change integration in their respective sectors, the NCCCC carries the following functions[22]:

- To serve as an advisory body on issues relating to climate change;
- To enhance coordination and dialogue amongst national stakeholders on issues of climate change;
- To promote climate change data and information collection, sharing and archiving;
- To facilitate the development, implementation and review of Lesotho's national climate change policy, strategy, programmes and action plans;
- To mobilize resources, nationally and internationally, for the implementation of climate change programmes;
- To assist key sectors to integrate/mainstream issues of climate change in their policies and plans;
- To promote advocacy for climate change initiatives;
- To prioritise climate change initiatives/projects according to national needs and priorities; and
- To monitor, evaluate and report on the implementation of national and sectoral climate change programmes.

The weaknesses of the NCCCC emanate from the fact that the membership is institutional, and the experience is that attendees are not backed by sector-specific climate change specialists who are capable of modelling and forecasting climate change impacts in their respective vulnerable sectors. So far technical inputs have been drawn from consultancy groups, usually from local tertiary institutions. As a result, the integration of climate change both in national policies and plans and climate-sensitive sectors of the economy remains weak. Further, there is currently no mechanism to coordinate climate change issues at the local level where the impacts of climate change are more intense and where vulnerability is greater. For the formulation, integration and implementation of effective climate change mitigation and adaptation policies

[22] Terms of Reference (TORs) published by LMS in November 2014.

and programmes, therefore, a more effective arrangement needs to be considered, together with capacity strengthening across vulnerable sectors of the economy and at local levels.

5.7.3 The Proposed Reorganization

The proposed reorganization for the improved coordination of climate change issues, including mainstreaming, is shown on **Figure 7** below. The proposed structure aims at improving coordination between the CCU in LMS and line ministries as well as between the same Unit and local governments. The structure carries the following advantages:

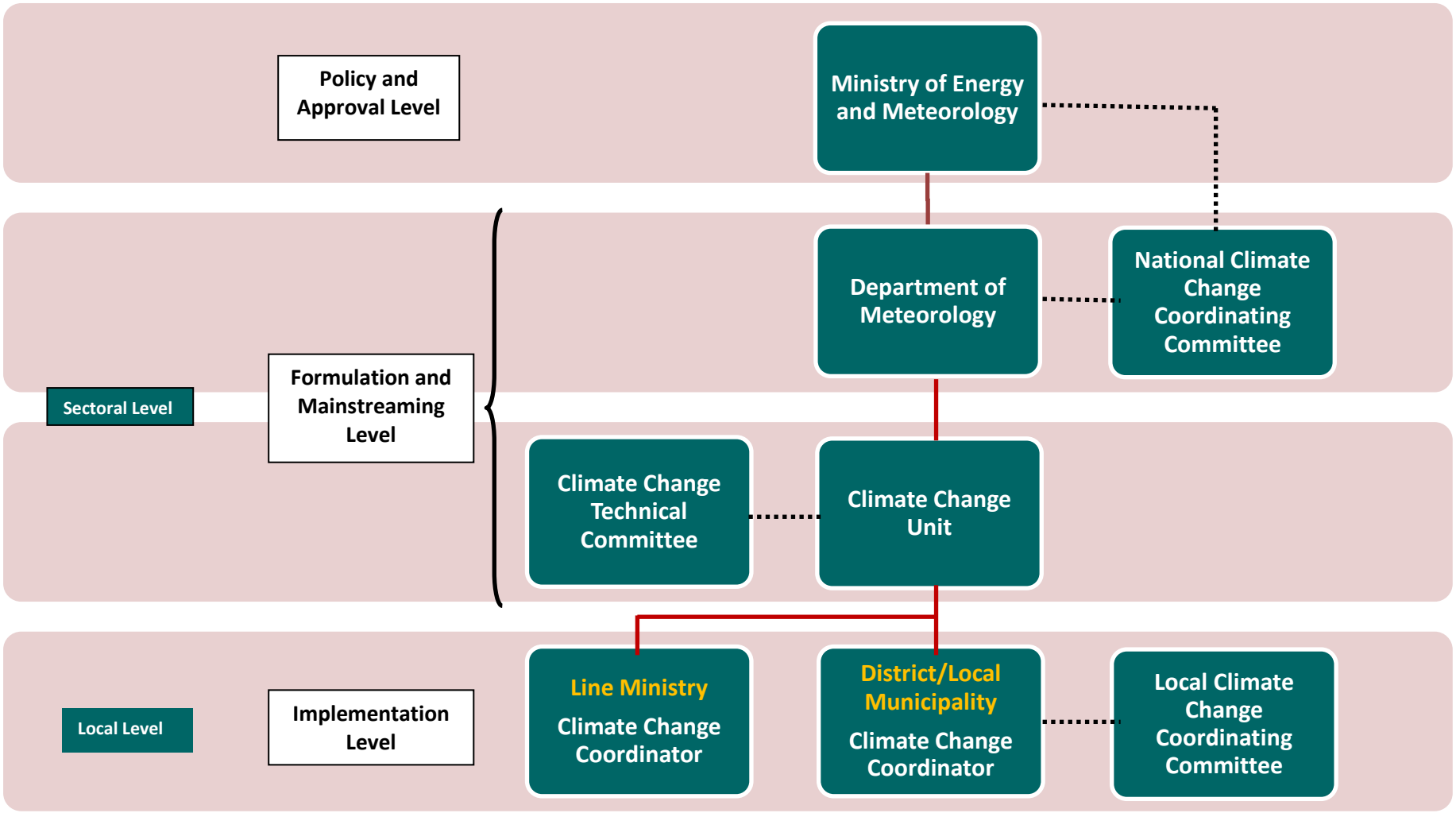
- The structure builds on what already exists, and therefore there is no overarching disruption of the current operations of climate change institutions;
- The structure is simple and ready for implementation without the need to apply enormous resources;
- The structure can be implemented using existing resources without having to increase establishments and recruiting new staff; and
- The structure provides for both lateral and vertical coordination, and strengthens climate change planning through coordinating committees and a technical committee.

5.7.4 The National Climate Change Coordinating Committee

The proposed National Climate Change Coordinating Committee (NCCCCC) is a mere renaming of the existing NCCCC of LMS. The renaming is meant to emphasize the coordination role that this Committee is expected to play. Its mandates will include the following:

- To assist LMS in the formulation of policies and plans relating to the mainstreaming of climate change adaptation in Lesotho's National Strategic Development Plans, as well as in other development frameworks;
- To advise the LMS and enhance coordination and dialogue amongst national stakeholders on issues of climate change;
- To commission the assessment of current and future national mitigation and adaptation measures, the formulation of new measures, and the mainstreaming of these in national policies, development plans, frameworks and programmes;
- To assist the mainstreaming of climate change mitigation and adaptation strategy formulation, implementation, monitoring and evaluation across climate-sensitive sectors;
- To identify climate sensitive sectors and advise on the commissioning of climate change vulnerability and risk assessments across the same;
- To take into account the projected climate change and associated adverse impacts, particularly the nature, intensity and frequency of hazards, and facilitate the formulation of more appropriate responses;
- To prepare appeals for and mobilize resources, nationally and internationally, for the implementation of climate change mitigation and adaptation responses;
- To review periodic and specific vulnerability reports and solicit financial support for response measures thereof from both domestic and foreign sources;
- To commission policy and legislative reviews to accommodate institutional restructuring measures that are approved by the Cabinet; and
- To facilitate institutional capacity needs assessments and build national, sectoral and local level capacity for climate change mitigation and adaptation responses.

Figure 7 Organization for Improved Coordination



5.7.5 The Climate Change Technical Committee

The **Climate Change Technical Committee** (CCTC) will be the technical think tank of the LMS that will tender its technical inputs through the CCU. Specifically, the Committee will carry out the following functions:

- To work closely with the LMS to ensure the mainstreaming of climate change mitigation and adaptation in national, sectoral and local policies, frameworks and programmes;
- To gather climate data and use climate science to make climate change projections and their impacts in various sectors;
- To undertake vulnerability and risk assessments across climate-sensitive sectors as directed by LMS and the NCCCCC;
- To review climate change mitigation and adaptation measures across climate-sensitive sectors and propose/formulate new and more appropriate measures; and
- To advise the LMS and the NCCCCC on the required institutional capacities for climate change mitigation and adaptation from the national, sectoral to the local levels.

The CCTC will be chaired by the Head of the CCU in LMS and be composed of the following:

- Professional staff of the CCU;
- Technical staff co-opted from institutions that are directly involved in the application of climate science and design and implementation of climate change mitigation and adaptation responses (Agriculture, Water, Forestry, Soil Conservation, Range, etc);
- Technical staff from academia and research institutions; and
- Technical staff from high GHG emission sectors (Industry, Mining, Sanitation, Transport, etc.).

5.7.6 The Local Climate Change Coordinating Committee

To establish synergies at the local level (District or municipal level), **Local Climate Change Coordinating Committees** (LCCCCs) should be constituted to perform the following functions:

- To ensure the mainstreaming of climate change mitigation and adaptation in local government policies, frameworks and programmes;
- To assist vulnerability and risk assessments that are conducted in their local areas by the CCTC or consultants;
- To review local level climate change mitigation and adaptation measures and propose new and more appropriate measures;
- To advise on the required institutional capacities for climate change mitigation and adaptation at the local level;
- To ensure coordination amongst various local actors that are involved in the implementation of climate change mitigation and adaptation measures and projects;
- To assist the formulation of integrated climate change mitigation and adaptation programmes, their implementation, monitoring and evaluation at the local level;
- To plan and mount public awareness campaigns on climate change mitigation/adaptation strategies at the local level;

The LCCCC will be chaired by a District Resource Planner (DRP) and be composed of the following:

- Local Heads of climate-sensitive sectors (Agriculture, Water, Forestry, Soil Conservation, Range, etc);
- Technical staff from high GHG emission sectors (Sanitation, Transport, etc.);

- Representative of the local municipality;
- Representatives of civil society organizations and the private sector;
- Representatives of traditional authorities; and
- Representatives of local communities.

It should be emphasized that the LCCCC should be provided with a supportive framework of standards, financial resources, climate change mitigation and adaptation information, services and capacities to help individual households and communities to take decisions that reduce their exposure to climate risks. Since the LCCCC comprises representatives of institutions that deliver public services in areas such as water and sanitation, health, law enforcement, education, emergency response, social protection, and engineering and public works, it should assume a leading role in the mitigation and adaptation process at the local level, and constitute an effective support to community-level initiatives. The LCCCC will also ensure effective national-local coordination, or enable coordination between climate risk management services provided by central agencies and local needs. Through decentralization, therefore, integration among line ministries can be fostered at the local level. It is therefore imperative to build institutional capacity at this level.

So far decentralization reforms in Lesotho have not been characterized by a sufficient transfer of powers and resources to local institutions, as intimated by the Decentralization Policy of 2014, and, in general, local institutions are often not accountable to local communities. Strong local institutions and capacities should be considered critically important for the implementation of successful climate change mitigation and adaptation measures on the ground.

5.7.7 Climate Change Coordinators

The position of **Climate Change Coordinator** (CCC) should be created in every climate-sensitive line ministry and at the district level. To avoid a ballooning of the establishment, this position should be filled by one Planning Officer in each of the Planning Units, and one District Resource Planner in each district. The identified incumbents should be retrained by LMS (Short and long-term training) to execute the following duties:

- To work closely with the CCU, NCCCCC, CCTC or LCCCC to ensure the mainstreaming of climate change mitigation/adaptation in sectoral/local policies, frameworks and programmes;
- To undertake vulnerability and risk assessments in their respective climate-sensitive sectors/localities as directed by the NCCCCC/CCU;
- To gather climate data and use climate science to make projections of future vulnerabilities and risks under different sectoral/local climate change scenarios;
- To review climate change mitigation/adaptation measures in their climate-sensitive sector/locality and propose/formulate new and more appropriate measures;
- To ensure that mitigation/adaptation proposals are subjected to EIA and economic analyses before they are submitted to the CCU for further processing; and
- To advise the CCU and NCCCCC on the required institutional capacities for climate change mitigation/adaptation in their respective sectors/ localities.

CCCs must be degree holders in either economic planning, environment, meteorology, natural resources management, environmental statistics, etc. and carry a minimum of 5 years experience in climate change mitigation/adaptation or related fields.

6. Monitoring and Evaluation (Strategic indicators)

6.1 Introduction

Monitoring is a process by which the performance of climate change actions can be systematically tracked over time. The routine monitoring and evaluation of a climate change strategic action therefore involves the assessment of its progress against set targets and objectives. It can help to evaluate funding needs for mitigation/adaptation actions, to identify future priorities, to ensure the effective allocation of scarce resources, and to provide for a wiser allocation of public funding for accountability purposes. The evaluation process starts from the objectives and preferred tools for implementing the strategic actions, and can result in adjustments in these strategies, their targets and methods.

The tracking of mitigation/adaptation actions over time focuses on objectively verifiable measurements of the values of indicators of achievement. An indicator provides evidence that certain results have or have not been achieved. It can be either quantitative or qualitative, allowing for comparisons across time. There are 5 qualities that determine the choice of an appropriate indicator:

- Policy relevance;
- Causal links to climate change;
- Data quality and accessibility;
- Robustness and known uncertainty; and
- Acceptance and intelligibility.

To assess the values of indicators, it is desirable to achieve consistency in methodologies and data collection across all the sectors and local authorities. However, comparisons may be difficult and updates of indicator values too costly, since local datasets could be complex and unique to each sector or local authority. **Table 10** below gives examples of some of the indicators by sector.

Table 10 Examples of Climate Change Indicators by Sector

Sector	Suggested Indicator(s)
Process Indicators:	
General	• Use of scenarios to inform adaptation options; • Identification of cross-sectoral issues/concerns; • Production of local adaptation guidelines; and • Production of local disaster management plans. • Enactment of legal framework for emissions standards
Agriculture	• Implementation of measures to reduce soil erosion and desertification; • Introduction of drought and heat resistant crops; and • Uptake of insurance to cover weather extremes. • Implementation of the grazing levy
Biodiversity	• Monitoring of climate change indicator species; • Removal of barriers to increase natural adaptive capacity; • Extension, connections and establishment of buffer

	zones around protected areas; • Demarcation of areas for tree planting.
Health	• Mapping and control of disease vector species (e.g. coli); • Provision of climate control equipment for vulnerable people; • Introduction of legislative framework for pollution control.
Tourism	• Modification of recreational facilities to accommodate higher ambient temperatures.
Water	• Construction of flood control dams.
Transport	• Upgrade of transport infrastructure • Introduction of carbon tax
Outcome Indicators	
Biodiversity	• Reduction in degraded ecosystems
Health	• Reduction in deaths during heat waves
Water	• Reduction in water consumption
Transport	• Reduction of CO_2 emissions

6.2 Challenges facing the Monitoring of Climate Change Measures

The final stage in the climate change mitigation/adaptation planning process involves the integration of the proposed actions into the national monitoring system in order to track emerging trends that relate to the implementation and impacts of climate change policies and actions. Based on the objectives and targets that are in policy documents and strategic development plans, practitioners need to embark on the following:

- Design appropriate climate-related policy and scientific indicators;
- Strengthen data collection and management; and
- Fully integrate climate change into the national monitoring system.

The final output of this activity is the monitoring of climate change issues within the framework of the existing national monitoring system which is spearheaded by the Departments of Monitoring and Evaluation (DM&E) and Project Cycle Management (DPCM) in MDP that work closely with the Bureau of Statistics (BOS) and other institutions that are involved in monitoring, particularly the Planning Units of line ministries.

The biggest challenge is to identify suitable indicators to be used in the design of the monitoring system to be integrated into the national monitoring system. This challenge derives from the following characterizations of climate change:

- Climate change, including the frequency and intensity of extreme events, as well as the long-term repercussions of climate change effects, is characterised by uncertainty, making it difficult to assess its impacts and those of policies and actions;
- The indirect impacts of climate change considerably affect the outcome of policies and measures that target mitigation and adaptation;
- The long-term nature of climate change means that the benefits of some of the mitigation and adaptation measures may not be realized in the short-term;

- Mitigation and adaptation policy measures in some line ministries and local level institutions may require new or increased budget allocations and public expenditures that are not always forth-coming;
- Implementation of mitigation/adaptation policy measures at national, sector and local levels may need to be strengthened to realise the intended results;
- Mainstreaming of climate change mitigation/adaptation is not yet established as standard practice in government and administrative processes, procedures and systems in Lesotho (e.g. budget call circulars, public expenditure reviews, coordination mechanisms, GHG emissions control, systematic climate-proofing, monitoring); and
- Measures designed to reduce vulnerability to extreme events can be evaluated only if the foreseen event occurs since it may be difficult to determine whether the measure was effective if the extreme events did not occur.

In undertaking monitoring activities, the monitoring departments of MDP need close cooperation with BOS on the collection and analysis of performance-related indicator data across a range of sectors. On the other hand, weather and historical climate data are available from LMS. Assessments of climate change impacts and vulnerabilities have also been summarized in the Second National Communication to the UNFCCC although in some sectors more in-depth analyses may be needed. Possible mitigation and adaptation indicators that could be relevant for national level policy monitoring have been summarised in Appendix 6 of these Guidelines. Although these indicators are not exhaustive and bear no baseline values, they provide good starting points for strengthening the national monitoring system. They will need to be revisited or complemented with additional data in order to adequately inform the national monitoring process.

6.3 Developing Climate Change Indicators

Indicators are decision-making tools and therefore need to be clearly linked to areas that can be influenced by policies and measures. They must also be simple enough to communicate messages to decision makers who have no climate science or mitigation/adaptation background. Where appropriate, visual graphics should be used to enable stakeholders to clearly visualise magnitudes of impacts, risks or mitigation/adaptation frameworks and their inter-linkages. Climate change measures and related indicators must be mainstreamed in existing policies and plans. On the other hand, stakeholders need to identify what data is available, how to use it, and how to combine it with other data to make it relevant for the monitoring and evaluation of the impacts of climate change measures.

In developing climate change indicators, it is important, in addition to developing indicators that are narrowly focused on climate, to develop indicators that show how climate change is affecting the poor and key sectors of the economy, and how policies themselves are addressing climate change and mitigation/adaptation. On the other hand, the process of selecting indicators should begin with an analysis of what is available and feasible, given resource and capacity constraints. Indicators that may require data that is not yet available may not be included in the monitoring system unless there is a clear indication that mechanisms to collect and analyse the relevant data are in the pipeline.

The **first step** in developing resilient mitigation/adaptation indicators involves literature review. This should be guided by the objectives of mitigation/adaptation in the sector of focus;

what needs to be measured; and how appropriate indicators should be identified. Before the practitioner identifies or selects indicators, there should be a clearly defined outcome or targets. However, this may not always be possible because mitigation/adaptation is largely a process rather than an outcome. Reliance on a set of principles may therefore be more appropriate.

The **second step** in developing resilient mitigation/adaptation indicators also involves literature review to develop a framework to identify both existing and new indicators that are considered useful, and to identify indicator assessment criteria. The inclusion of existing indicators enables practitioners to build on what already exists and to assess whether they measure or contribute to measuring the desired outcome. The indicator framework for mitigation/adaptation should encompass established monitoring and reporting systems across sectors, without duplication. In addition, indicator identification and selection should be carried out in consultation with those who are responsible for data collection and reporting, taking into account practical considerations of existing resources and processes in place. The resultant proposed list of indicators and assessment criteria should be circulated to a wide audience of mitigation/adaptation practitioners for comment.

In the **third and final step** of developing climate change indicators, the revised list of indicators should be subjected to further testing against revised assessment criteria. It should be emphasized that climate change impact indicators as measures of progress in mitigation/adaptation may present challenges since it is not always easy to identify the actual drivers of the impact.

A framework for identifying indicators of climate change mitigation/adaptation in natural resources is shown in **Figure 8** below. Based on a set of principles for adapting the natural environment and expanding CO_2 sinks, the objective is to identify characteristics that make natural resources resilient to climate change and function. These characteristics are then used to identify potential indicators of climate change resilience and function. The resultant indicators should include cross-cutting issues or be integrated into cross partners and sectors.

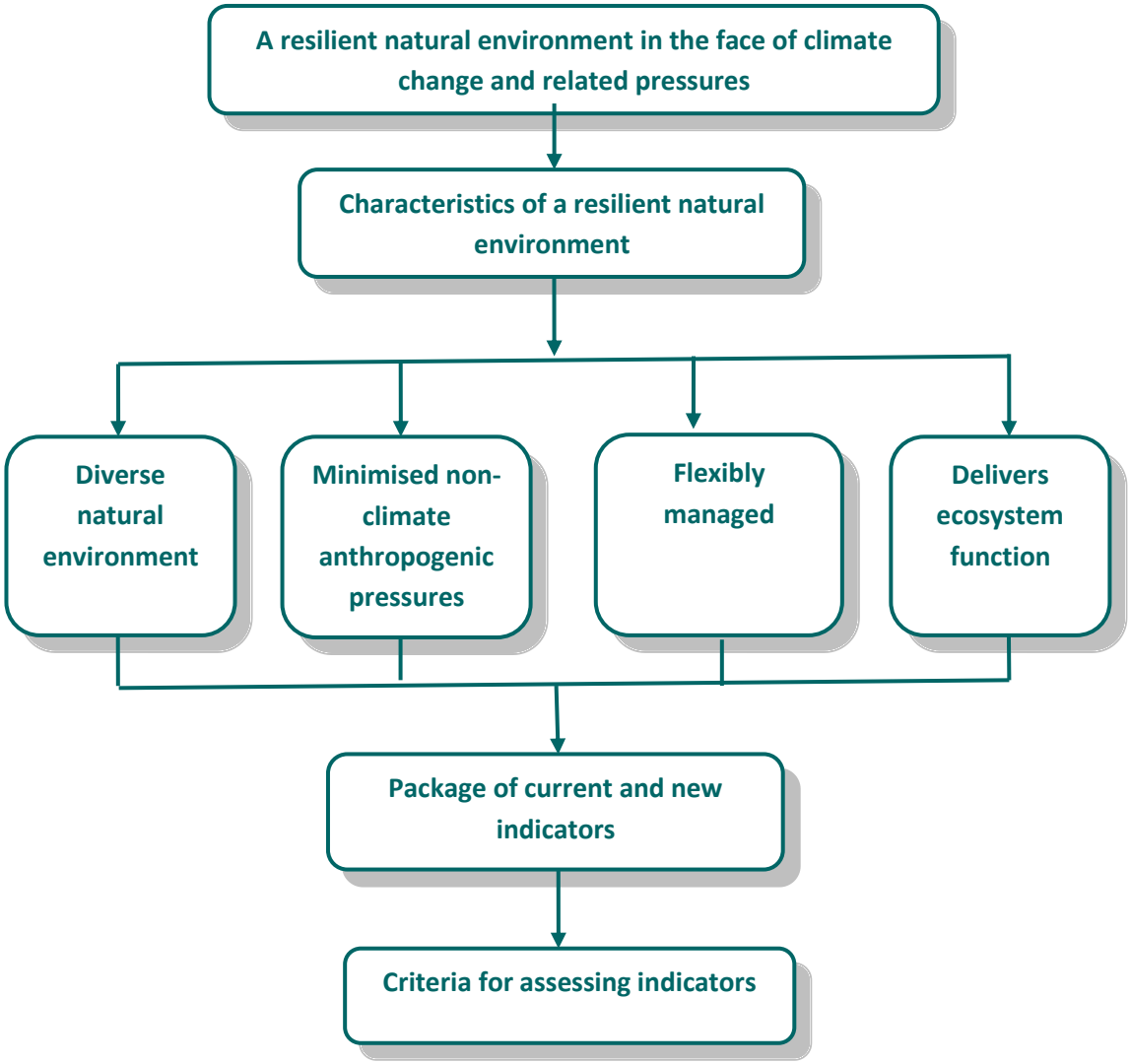
Ideally, monitoring that aims at mainstreaming mitigation/adaptation should include the following categories of data:

- Climate data (e.g. temperature, extreme events, seasonal precipitation, start and length of the rainy season, level of CO_2 sinks);
- Ecosystem services (e.g. agricultural yields, water salinity, erosion, CO_2 sinks);
- Socio-economic data (e.g. health, livelihoods, job and income generation, GDP); and
- Institutional and policy processes.

Correlations between climate data and other types of data can help refine the practitioner's understanding of climate change impacts. On the other hand, starting from historical baseline data enables practitioners to conduct climate change projections and more ambitious scenario-building analyses. On the whole, however, process-based indicators could be more appropriate for monitoring and evaluating mitigation and adaptation because of the high uncertainty and long timeframes that are associated with climate change adaptation. They also allow the introduction of new information and activities to shape the course of mitigation/adaptation at later stages, following incremental reviews (mitigation/adaptive management). However,

process indicators will not give a clear indication of the delivery of mitigation/adaptation measures but simply the process of planning these measures.

Figure 8 Framework for Identifying Indicators in Natural Resources



6.4 Data Processing and Reporting

The overall monitoring and evaluation of strategic development plans in Lesotho is conducted by the Department of Monitoring and Evaluation (DM&E) in the MDP. On the other hand, the monitoring of capital projects is done by the Department of Project Cycle Management (DPCM) of the same ministry. In the past, the M&E Framework of the strategic plan did not clearly specify the intended outputs and outcomes of many Plan activities that could be evaluated through objectively verifiable indicators. They also had no baseline data and budget allocations from which their achievability and measurable performance could be determined.

Those mitigation/adaptation indicators that will pass the test will be included into the M&E Framework, with baseline values and targets over the 5-year period of the plan. Process indicators will also show the intended achievements over the Plan period to enable evaluations. Data collection, processing and analytical methods of each indicator and institutional

responsibilities will have to be specified. However, the collection of reliable data remains a challenge in Lesotho and capacity building and training, including long-term training in climate science and related fields, will have to be considered.

Experiences gathered from NSDP I revealed weaknesses in performance data collection, with responses by line ministries generally poor and, for many of those line ministries that responded, the data was either erroneous or full of omissions[23]. These weaknesses will have to be dealt with and sanctions against defaulters introduced in order to build a robust M&E system. The Indicator Protocols to be kept by the DM&E will have to keep the following record:

- The name and code of the indicator;
- The definition of the indicator;
- What the indicator attempts to measure;
- The baseline value of the indicator, specifying year of measurement;
- Annual mitigation/adaptation targets to be achieved;
- Methodology of data collection and processing;
- Units of measurement;
- The name and contact details of the data collector; and
- Frequency of reporting.

[23] Interviews with staff of DPCM.

7. Climate Change Policy Measures at the Local Level

7.1 Introduction

There are several environmental, cultural, institutional and socio-economic factors that make rural Lesotho very vulnerable to climate change, and which weaken local communities' mitigation and adaptive capacity to climate change:

- **Overdependence on natural resources** - Unsustainable natural resource utilization, particularly the accumulation of large populations of livestock and associated overgrazing, as well as overharvesting for fuel wood and other uses have resulted in widespread ecosystem degradation;
- **Dependence on traditional agriculture** - The mainstay of the rural population in Lesotho is traditional agriculture in the form of rain fed crop farming and extensive livestock production, both of which are low productivity economic activities that increase the vulnerabilities to reduced precipitation and erratic rainfall;
- **Limited mitigation and adaptive capacity** - Limited technical knowledge on climate change limits the capacity to plan and implement climate change mitigation and adaptation interventions both at the national and local levels; and
- **Poverty and limited financial resources** - Since rural households in Lesotho are heavily dependent on natural resources for livelihoods, they are very vulnerable to climate change and have the least financial capacity for adopting clean energy devices and new adaptation strategies.

As was revealed in Section 3.9 of this document, there is currently no formal planning at the local level in Lesotho although there is reference to the subject in the policy framework. Interviews with relevant officials indicated that local level planning was one of the items that were hotly under consideration. These guidelines will therefore find active use in future. Some of the principles that are espoused here have already been successfully incorporated into the design of a number of donor assisted, integrated interventions that are under implementation in various localities in Lesotho, and from which learning experiences were gathered for the compilation of these guidelines.

In general, the mainstreaming of climate change at the local level must incorporate the following key elements:

- An assessment of vulnerabilities and risks with the aim to enhance positive synergies with other crosscutting aspects such as biodiversity, air quality, energy, gender, vulnerable groups, etc.;
- Considerations of the principles of international and national mitigation and adaptation strategies, and, for rural areas, special regard to the national agricultural policy since agriculture is the mainstay of the rural economy in Lesotho;
- Considerations of the long term economic and environmental sustainability of the development of farming communities;
- Development of local mitigation and adaptation responses that are mainstreamed into local Integrated Development Plans;

- Facilitation of technical and managerial capacity building and knowledge-transfer throughout the process so as to enhance implementation of the prioritised adaptation options; and
- The involvement of local stakeholders in the process of defining and implementing adaptation initiatives.

The focal institutions for the mainstreaming of climate change adaptation at the local level in Lesotho have not yet been clearly identified since local government structural reforms have not yet been concluded. However, it is conceivable that the overall coordination will lie with the proposed position of Executive Mayor who will be assisted by a Planning Unit. It is the latter institution that will have to ensure that the adaptation programmes are prepared as closely as possible to the current guidelines and that the elements listed above are incorporated.

7.2 Major Challenges facing Climate Change Actions

Perception and awareness - Climate change is still perceived as something distant, as an environmental topic, and climate adaptation is sometimes still confused with climate mitigation.
Knowledge gaps and uncertainties - Climate change actions have to live with uncertainties and knowledge gaps. Different vulnerabilities and varying levels of concern exist between sectors and localities. Different sectors and localities may have different, even contradictory visions for both mitigation and adaptation to climate change.
Policy integration - Local mitigation and adaptation policies need to identify and coordinate different interests and potential conflicts. Competencies in policy and administration are strongly fragmented and assigned to different sectors and localities.
Coordination Requirements - Mitigation and adaptation actions designed for one sector could potentially create negative side effects for other policy sectors, if not properly coordinated.

7.3 Examples of Local Mitigation Strategies

7.3.1 Development of energy-efficient clean technologies

The development of energy efficient, low-carbon energy technologies that limit the use of fossil fuels goes a long way to reduce CO_2 emissions. This is more so in Lesotho where a big proportion of households use dung and biomass for heating and cooking. This strategy could include the development of standards, codes of practice and specifications for mini and off-grid energy solutions; the development and dissemination of energy efficient technologies; the expansion of the Rural Electrification Programme and the promotion of private sector involvement in off-grid energy generation and distribution.

7.3.2 Increasing the area under forests

Farming on marginal lands and steep slopes, high dependence on biomass energy sources and associated overharvesting, and other developments such as construction and mining have resulted in a severe loss of tree cover in Lesotho. The plan here would be to expand CO_2 sinks through tree planting, reseeding of pastures and increasing the area under fodder crops.

7.3.3 Reduction of livestock Numbers

Although the magnitude of emissions from the agricultural sector in Lesotho are said to be minimal (2,230Gg CO_2e), reductions in livestock numbers would result in benefits in the form of the improved health of forests (And therefore the expansion of CO_2 sinks), and the reduction of emissions of nitrous oxide (N_2O) and methane (CH_4). This strategy should go hand-in-hand with treating VIP latrines in order to reduce methane emissions and the promotion of the application of organic manure (dung and crop residues) in agricultural crop production.

7.3.4 Improvement in waste management

This mitigation strategy involves the development of targeted programs to raise awareness of the importance of, and opportunities for, reducing waste and recycling at source; the development of infrastructure (e.g. collection depots and processing plants, etc.) to support recycling activities; the design of incentives to promote recycling activities; the construction of proper landfill sites in all 10 districts of Lesotho with methane recovery facilities; the promotion of methane recovery from cattle kraals and VIP latrines and the development of a national Waste Management Programme.

7.4 Examples of Local Adaptation Strategies

7.4.1 Promotion of sustainable soil and land management

Adaptation requires higher soil resilience against both excess (intense rainfalls) and deficits (extended droughts) of water. A key element to respond to both challenges is to enhance soil organic matter. In this sense, adaptation objectives should be targeted at incentives for good soil management practices in order to maintain the main functions of the soil. This is already happening in donor funded projects that focus on conservation agriculture.

7.4.2 Enhancement of sustainable water management

Selecting more suitable crops to withstand heat stress and droughts may reduce irrigation water demand. Other low-cost techniques of water management such as minimum tillage or mulching may be promoted to enhance water retention and minimize water evaporation during extreme events. This is a strong characteristic of conservation agriculture where crop residues facilitate water infiltration, suppress weeds, reduce evaporation and improve soil fertility.

7.4.3 Intervention measures to support the adaptation process

Support interventions for farmers range from providing ad hoc insurance mechanisms to cope with extreme event hazards to farm management and technical equipment support. Some collective measures that may be provided by local authorities in order to support farmers could include opening and maintaining local abattoirs; creating meat-cutting and packaging facilities and sales outlets to support the development of farm processing activities; promoting local distribution channels or provision of equipment for tiling the soil; etc. Linking mountain farming with eco-tourism might be a source of attractiveness for mountain tourism. Local authorities should financially support some of the new processes (e.g. with incentives, collective facilities, etc.).

7.4.4 Ensuring stakeholders' involvement

Ensuring stakeholders' involvement and the dissemination of information on climate change impacts and "know-how" are crucial social tools to ensure an adequate perception of the identified risks and a satisfactory degree of acceptance of the adopted adaptation measures. Also important is keeping contacts with higher governmental levels to ensure vertical coordination of local adaptation initiatives with the national adaptation framework.

7.5 Local Disaster Management

(Extreme events and natural hazards)

7.5.1 Introduction

Local level disasters in Lesotho could include the following extreme events or natural hazards:

- The evolution of heavy precipitation patterns and the risk of extended floods;
- The reduced stability of rock walls and the rockfall pattern;
- Frequent and extended slope instabilities and landslides;
- Frequent and heavy snowfalls;
- Destructive tornado trails;
- increased occurrences of veldt fires; and
- Widespread crop failures.

There are two approaches that local authorities could take to deal with the above disasters:

- The ***wrong approach*** - This is an approach where disaster risk preventions occur mostly as a reaction within a relatively short time period after an extreme event has happened rather than in the form of a proactive prevention; and

- The ***most appropriate approach*** - This is an approach where climate change adaptation in cases of extreme events and natural disasters is a holistic strategy for disaster risk reduction with the consideration of structural, non-structural and organizational measures and their best combination.

7.5.2 Possible Adaptation Strategies

The overall goal of climate change adaptation to ***extreme events or natural hazards*** is to limit existing risks to human health, material assets, economic activity and the environment to acceptable levels, and to prevent the emergence of new unacceptable risks. In other words, the main target is to achieve and preserve adequate levels of safety in relation to natural hazards and to ensure sustainability. An adaptation plan for extreme events or natural hazard management at the local level must therefore comprise the following:

- Definition of the targeted safety level in respect of sustainability;
- Identification of the level of individual awareness preparedness and precaution;
- Development of a framework for monitoring and analysing continuous changes in the environment;
- Identification of the actual and possible future risks resulting from natural hazards;
- Analysis of the climate change suitability of existing protection measures;
- Defining risk reduction measures under current and future climate conditions;
- Formulation of different options for risk reduction and assessment of the effectiveness and efficiency of each or their combinations;

- The long-term development of the community in terms of risk-appropriate land use and adaptive capacity;
- The residual risks after the implementation of risk reduction measures, and a plan for coping with residual risks and unexpected natural hazards;
- The linking of the local emergency plan to existing national early warning system;
- The cross-sectoral coordination between all the relevant stakeholders at the local level and collaboration between local and national level administrations; and
- Attention to important principles like participative planning processes, the involvement of stakeholders, the risk dialogue and strengthening of individual preparedness and precautions.

7.6 Prioritization of Mitigation and Adaptation Measures

The evaluation of the impacts of each of the climate change mitigation/adaptation option could be based on the following criteria:

- Social criteria - e.g. consequences on local cultures and customs, impacts on levels of cohesion and social equity, etc. Higher priority should be given to those options that carry minimum adverse social impacts;
- Economic criteria - full cost-benefit analyses of the options in economic terms. Higher priority should be given to those options that have higher scores on economic decision tools;
- Environmental criteria - e.g. applying the environmental impact assessment approach to determine impacts on the improvement/deterioration in the quality of water, soil and biodiversity as well as the positive or negative contributions to GHG emissions. Priority will be given to those options that are most effective in terms of the highest number of mitigation/adaptation goals achieved and in terms of cost outlays involved;
- Urgency of the risk - prioritization based on the urgency of the risk or the potential risk that the options intend to mitigate or to adapt to. Higher priority is given to options that are suitable to address immediate risks;
- The technical feasibility of the options - higher priority should be given to options that are easier to implement and that can be implemented with speed;
- Positive synergies with sectoral and national mitigation/adaptation options - potential interaction of mitigation/adaptation options with other initiatives that are already undertaken at national level and can help to reduce vulnerability; and
- Funding possibilities - availability of funds from existing funding streams (Government sources, development partners, NGOs, the private sector, etc.) to cover implementation costs.

7.7 Implementation of Priority Options

- The measures that are selected for implementation must be concrete and feasible, and should be consistent with national and sectoral mitigation/adaptation frameworks and be coherent with the sectoral strategies at higher levels;

- After approval for the local climate change mitigation/adaptation action to go ahead, there should be provision for funding from either the national government, development partners, NGOs or the private sector;
- Coordination to ensure consistency with sectoral and national plans must be clearly spelt out. Such coordination needs to be both cross-sectoral because of the interconnectedness of the affected sectors, and vertical in order to ensure consistency with sectoral and national plans (See **table 11**);

Table 11 Climate Change Implementation Responsibilities by Administrative Level

National Action	Sectoral Action	Local Action
→	↔	←
• Providing a supportive policy and international and national legal framework; • Development of a national climate change mitigation/adaptation strategy, specifying climate risks, vulnerabilities and impacts; • Providing national information related to climate change and locally disaggregated information • Funding of research and development for local level mitigation/adaptation • Mainstreaming of climate change mitigation/adaptation into different national policy documents and national strategies; • Funding of local mitigation/adaptation measures; • Supporting boundary organisations that link science and policy to local mitigation/adaptation actions; • Adjusting the degree of decentralisation of competences and authorities.	• Development of a sectoral climate change mitigation/adaptation strategy, specifying sectoral climate risks, vulnerabilities and impacts; • Undertaking sectoral risk and vulnerability assessments and providing a supportive sectoral framework for building resilience; • Conducting sectoral information relating to climate change and disaggregated information on local risks and vulnerabilities; • Mainstreaming climate change mitigation/adaptation into different sectoral policy documents and sectoral strategies; • Approving local climate change mitigation/adaptation options that are consistent with sectoral mitigation/adaptation frameworks; • Incorporating local mitigation/adaptation options into sectoral budgets; • Monitoring and evaluation of the implementation of local mitigation/adaptation measures;	• Building local resilience to climate change through the planning and implementation of multi-sectoral mitigation/adaptation actions; • Planning and implementation of local mitigation/adaptation strategies; • Mainstreaming of mitigation/adaptation concerns into other policy documents; • Spatial integration of mitigation/adaptation needs through local planning; • Local planning for extreme events; • Allocation of local resources (budget) and raising of other funding from development partners, NGOs, the private sector, etc. for mitigation/adaptation; • Upgrading local infrastructure to make it resilient to climate change; • Engaging stakeholders, civil society and private actors on the planning, implementation and evaluation of mitigation/adaptation measures.

- The most effective climate change strategies need to ensure a "horizontal" integration of mitigation/adaptation policies across sectors within and beyond the environmental

domain, as well as mechanisms of easing the dialogue between state, business and civil society in the affected sectors; and

- A clear definition of the roles of all the stakeholders that are involved in the planning, implementation and monitoring and evaluation of the climate change mitigation/adaptation actions that are anticipated in the approved action plan.

7.8 Mainstreaming and Integration in Cross-Cutting Issues

Climate change actions offer a number of possible synergies and opportunities for integration into focal areas that, if properly managed, can support policies in different sectors. In Lesotho, cross cutting issues include, amongst others, poverty alleviation, gender issues, vulnerable groups (the youth, the disabled, children and the elderly), environment, food security and nutrition. In addition, the need for capacity-building to assist practitioners and communities to respond to climate change has long been recognized. As a result, GEF and other funding facilities have laid out frameworks to guide climate change capacity-building activities of developing countries. Other areas demanding mainstreaming include research and systematic observation, and technology development, innovation and transfer.

As was reiterated in many sections of this report, women have a unique relationship with natural resources (particularly energy, water, crops, wild vegetables, etc.) and food preparation, which renders them more vulnerable to climate change than men. They are responsible for households' food security through collection activities (vegetables, dung and firewood), crop production and meal preparation. Most of these activities are very climate sensitive. Already, women are overburdened by a number of household chores such as child-rearing, domestic management and meal preparation. Any added challenges such as those imposed by climate change, therefore, will increase their vulnerabilities and workloads. Climate change adaptation and some mitigation actions should necessarily include measures to reduce women's workloads.

In rural Lesotho, a large percentage of boy children enter the labour force early, herding livestock to the detriment of their education. They are often exposed to climate change related extreme weather events such as snow storms, frigid temperatures, floods, windstorms, etc in these remote grazing areas, making them one of the most vulnerable social groups in the country to whom adaptation measures should be directed.

7.9 Participation

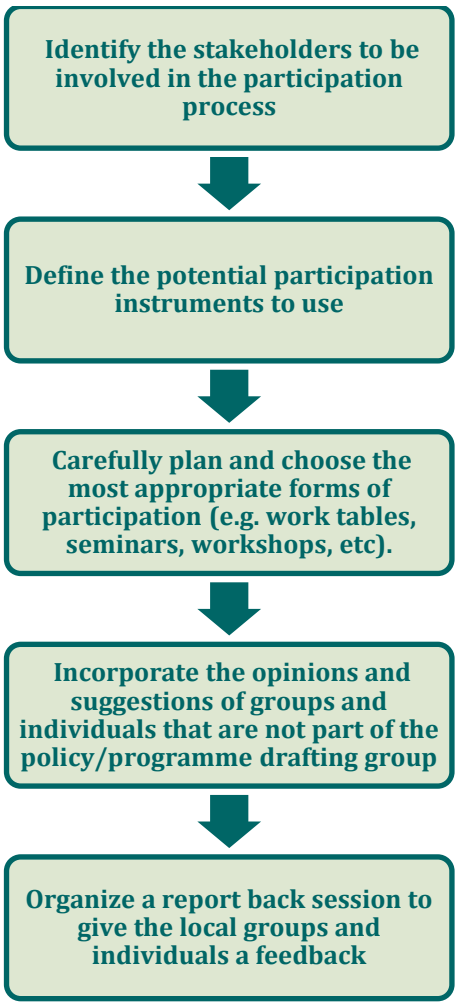
Mitigation and adaptation strategies at the local level have to be developed with a participative approach at all stages, from the drafting to the implementation process. An effective participation brings about several benefits amongst which are the following:

- It assists a wider dissemination of scientific information about climate change;
- It offers opportunities to better identify the most significant impacts and vulnerabilities and consequences at the local level;
- It facilitates the integration of mitigation and adaptation issues in local level sectoral policies and governance actions; and

- It usually leads to a greater understanding and acceptance of the overall mitigation/adaptation strategy.

The participation process needs to be carefully planned for it to be inclusive and effective. The planning should go through 5 steps as shown on **figure 9** below. The first step is to identify possible stakeholders that should be part of the process. For Lesotho, this might involve local NGOs and CBOs, influential individuals, particularly farmers, traditional authorities, local government councillors and their secretaries, agricultural resource centre staff, district based professional staff, local project staff, etc.

Figure 9 Steps in the Planning of a Participatory Process



The second step in the planning of a participatory process is to define the potential participatory instruments to be used. This could involve questionnaires, oral comments following discussion templates, local mapping, etc. The instruments chosen will influence the form of participation to be applied, which forms the third step. These range from work tables, seminars, workshops, etc. Issues of logistics should be carefully considered. It may be necessary to hold several participation sessions for effective coverage and to avoid long distance travelling by potential participants. The fourth step involves holding the planned participatory sessions and incorporating the opinions and suggestions made by participants, while the fifth step demands the organization of report back sessions that inform participants of the final

policy/programme and the preparation of same participants for policy support and programme implementation.

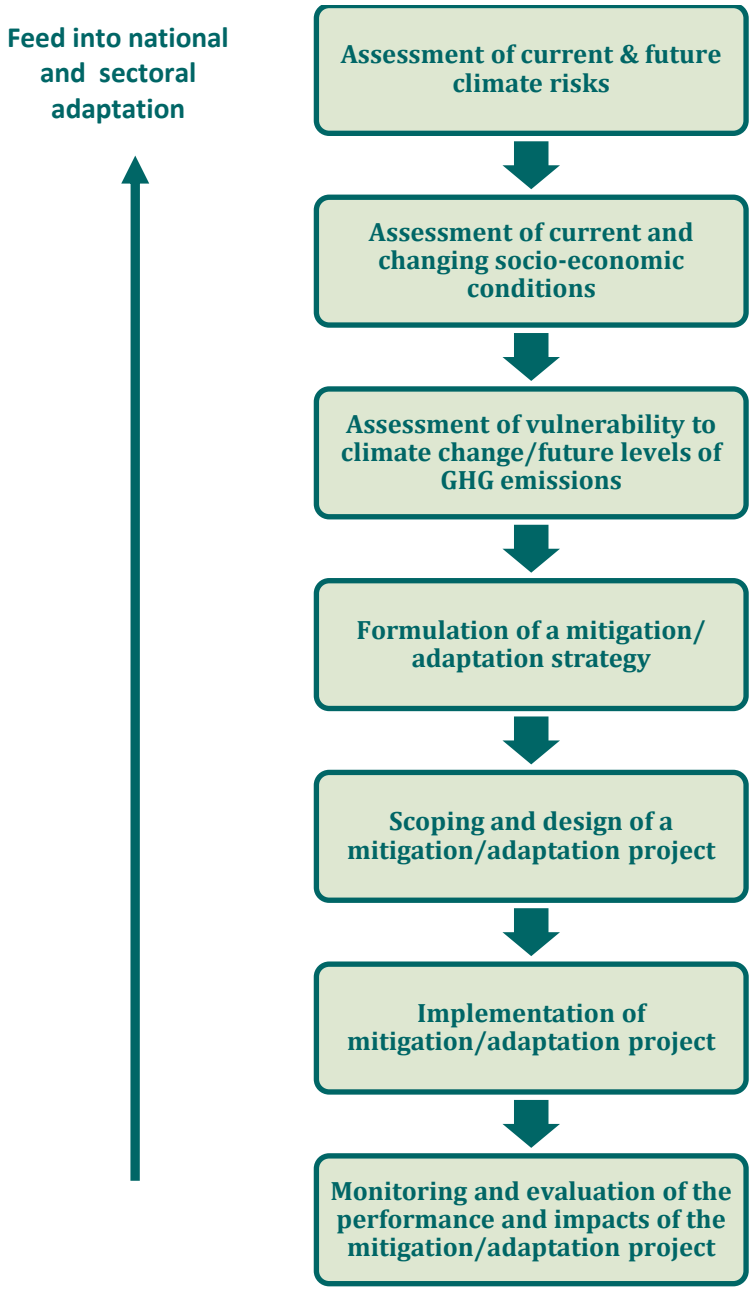
The strength and coverage of participation is a function of effective communication, and for climate change, the latter could be defined as a form of public engagement that facilitates an intended behavioural, organizational, political and social change that is consistent with identified mitigation or adaptation goals (Alpine Convention:2014). Effective communication on climate change for local mitigation and adaptation strategies should carry the following characteristics:

- It should bring home a problem that is initially perceived as distant;
- It should be transparent, meaning the invisible causes and impacts must be made visible;
- Those solutions that are deemed inconceivable must be illustrated;
- Perceived and real barriers to proposed mitigation/adaptation actions must be shown as things that normal people have overcome elsewhere or in the past;
- Messages must be enhanced with emotion invoking active imagery from pictures, symbols, colours, music, etc.;
- Communication should be sustained over time in order to keep up the motivation with practical information; and
- Communication has to focus on positive sustainability and mitigation/adaptation issues, and not provoke fear or make participants feel personally vulnerable.

Participation is very critical to give effect to climate change adaptation at the local level. In addition to local communities assuming ownership of the mitigation/adaptation process, participation ensures sustainability beyond the project stage. It also enables local communities to internalise the knowledge that they acquire from the process, leading to greater mitigation/adaptive capacity. That said, participation has the power to harness indigenous knowledge on climate change at the local level, and thus facilitate the design of locally relevant and locally acceptable mitigation/adaptation actions.

There are several levels of local stakeholder participation in the climate change mitigation/adaptation process (**figure 10** below). In the first instance, because of their long-term experiences and knowledge of the local climate, their participation in the assessment of the current and future climate risks is bound to be very beneficial. The same could be said of their participation in the assessment of current and changing socio-economic conditions. Their experiences and coping strategies will enable the assessment of their vulnerability to climate change and the formulation of a climate change strategy for the area that will feed into sectoral and national climate change strategies.

Figure 10 Levels of Stakeholder Participation in the Adaptation Process



With a thorough assessment of the current and future climate risks and vulnerabilities, and a formulation of the necessary mitigation/adaptation strategy, practitioners will be able to define the scope and formulate an appropriate climate change mitigation/adaptation project or programme for the local council or municipality, and present it to the same local communities for comments before submitting the document to the sectoral or national authorities for approval. If the project is approved, it must be further presented to the stakeholders so that there is a clear understanding of their expected roles during project implementation. During implementation, local stakeholders must assist in the monitoring and evaluation of the performance of the project to ensure that there are no adverse impacts and, if there are any,

how further corrective actions could be implemented in order to realise the maximum benefits of mitigation/adaptation.

7.10 Financing of Mitigation/Adaptation Actions

7.10.1 Government Funding

In general, climate change mitigation/adaptation measures involving minor actions can be accommodated in the government budget without the need to design complex proposals that might require feasibility studies and EIA assessments and approvals. In this case, a list of affordable priorities is prepared within the available budget. This planning process is already in progress in Lesotho where local government councillors organize communities under their councils to rank their development needs and the first priorities are then submitted to the district councils for further prioritization and submission either to the Ministry of Local Government, chieftainship and Parliamentary Affairs (MoLGC) or to relevant sector headquarters for further assessment and inclusion into the sector or national budgets.

The current National Decentralization Policy advocates for fiscal decentralization and the prudent public financial management to ensure effective, efficient, transparent and accountable planning, budgeting, public expenditure management, and accountability at all levels of the decentralised service delivery (Section 3.4). Although there is no time frame that has been attached to the devolution process, it is clear that there is a strong Government commitment to move towards this direction. In future, therefore, it is conceivable that each community council or municipality will have to scrutinize its own climate change mitigation/adaptation measures and prioritize them to fit within the allocated fiscal resources.

Many mitigation/adaptation actions that are designed to reduce GHG emissions or the climate change vulnerability of a given local council area may affect areas beyond its (the council's) administrative boundary, making the mitigation/adaptation process a shared inter-council responsibility. This may call for closer collaboration between or amongst two or more affected councils. It may also translate into a need for additional financial resources and staff. In any case, most of the local funding of the climate change mitigation/adaptation actions will come from the public purse since the benefits of investments are largely of a social nature.

7.10.2 External Funding

Not all climate change actions can get funding from the Lesotho Government budget. It may be necessary to look for external funding in the form of donor support. Many development partners and multilateral institutions and climate funds will be willing to finance climate change mitigation/adaptation projects in developing countries. Some of these institutions also contribute in the form of international best practice. The multilateral donors such as the United nations Development Programme (UNDP), the United Nations Environmental Programme (UNEP), and the Food and Agriculture Organization (FAO), as well as multilateral facilities such as the Global Environment Facility (GEF) and bilateral donors have been funding climate change adaptation activities in Lesotho and will probably continue to do so where there are well conceived and well articulated proposals. Some of the donors have templates that can be used to develop sound investments in climate change mitigation/adaptation. There are also several international NGOs that are involved in the design and implementation of climate change measures at the local level throughout the country.

7.10.3 The Private Sector

A changing climate comes with threats to economic activity and physical assets. However, it can also open opportunities or new horizons for new businesses and investments. As a result, growing attention should also be paid to funding sources by the private sector. It is now common practice to demand that corporate institutions should attempt to cover their carbon footprints by adopting green technologies in their production processes, providing funds for land rehabilitation (In the case of activities such as mining), protecting the biodiversity of the environment within which they operate, and providing financial and other assistance to fund projects aimed at improving the livelihoods of communities that neighbour their operations as a form of social responsibility. On the other hand, the scarcity of biomass energy sources in rural Lesotho, with associated energy insecurity of the rural population, has encouraged private companies to invest in renewable technologies, particularly solar technologies, in order to meet the growing demand for energy resources.

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Appendices

Appendix 1 Legal Instruments for the Environment in Lesotho

Number	Name of Legal Instrument	Objective of the Legal Instrument	Status of Legal Instrument
41/1967	Historical Monuments, Relics, Fauna and Flora Act, 1967	A law relating to the preservation and protection of historical monuments/relics, flora and fauna in Lesotho.	Very limited implementation. Parts superseded by Order 18 of 1993 and Environment Act No. 10 of 2008.
22/1968	Chieftainship Act, 1968	A law providing for duties (to promote the welfare and interests and maintain public safety and order in the area of jurisdiction) of the office of chief, and associated administrative issues, including land and rangelands allocation.	Still in force but parts in conflict with Act 45 of 2010.
12/1970	The Public Health Order, 1970	A law that makes provision for the surveillance, prevention, and control of communicable diseases; establishment of sanitary conditions; and maintenance of food and water safety.	Still in force but limited implementation. Parts included in Act No. 10 of 2008.
11/1975	National Parks Act, 1975	A law paving the path for the creation of national parks in Lesotho.	Still in force although only vigorously implemented recently by the LHDA.
6/1997	Local Government Act, 1997	A framework law setting out the statuses, powers, and duties of local councils in Lesotho. The latter include control of natural resources, environmental protection, grazing control, water supply in the villages, physical planning, agriculture, forestry, etc.	Still in force with amendments in 2004 to pave the path for local elections
22/1978	Water Resources Act, 1978	A law that provides for the control, protection and conservation of water resources, specifying water uses, water administration and pollution control.	Repealed by the Water Act 2008
11/1980	Town and Country Planning Act, 1980	This law provides for the orderly development of urban and rural land by promoting efficiency and economy, and improving amenities.	Still in force but limited implementation.
LN39/1980	Range Management and grazing control Regulations 1980	Regulations setting out framework for grazing control by chiefs through grazing permits, establishing approaches to disease control and range recovery strategies and prohibiting veldt burning	Still effective but parts overtaken by Act 6, 1997 and Act 45, 2010.
LN22/1980	Water Resources Regulations 1980	Regulations passed to guide the implementation of the Water Resources Act 1980	Partially effective since there are no updated regulations. Does not include trans-boundary water management
LN36/1980	Forest Regulations 1980	Regulations that control deforestation, grazing, squatting and constructing buildings on forest lands.	Partially effective since there are no updated regulations.
8/1981	Road Traffic Act 1981	An act specifying, amongst others, procedures for the licensing of drivers and vehicles, rules for the utilization of roads, the use of non-motorable transport on public roads and the control of motor vehicle noise	In full force although resources for enforcement are limited; parts are included in Act 10 of 2008.
24/1983	Human Rights Act 2003	A law designed to guarantee and safeguard the rights of individuals, including the right to work, to free choice of employment, to just	The law is effective although discrimination against women in the

		and favourable conditions of work and equal pay for equal work without discrimination	workplace is still widespread
23/1986	Lesotho Highlands Development Authority Order, 1986	A law creating the Lesotho Highlands Development Authority (LHDA) and defining functions and a wide range of powers, including environmental management, of this authority over the same region.	Still in force, with exemplary successes in some Mountains region areas
24/1992	Labour Code Order 1992	Internationally aligned law providing for employment and conditions of employment in the public and private sector, covering issues such as health, safety and welfare at work; employment of women, youth and children; unfair labour practices and protection of wages.	Still effective although under revision.
18/1993	Managed Resources Areas Order 1993	A law making provision for the protection, preservation, and conservation of ecological processes, natural systems, aesthetics and biodiversity of a specified area; for the establishment of managed resource area committees, and for controlling the utilization and re-use of the same natural resources	Still in force but limited application in grazing areas. Parts of the law included in Act 45 of 2010 and in Act 10 of 2008.
17/1998	Forestry Act,1998	A law that repeals the Forest Act 1978 and provides for the sustained management of forests and forest reserves and the regulation and control of the utilisation of forestry products.	Still in force although limited application.
4/2002	Tourism Act, 2002	An Act that provides for the establishment for a corporation to spearhead the development of tourism, the control of tourism development, and encouragement of the enhancement of the physical environment for development.	A number of ecotourism attractions have been secured for protection. Implementation is limited by resource limitations.
4/2005	Mines and Minerals Act 2005	An Act that, amongst others, provides for the adoption of international practices and standards in the mining industry - submission of EIAs, preservation of the natural environment, minimization of damage to natural and biological resources, prevention of environmental pollution, rehabilitation, reclamation, etc.	In force with sections repeated in Act 10 of 2008.
42/2006	Labour Code (Amendment) Act 2006	An amendment to the Labour code Order 1992 to provide for information and education of employees on HIV and AIDS, testing, confidentiality, discrimination in employment, working conditions, protection against victimization, care and support, and workplace HIV and AIDS policy and guidelines.	Still operational although there are limited resources for effective enforcement
9/2006	Legal Capacity of Married Persons Act 9 of 2006	A law repealing the common law and any other practice whereby a husband acquires the marital power over the person and property of his wife.	Still operational although there are limited resources for effective enforcement
10/2008	Environment Act 2008	A comprehensive legislation to address a host of issues such as the institutional framework, environmental planning; environmental impact assessments, audits and monitoring; environmental quality standards; pollution control; environmental management (conservation and protection) and environmental restoration.	Parts of the law, particularly EIAs, under implementation by the Department of Environment. Lack of resources remains a problem for implementation
15/2008	Water Act 2008	A law that provides for the management, protection, conservation, development and sustainable utilization of water resources in Lesotho	In force, with implementation constrained by droughts and limited resource

			availability
45/2010	Land Act, 2010	An Act that aims at the introduction of the sustainable utilization and management of land in Lesotho, specifying issues relating to administration, allocation in rural areas, land titles in urban areas, leasing and transactions, limitations on land holding, expropriation and compensation. The Act puts authority for agricultural land allocation, including grazing land, on local authorities.	Parts of the law under active implementation by the Land Development authority. Resource limitations remain a problem.

Appendix 2 Possible Mitigation/Adaptation Actions by Sector

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A. Agriculture

The main factors that define the resilience of agricultural communities to climate change are:

- The exposure of farming socioeconomic systems and agro-ecosystems to the impacts of climate change - Exposure depends mainly on biophysical factors, such as geographic context and site-specific climatic conditions;
- The sensitivity of such systems to the exposure - Sensitivity is related to the specific characteristics of the social-ecological systems and refers to the degree to which farming systems are able to respond to a change in climate conditions, either positively or negatively; and
- The ability of the local farmers and their socioeconomic system to adapt to the new situation - Ability of farmers to adapt to the new climate conditions may be considered to be a function of wealth, technology, education, information, skills, infrastructure, access to resources, and stability and management capabilities.

A lot of preparatory work is required to facilitate the design and implementation of appropriate climate change adaptation measures in Lesotho. Amongst some of the outstanding issues are the following:

- A closer examination of the potential impacts of changes in climate on agricultural production - the impacts of increasing atmospheric CO_2 concentrations, rising temperatures, and water stress could assist decision-making relating to the choice of adaptation measures;
- Although it is possible that Lesotho could benefit from changes in climate, the capacity of small-scale farmers to take advantage of these opportunities appears limited. More needs to be known in this respect;
- Further evaluation and extension of the different adaptation measures could improve the decision-making process and enhance the robustness of adaptation measures; and
- A thorough assessment of the risks and opportunities for Lesotho's agricultural sector resulting from potential changes in climate.

Climate Change Objectives

- Integration of climate change issues into agriculture sector policies, strategies, plans and regulatory frameworks;
- Development and implementation of an agricultural research agenda that addresses climate change issues and provides mechanisms to enhance climate change resilience;
- Development of climate resilient agriculture and food systems for all agro-ecological zones through strengthening the technical capacity of agricultural research and extension services for climate-smart agriculture;
- Promotion of conservation farming in order to improve sustainable agricultural production and natural resources management; and
- Development of human resources capacity for research and promotion of climate-resilient agriculture.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Longer dry spells interspersed with heavy rainfall events	• Accelerated hydrological soil erosion; • Reduced area of arable land; • Increased nutrient and sediment transport in streams and rivers; • Flood hazards for farmers and livestock; and • Reduced access to farms in rural areas.
Recurring droughts and rising temperatures and suboptimal rainfall	• Reduced availability of soil moisture; • Increase in bacterial and viral animal diseases; • Increases in water temperatures and therefore lower water quality,

	leading to ecosystem imbalances; • Crop failure due to variability and unpredictability of weather conditions; • Increasing incidence of alien diseases and pests as a result of changes in temperature and humidity; • High mortality rates of livestock due to climate related diseases and extreme weather events; • Increased food insecurity in the face of limited irrigation practices and limited access to climate smart technologies; • Loss of climate resilient native species of crop seeds and livestock breeds; and • Low productivity of livestock due to heat stress.
Increased precipitation variability	• Undermining of the rural economy as well as of rural livelihoods due to vulnerability of agriculture; and • Crop failure and food insecurity for a largely agriculture-dependent population.
Early frost and longer winters	• Reduced duration of the growing season.
Dry soils during dry spells	• Decreases of soil micro-organisms and reduced soil biology.
Heavy rainfall events on degraded soils with poor infiltration capacity	• Heavy runoff that washes away nutrients and organic matter of the top soil; • Land degradation; • Reduced recharge to ground water; • Flooding and crop damage; and • Reduced availability of safe water for people and livestock.
Changing climatic conditions and land degradation	• Reduced productive capacity of rain-fed agricultural croplands and rangelands; • Reduced availability and productivity of palatable grass species in the rangeland areas • Stress factors and yield losses; • Multiplication of new diseases, insects and pests; • Reduction of composition and amount of forage; and • Severe impacts on local livelihoods and national food security.
Extreme temperatures ranges	• Changes in livestock feed intake and lower productivity due to reduced grassland, crops and water availability.
Higher concentrations of CO_2	• Higher crop production and productivity.
Climate change induced irrigation	• improvement in agricultural production; • Reduction in the number of food insecure households in Lesotho; and • Enhanced security against global price fluctuations.
Non-optimal combination of plant growth factors (CO_2, light, water and mineral nutrients)	• Lower crop yields.
Increase in temperature coupled with an increase in atmospheric CO_2 levels	• A fertilising effect on crop growth for certain species and on grassland productivity (Increase in agricultural productivity); • Extension of the frost-free period and resultant extension of the growing season for major crops; • Changes in current distribution of crops; • Increase in the spatial distribution and intensity of existing pests, diseases and weeds due to higher temperatures and humidity; and • Improved survival of pathogens and/or their vectors, which may cause risks for health in animal populations.
Combined climate change events in	• Lack of proactive water catchment management; • Declining water availability and quality;

Lesotho	• Uncertainty regarding government policy (e.g. land reform); • Poor implementation of policies; • Absence of effective extension services; • Insufficient funding for research; • Challenges associated with new technologies; • Poor road infrastructure; • Challenge of investing in new technology; • Increasing input costs; and • No relief/protection in the value chain for disaster.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Drought related harvest failure	• Crop diversification involving crops with differing susceptibilities to droughts, pests, flooding, etc.; and • Optimal crop densification.
Loss of essential soil resources	• Conservation agriculture with the following advantages/benefits: ○ Minimises soil disturbance; ○ Reduces and reverses soil loss; ○ Provides permanent soil cover; ○ Encourages minimal use of fertilizers; ○ Improves soil chemical, physical and biological properties; ○ Crop residues facilitate water infiltration, suppress weeds, reduce evaporation and improve soil fertility; ○ Allows minimal disturbance of soil surface, reducing impacts of raindrops on the soil; ○ Includes crop rotation and other improved practices; and ○ Protects degraded watersheds.
Droughts and related crop and livestock stresses	• Research into breeding resilient crop varieties and livestock breeds; • Introduction of improved drought resistant seed varieties and improved livestock with a tolerance for climate extremes, and adoption of climate change adapted cropping patterns; • Supplemental irrigation development; • Water harvesting; • Catchment protection with forests; • Protection of wetlands and other water sources; • Grassing of the rangelands; and • Supplementary feeding will be required throughout the year under predicted climate change scenarios.
General climate change impacts	• Development and implementation of climate screening guidelines in order to identify risks and vulnerabilities, exploit opportunities and adapt to adverse impacts of climate change; • Making agriculture climate smart through an integrated approach - Adoption of climate smart agriculture (CSA) includes soil/water conservation practices like watershed management; water harvesting and mulching and grazing management; planting of multi-purpose tree species; adoption of agronomic practices like crop rotation and multiple cropping of legumes alternating with non-legumes; conservation farming; agro-forestry; integrated farming; generation and use of climate-smart varieties of crops; development and use of high-yielding genetic stocks of crops and livestock; forecasting weather and market risks and alerting farmers through the media. The adaptation strategy carries the following advantages: ○ The strategy can deliver joint adaptation and mitigation outcomes[24];

[24] Locatelli, B. et al, "Integrated Climate Change Mitigation and Adaptation in Agriculture and Forestry: Opportunities and Trade-offs" in ***WIREs Climate Change***, Vol.6, Nov./Dec. 2015, pp585-598.

	○ Moving away from mono-cropping for subsistence; ○ Best utilisation of the growing space; ○ Management for maximum productivity; ○ Ensured nutritional and economic security for better health; ○ Improves the soil's physical and chemical properties, its nutrient status and biological components; ○ Promotion of high-yielding germplasm with climate-smart attributes like pest resistance and drought tolerance; ○ Creating awareness among producers about climate-resilient agriculture; and ○ Creation of micro-finance schemes. • Building and strengthening of the capacity of extension agents in climate smart agriculture to enhance support to farmers; • Promotion of capacity-building and awareness for farmers on climate smart agricultural practices; • Collection, documentation and dissemination of indigenous knowledge of agricultural climate change adaptation practices; • Increasing area under fodder crops in order to sink CO_2 and conserve moisture; • Introducing crop varieties and livestock breeds that are tolerant to varying climatic conditions and to pest/disease occurrences; • Promotion of diversified agricultural practices, including agro forestry, dry-land farming, vegetable production, etc. in order to reduce the risks and increase the capacity of farmers to cope with climate change extreme events; • Tree planting and reseeding of pastures to provide nutritious forage and minimise soil erosion and moisture loss; • Collection of an inventory of existing local/traditional varieties and breeds; • Redesigning of livestock housing units to reduce heat stress (poultry and pigs); • Decreasing livestock stocking rates in order to conserve grazing land; • The conservation and utilization of adapted indigenous animal genetic resources; • Strengthening animal disease control through surveillance and risk assessment to determine ways of preventing the spread of diseases; • Introduce risk transfer schemes (e.g., agricultural insurance schemes) against harvest failure due to climate conditions; and • Evaluation of the economic implications of the various adaptation options available to decision makers.
Climate change induced droughts and land degradation	• Improvement and harmonization of research activities in climate smart agriculture; • Adaptive research where various crop trials have been conducted with the participation of farmers (through training and workshops) and assistance from development partners; • Conservation agricultural trials where ploughing and removal of crop residues are discouraged, with reports of improved yields; • Planting date - Timely planting and timely operations; • Dissemination of drought tolerant crop varieties; • Minimisation of moisture loss by reducing row spacing; • Crop rotation and intercropping with leguminous crops as a source of nitrogen; and • Conservation of genetic resources of traditional crops and livestock; • Development of environmentally friendly and energy saving irrigation systems; • Promotion of the application of organic manure (dung and crop residues); • promotion of gene banks, community seed banks, zoological and

	botanical gardens to conserve the biological diversity of valuable plant and animal species; and • Improvement of early warning systems on adverse weather, pests, and disease occurrences in order to provide up-to-date information and decision-making support.

B. Water Resources

Climate Change Objectives

- Integration of climate change issues into water sector policies, strategies, plans and regulatory frameworks;
- Analysis of the potential effects of various climate change scenarios, together with other uncertainties, on the water resources of Lesotho;
- Development of adaptation strategies to reduce the effects of climate change across water-using sectors and rationalise the utilization of water resources; and
- Build capacity within agencies in the water sector to maintain a continuous, adaptive process of planning to ensure water security for Lesotho.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Recurring droughts, rising temperatures and suboptimal rainfall	• Altering of the seasonal snow melt, runoff, and soil moisture content; • Reduced supply reliability across water use sectors (upstream and mid stream activities), including domestic, agriculture, hydropower, and industry; • Dry wetlands and sponges; • Reduced surface and ground water resources - lower water tables, dry rivers and dry springs; • Failure to meet the requirements of domestic demand growth - population and the economy; • Increased demand of water that is required for irrigation; • Opportunities for increased irrigation if temperature increases result in longer growing seasons or more favourable growing conditions for new cash crops; • Undermining of economic growth and development resulting from long-term vulnerabilities of the domestic and industrial sectors (Indirect); • Domestic and industrial water security highly vulnerable under historical and current climate conditions, as well as under the full range of future climate scenarios (World Bank: 2016); • Reduced quantity and reliability of water transfers to South Africa; • increased biological and chemical degradation of water quality; • Changes in watershed agricultural practices and in the resulting pollution loads from agriculture; and • Possible reduced revenues from water exports and lower economic growth and development. (High degree of resilience to predicted future climate change scenarios by the LHWP (World Bank: 2016)).
Changes in precipitation patterns and increase in average air temperatures	• Increased flooding; reduced rainwater infiltration; and increased erosion; • Increased erosion of soils that are degraded or have been deforested or overgrazed; • Erosion-induced reduction of the rate of infiltration of water into the soil; • Reduced rate of groundwater recharge as well as an increased rate of

	surface water runoff due to poor infiltration; • Degradation of watershed areas and other sensitive ecosystems result in multiple negative impacts on water resources; • A decline in groundwater levels will reduce the availability of safe drinking water for people and livestock; • Changes in hydrological regimes with an immediate impact on the use and distribution of water; • Contamination of surface water sources; and • Increased vulnerability of rural communities who are dependent on groundwater for drinking and cooking.
Seasonality of precipitation and inter-annual variability	• Changes in the cropping calendar/cycle and suitability of cultivars; • Changes in crop yields, crop quality and even crop choice.
Impacts of warmer temperatures on water supply	• Higher evapotranspiration rates, thereby increasing crop water requirements; and • Increased water demand as a result of more frequent or more intense heat waves and dry spells.
Impacts of warmer temperatures on waste water	• Increased challenges to biological and treatment processes of treatment plants; • Changing chemical balances and eutrophication in receiving water bodies; and • Reduced capacity to meet waste water treatment standards.
Impacts of heavy rainfall events on water supply	• Reductions in water quality - increased turbidity and sedimentation of surface water; • Undermining of water purification capacity; • Damage to storage and reticulation infrastructure; • Threats to human health, the equilibrium of the ecosystem and the prevention of natural hazards; • Inadequate infiltration and ground water recharge resulting in challenges in aquifer storage and recovery; • Loss of reservoir capacity as a result of increased erosion in the watershed; • Damage to water infrastructure (treatment plants, pumping and conveyance as well as outfall) and disruption of services; and • Increased risks of landslides and associated damage to infrastructure.
Impacts of heavy rainfall events on waste water	• Increased loading of pathogenic bacteria and parasites in reservoirs; • More frequent overflow events of sewerage systems; • Damage to water infrastructure (treatment plants, pumping and conveyance as well as outfall); • Increased of untreated sewerage overflow contaminating water supply sources; and • Changes in the quality of watershed runoff and associated increased pollution loads in receiving water sources.
Difficulties in predicting climate events	• Challenges in precipitation and temperature data - still has gaps; and • Challenges in agricultural data - remains weak.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
General vulnerabilities and risks of climate change on the water sector	• Assessment of the vulnerability and sustainability of water resources under predicted climate change scenarios • Building capacity in risk assessment, technological solutions and adapted and flexible management practices, as well as in emergency preparedness measures. • Awareness and communication to promote a common

	understanding of the risks, impacts of climate change and the measures necessary to adapt; • Making climate science accessible to the average citizen to improve people's understanding of the problem and their receptiveness to changes; • Capacity development for different stakeholders and professionals that are already involved with water management and climate change; • Research and development of local knowledge and the technology that is necessary to adapt to climate change in the water sector; • Information, consultation and involvement of all relevant stakeholders that are concerned with climate change; • Integrate water into the national policy discourse and institutional framework on climate change; • Develop mechanisms to mobilize resources for climate change adaptation in the water sector; • Increase water storage relying both on natural and constructed systems; • Accelerate service provision and address the vulnerabilities of existing water supply and sanitation systems; • Improve food security through the development of efficient and resilient irrigation and drainage systems; • Develop new groundwater sources and secure appropriate groundwater recharge; • Diversify and improve water supply sources to reduce climate vulnerability; • Flood control - Reduce the negative impact of floods on land, ecosystems and human settlements; • Strengthening of networks of hydro-geological and meteorological observatories to improve the dissemination and use of water related information; • Construction of water reservoirs; • Technological upgrade of the measuring systems (e.g. remote sensing equipment, etc.); and • Mapping out flood prone areas under various climate change scenarios and build the necessary resilience.
Vulnerabilities and risks to Water Management	• Promotion of policy, institutional and fiscal responses to support the necessary adaptation and resilience-building actions in an informed and coordinated manner; • Data and information - Develop systems to collect, store and share ground and surface water data and information to guide decision and policy making; • Climate modelling and scenarios - Incorporate uncertainty about the future climate into planning and decision making; • Vulnerability assessments - Determine the groups, places, sectors and ecosystems that bear the highest risks associated with climate change; • Improvement of the accuracy and quality of hydrological data; • Precipitation measurement and flow forecasting - Develop a sound scientific basis for predicting and forecasting future hydrological conditions; • Ensure the minimum vital flow (MVF) downstream major dams; • Early warning system - Provide reliable and timely information on the likely incidence of floods and droughts; • Promote events for awareness raising in the areas affected by the variation of the hydrological cycle (extreme events, drought, high runoff variability, etc.); • Introduce integrated water resource management to optimise the

	use of water across sectors; • Optimisation of storage operation - Balance the interests of various demands - environmental flows, flood reduction, agriculture, hydropower generation, domestic demand, industry, etc.; • Water demand management - Minimize water losses and improve social equity and water use efficiency; • Groundwater management - Protect groundwater resources and improve recharge mechanisms in the long term, e.g. utilization and management of rain water; • Water quality management - Control water pollution and account for the potential impact of climate change on water resources quality; • Integrated water resources management - Coordinate the development and management of water, land and related resources; • Building capacity to facilitate the integration of climate change into water resources development and utilization policies, legal frameworks, strategies, plans and programmes; • Development and strengthening of infrastructure and technologies related to water development and use; • Use of grey water for agricultural purposes in dry summer months; • Strengthening of the current methods for monitoring the status of surface and ground water and river flows; • Mobilizing technical assistance and help for capacity-building from the international community; and • Regular reviews/evaluations and updates of climate change impacts and adaptation measures in the water sector.
Domestic and industrial water vulnerabilities	• Continuation of rural water supply infrastructure investments (e.g. installation of communal standpipes and protection of springs); • Support for the further development of water resources in the highlands of Lesotho; • Promotion of water harvesting techniques; • Embarking on catchment protection; • Promotion of recycling techniques; • Investments in continued development of the human resources, technological, and resource capacity - ensure a sustainable, strategically aligned water management system that can provide a basis for the continued socioeconomic development of Lesotho; • Investments in data integrity and enhancements to strengthen the underlying assumptions in the analysis and to monitor the predicted outcomes. Specific data needs: o A more detailed examination of how climate extremes, such as extended drought periods and changes in the intensity and frequency of rainfall, might affect water supply in Lesotho; o Data on agricultural areas, cropping patterns, yields, and inputs; o Current water withdrawals by South Africa from the Caledon River; o Future demand by South Africa caused by climate change; o Data on capital, operation, and maintenance costs of planned infrastructure; and o Data on sedimentation and related processes that contribute to increased sediment loads to rivers. • The development and application of tools used in the analysis, as well as the methods for interpreting climate statistics and understanding effects and vulnerabilities, and in the design of robust strategies; • An economic evaluation of the robustness of different adaptation options in the water sector; and • Continued development of the Lowlands Water Supply Project in order to improve the reliability and resilience of the domestic and

	industrial water supply.

C. Energy

The energy sector must identify and evaluate how climate change impacts can disrupt supply, alter demand patterns and damage infrastructure. The following are key elements of building energy resilience through an effective International Energy Agency (IEA) recommended resilience building strategy:

- Climate information - This includes the collection and tracking of statistical data on weather and climate, the development of vulnerability assessments nationwide, the development of scenarios of future regional and local weather patterns, and the communication of data and information to all stakeholders.
- Adaptation strategies and plans - Overall guidance to the energy sector on how to enhance its resilience to climate change impacts, increase energy security, create synergies between mitigation and adaptation, and fostering inter-sectoral co-operation and management planning.
- Institutional co-ordination and partnerships - Integrating adaptation considerations across policies and management approaches through coordination across policy domains (e.g. water, transportation, energy) and levels of government (e.g. between central and local governments), engagement of non-governmental organisations and the private sector, and mobilisation of scientific knowledge.
- Capacity building - Capacity building includes the exchange of information and best practices, training for risk auditing and resilience enhancing measures, training for fast emergency response and recovery, and training for data management and forecasting.
- Action across the resilience "value chain": robustness, resourcefulness and recovery - The enabling environment should support actions across the three main elements of promoting resilience: increased robustness, facilitating the ability to manage operations during extreme events and enhancing the ability to recover quickly.

Climate Change Objectives

- Integration of climate change issues into energy sector policies, strategies, plans and regulatory frameworks;
- Development and promotion of advanced renewable energy technology solutions;
- Development of energy efficient, low-carbon energy technologies;
- Making assets and operations resilient to climate-change impacts and adapting them to future changes;
- Promotion of energy research and development, and collaborate with local, regional and international energy research institutions; and
- Develop legal, regulatory and institutional frameworks to ensure energy security and an increased number of players in the sector.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Extreme weather events (Strong winds, rainstorms, snowstorms, thunderstorms and lightning)	• Reduced energy production and availability due to damages to power generation and distribution infrastructure; • The risk to energy infrastructure will grow as the frequency and intensity of certain types of extreme weather events increase; • Increased power outages and reduced economic activity; • Risk of source supply intermittency for wind and solar energy; • Increased infrastructure maintenance budget; and • Low economic growth and development. (Climate-related threats to transmission, storage and distribution

	systems include high winds, falling trees, snow and ice accumulation, temperature-related equipment failures, lightning strikes, storm surges and floods, efficiency losses and sagging of lines).
Recurring droughts, rising temperatures and suboptimal rainfall	• Reduced hydropower generation due to low levels of water and a rising demand for water from a growing population; • Reduced bio-energy production (particularly bio-fuel production) and power generation from some solar power systems which require water for cooling; and • Low energy availability since rural population relies heavily on biomass fuel sources to meet their basic household needs.
Increased flooding extreme precipitation and storms	• Damage to energy infrastructure which is located in flood prone areas; and • Landslides threat to power transmission lines.
Climate change induced high ambient temperatures	• Wild fires that often destroy energy infrastructure; and • Reduced power plant efficiency and increased demand for cooling water.
Climate change induced longer cold seasons	• Higher domestic and commercial demand for energy; and • Increased energy budgets;
Increased use of renewable energy sources	• Adverse landscape impacts of dams, solar panels, windmills, etc.
Climate change induced land degradation	• Reduced productivity of biomass, longer collection journeys for biomass energy sources and higher exertion for rural women.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies

Exposure to global fuel supply disruptions caused by extreme weather events and associated water stresses	• Development of renewable energy source-promoting policies - advantages include:
	  ○ Energy security - reduced dependence on foreign energy imports for Lesotho;
	  ○ A more distributed generation that offers a greater ability to localise and buffer disruptions, resulting in greater resilience;
	  ○ Environment - mitigating global climate change, regional acid and eutrophic precipitations, local air pollution, and indoor air pollution;
	  ○ Employment - technology development, manufacturing, installation and maintenance services;
	  ○ Technological development and competitiveness - rise of new and "greener" industrial products and processes;
	  ○ Rural development - improved energy services and income-generation opportunities; and
	  ○ Reliability - greater energy availability and/or reliability in areas where service from electric power grids may be intermittent or unreliable.
	• Development and promotion of advanced renewable energy technology solutions;
	• Expanded use of renewable energy sources by mounting public awareness campaigns;
	• Development of energy efficient low-carbon energy technologies that limit the use of fossil fuels and emit much less CO_2;
	• Embarking on demand-side energy efficiency management in order to offset the need for electricity capacity additions;
	• Rationalizing energy use in all sectors and increasing energy usage efficiency through consumption reduction;
	• Development of practices and tools that are designed to help manage physical hazards and adjust planning based on forecasts of

	future climate-related events, facilitating recovery actions; • Making assets and operations resilient to climate-change impacts and adapting them to future changes by assessing the risks of future climate-change impacts, e.g. designing wind turbines to better manage high wind speeds and modifying pipeline materials to withstand extreme weather events and temperature fluctuations; • Strengthening emergency preparedness and response measures to enable organised and co-ordinated reactions to energy disasters and disruptions; • Undertaking load forecasting using climate information; • Modelling climate impacts onto existing and planned assets in collaboration with meteorological services; • Improving energy efficiency of existing buildings; • Training emergency response teams for a fast and proper response in the case of a disaster, and also for quick repair and restoration actions; • Training for data management, modelling and forecasting in order to start integrating climate forecasts into energy system planning; • Development of logistical and back-up plans to provide for a rapid recovery from supply interruptions, e.g. pre-deploying emergency response teams and vehicles, and developing recovery strategies; • Establishment of technical, safety, environmental, risk, quality and service standards of energy generation/production, distribution, installation, use and maintenance; • Development of standards, codes of practice and specifications for mini and off-grid energy solutions; • Collaboration with local, regional and international energy institutions for energy information collation, dissemination, exchange and sharing; • Promotion of energy research and development, and collaborate with local, regional and international research institutions; • Reduce pressure on biomass energy resources through substitution and application of energy efficient technologies; • Promote private sector involvement in research, application, installation and maintenance of renewable energy systems; • Support infrastructure expansion under the Rural Electrification Programme and promote private sector involvement in off-grid energy generation and distribution; • Develop legal, regulatory and institutional frameworks to ensure energy security and an increased number of players in the sector; and • Reduce levies and taxes on imported components of renewable energy systems such as solar panels and collectors, and hydro/wind turbines.

D. Forestry

According to future climate predictions over Lesotho, there are two possibilities in which climate change will affect the future stability of forests (Second National Communication: 2013). The first is that in a scenario with increasing temperatures with longer growing seasons, trees will grow faster and flourish in areas where they have never grown before and absorb more carbon dioxide. On the other hand, the second view postulates that warmer temperatures will invite more forest fires and insect predators and generate more carbon dioxide from the decomposition of dead trees. Whatever scenario comes to rule, the fact is that extreme weather events such as wind storms, droughts, forest fires, floods, etc. are already having adverse impacts on forests and these are expected to become more frequent in future.

A number of resilience challenges face the forest sector in Lesotho today. These include the following:

- The rapid deterioration of the land base and the high prevalence of indiscriminate burning;
- Difficulties to protect forests under the communal land tenure system and associated high forest management costs;
- High and increasing demand for wood (material utilization, biomass energy, grazing, etc.) and associated difficulties to balance forest protection and wood harvesting;
- Population pressure (human and animal), the growing demand for ecosystem services and rapid expansion of human settlements and urban areas;
- A low forest survival rate due to, among other factors, harsh climatic conditions; and
- Poor range management practices.

Climate Change Objectives

- Integration of climate change issues into forestry sector policies, strategies, plans and regulatory frameworks;
- Development of the resilience of communities, individuals and the private sector to develop, control and manage their own forest resources;
- To provide alternative energy sources for rural communities in order to relieve the pressure on established biomass forest resources;
- Promote ecosystem balance by improving and maintaining the conservation of indigenous forest resources and habitats at optimum level using ecologically sound forest management practices;
- Rehabilitation of degraded natural ecosystems by planting drought resistant and other climate change resilient tree species; and
- Integration of gender and traditional medicine into the planning and implementation of forestry programmes with the objective to promote sustainable harvesting of forest resources.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Climate change induced high ambient temperatures	• Improvement in the growth and yields of various forest species (One scenario) and associated increases in biomass production; • Wild fires that often destroy forest resources and reduce their services to humans and animals (Another scenario); • Reduced supply and composition of forage, wild vegetables, shelter, construction materials, medicines, etc.; • A shift in the distribution of tree species; • Low survival of forest replacement stock; • Increased stress on tree health resulting from invasions and impacts of pests and diseases; • Scarcity of biomass energy for rural communities; • Exacerbation of soil erosion and land degradation; and • Diminishing indigenous biodiversity.
Extreme climatic events	• Reduced resilience and regenerative capacity of forest resources; • Increased runoff and flooding; • Soil erosion and siltation of waterways; • Reduction of soil quality and productivity; • Decline in water quality; • Loss of habitat for ground and surface biodiversity; • Loss of capacity for carbon sequestration; • Loss of ecosystem function; and • Unsustainable rural livelihoods.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Vulnerabilities resulting from extreme weather events	• Introduction of mixed forests that include natural regeneration and uneven-aged, patchy structures in order to maximize the natural gene pool and the resilience of the forest; • Reliable monitoring of damage occurrence; • Exchange of data and experience/cooperation) in tackling climate change risks and damages; • Dissemination of information of the important role that forests play and the services they provide to the local communities; • Extending regeneration as far as possible in order to allow for quick recovery in the case of extreme events; • Mainstreaming gender and traditional medicine in the planning and implementation of forest development programmes; • Development and implementation of measures to increase forest stability and resilience; • Encouragement of climate smart community land use practices and natural resource planning; • Promotion of alternative sources of fuel for domestic use, especially in rural areas, e.g., LPG as an alternative to wood fuel, etc.; • Strengthening of climate change related institutional and technical capacity in natural resource management; • Advancement of skills in forest tree management at the professional and community levels; • Promotion of plantation development and management in selected areas for private and public-private partnerships, through increased funding and other opportunities; • Rehabilitation of degraded natural ecosystems through enrichment planting in degraded forest reserves and designated areas; • Supporting initiatives for the enhancement of carbon sinks and reducing pressure on forests for fuel wood through afforestation/reforestation measures; • Implementation of sustainable forest management plans; • Support for agro-forestry programmes initiated to conserve trees and crops; • Establishment of bio-reserves for biodiversity preservation and sustainable utilization of natural resources; • Reinforce local community involvement in natural resource management; and • Mount research on the impacts of climate change on forestry.

E. Human and Animal Health

Climate Change Objectives

- Integration of climate change issues into health sector policies, strategies, plans and regulatory frameworks;
- Building climate change resilience amongst communities through the strengthening of primary health care systems and preventive care;
- Enhancement of research and development on climate-sensitive or environmental diseases through capacity building and technological acquisitions;
- Strengthen the public health care delivery system through opening and maintaining collaborative initiatives in the areas of waste, air and water pollution, nutrition and zoonotic disease management; and

- Expanding access infrastructure and strengthening of community, district and national preparedness for health emergencies and disasters.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Climate change induced formation and transport of air pollutants.	• Increased burden of illness and mortality associated with air pollution and poor ventilation; and • Increases in incidence of respiratory tract infections.
Thermal inversions and local wind systems and hampering of the dilution and transport of pollutants	• Increased burden of illness and mortality associated with air pollution and poor ventilation; and • Increases in respiratory tract infections.
Increases in temperatures	• Worsened air quality; • Cardiovascular complications; • Kidney diseases; • Heat strokes and fatalities; • Improved survival of pathogens and/or their vectors, which may cause risks for health in human populations; • Threats of increased frequency of new tropical diseases such as malaria; • Increases in the occurrences of forest fires, accompanied by threats to human and animal life, and to biodiversity and property; and • Low water security and poor sanitation, and higher risk and persistence of diseases, especially climate-related ones such as diarrhea and cholera.
Increases in the frequency and intensity of heat waves	• Direct threat to human and animal life; and • Indirect threat to human and animal life by reducing quantity and nutritional value of food.
Climate change induced land degradation	• Deterioration of the quality and coverage of traditional medicine ; • Deterioration of indigenous knowledge systems in traditional medicine; and • Poor crop yields and widespread food insecurity and malnutrition.
Heavy rainfall events and flooding	• Increase in zoonotic diseases such as rabies, tick fever, etc.; • Increased injuries from accidents (increase in road accidents or from collapse of buildings, etc.); • Increase in health emergencies and threat to health facilities; • Reduced access to health services by flooded rivers; and • Water pollution and threats of water borne diseases.
Heavy rainfall events on degraded soils with poor infiltration capacity	• Reduced recharge to ground water and water stress for rural communities.
Severe winters and frequent and heavy snowstorms	• increase in local vector borne and zoonotic diseases; and • Increases in snow related deaths and injuries.
Storms (Strong winds, rainstorms, snowstorms, thunderstorms and lightning)	• Increases in physical injuries and death in humans and animals; • Damages to health infrastructure; and • Disruptions in health services.
Increases in the frequency and intensity of heat waves	• Threats to human and animal health and life.

Thermal inversions and formations of local mists and fog.	• Reduced vision and the threat of road accidents.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies

Air pollution related vulnerabilities and risks	• Strengthening of current air pollution prevention policies;
	• Combining local air pollution and global climate change mitigation policies;
	• Adjusting and strengthening current surveillance and monitoring systems to ensure prompt responses to the potential increase of acute atmospheric pollution situations;
	• Ensuring adequate early warning systems to ensure prompt communities' response to reduce exposure and avoid health risks; (To be effective and complete, an early warning system requires: (i) risk knowledge, (ii) monitoring and warning service, (iii) dissemination and communication and (iv) response capability.)
	• Provision of relevant information and education on environmental pollution and related hazards/risks/diseases;
	• Prioritising adaptation options that also offer opportunities for decreasing emissions of methane and other ozone precursors in industry, farming, mining and transport activities;
	• Strengthening technical and managerial measures to decrease emissions of fine particulate from biomass burning, livestock and agricultural activities;
	• Promotion of soil management practices that can enhance both the adsorption of pollutants and carbon sequestration;
	• Promotion and support for research on pollution and related impacts, and looking into:
	  ○ The exposure of populations to its consequences;
	  ○ The sensitivity of the population to the exposure; and
	  ○ The ability of the local socio-economic system and populations to adapt to the new situation.
	• Advocacy for the introduction of a carbon tax on imports of used motor vehicles upon registration and consolidation of all energy related Funds into a single fund to finance mitigation/adaptation activities in the energy sector; and
	• Creation and maintenance of an updated database of sources and types of pollution in the country.

Increases in temperature and heat waves	• Development of climate resilient technologies; • Mounting public awareness campaigns and early warning systems; • Promoting tree planting for the provision of shade; • Using sensors to check for cholera contaminated water; and • Promoting avoidance strategies where important activities are shifted to cooler hours of the day.
Climate change induced food insecurity	• Increasing liaison with the agricultural sector to promote food security; • Promote fortification of available and consumed foods, particularly for women and children; • Prevent and control the transmission of food-borne and food-related diseases; • Promote a healthy environment that encompasses safe food and water, adequate sanitation, shelter, ventilation and hygiene; • Participate in surveillance campaigns with other stakeholders, focussing on the prevalence of malnutrition and associated diseases; • Promote institutional and community-based nutritional care and

	support to vulnerable women and children; • Mount child nutrition screening, counselling and support, and promote breast feeding; • Strengthen emergency preparedness and response. • Promote and support food quality and safety research; and • Strengthen public awareness about food quality, food safety and food-borne diseases.
Disease outbreaks and injuries caused by extreme climate change events	• In collaboration with other stakeholders, strengthen emergency preparedness and response; • In collaboration with other stakeholders, strengthen the coordination of responses to emergencies; • Strengthening of community, district and national preparedness for health emergencies and disasters; • Conduct epidemiological investigations of climate change related disease outbreaks; and • Provide standard guidelines and protocols on health emergencies to all health facilities, health staff, relevant field professionals and communities; • Decentralise health care infrastructure and services and introduce outreach programmes; • Develop climate proof health infrastructure; and • Construct access infrastructure in remote and isolated areas.
Health issues emanating from climate change land degradation	• Promote and preserve indigenous knowledge systems in traditional medicine; • Collaborate with relevant institutions to establish botanical gardens for the conservation of medicinal plants; and • Identify vulnerable areas and strengthen health centres to improve access to health facilities within walking distance.

F. Infrastructure and Transport Systems

The extent to which infrastructure transport systems are affected by climate change impacts depends on:

- The exposure of infrastructure and transport systems to climate change risks (e.g. magnitude, intensity and extension of a climate-induced hazard);
- The sensitivity of infrastructure and transport systems to the specific degree of exposure; and
- The ability of the local socioeconomic and transport system to adapt the sector to the new situation.

Climate change adaptation policies and measures in infrastructure and transport systems must be long-lasting and should not contribute to the increase of greenhouse gas emissions or put pressure on natural resources. It should therefore integrate the following:

- Considerations to enhance positive synergies with other crosscutting aspects such as biodiversity, air quality, energy and carbon neutrality;
- Prevention and control of natural hazards and limiting their consequences on the infrastructure and transport sector; and
- Ensuring sustainable development in infrastructure and transport, and in their policies.

Climate Change Objectives

- Building climate change resilience by developing climate proof economic and social infrastructure, as well as transport systems;
- Creation of a low carbon economy by developing clean energy and energy-efficient economic and social infrastructure and transport systems;

- Development of human resources capacity for governance and the development of innovative and low-energy consumption technologies in economic and social infrastructure and transport systems; and
- Establishment of an institutional and regulatory framework to monitor and regulate GHG emissions from economic and social infrastructure and transport sector.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Storms (Strong winds, rainstorms, snowstorms, thunderstorms and lightning)	• Damages to economic and social infrastructure, assets and services by landslides, rock slides and floods; • Higher maintenance and rehabilitation budgets; • High number of accidents and fatalities; • Poor access to socio-economic services by remote Mountain communities; • Disruptions to communications and connectivity; • Threats of land degradation and inundation of settlements, croplands and rangelands by damaged water reservoirs; and • Threats to human and animal life from dysfunctional infrastructure.
Increases in the frequency and intensity of heat waves	• Destruction of economic and social infrastructure and assets by fires; and • Impacts on the performance of certain modes of transport.
Thermal inversions and local wind systems, and the hampering of the dilution and transport of pollutants	• Poor visibility and increased risks of traffic accidents; and • Threats of damage to roadside infrastructure by traffic accidents.
Increases in temperatures	• Changes in the quality and functionality of transport and other infrastructure; and • Increases in the occurrences of forest fires and therefore increased threats to transport and other infrastructure and assets.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
General vulnerabilities and risks of climate change and associated extreme events on the transport sector	• Identification of local infrastructure risk areas following harmonised procedures (e.g. by following integrated risk assessment protocols); • Increase of resilience of local economic and social infrastructures (e.g. by adapting building codes and regulations to more climate-proof materials and alignments); • Reinforcement of local prevention and strategic management of natural hazards especially in transport infrastructures; • Introduction of the concepts of participative planning processes, the involvement of stakeholders and a concept of a risk dialogue; • Strengthening of individual preparedness and precautions; • Ensuring vertical coordination of local adaptation initiatives with the national adaptation framework; • Anticipation of the risks of economic and social infrastructures deterioration due to climate change by conducting inspection surveys and developing crisis management plans; • Reinforcement of the climate change adaptation capacity of disaster management and economic and social infrastructure institutions (e.g. adapt existing tools and planning methods for an innovative management looking towards the future);

	• Fostering of vertical and horizontal co-operation of local public and private bodies to enhance crisis management; • Development and strengthening of reliable detection and early warning systems and clearly define responses and responsibilities; • Development of a seamlessly integrated transport and diversified system that can withstand climate change related disturbances; • Expansion of access and communication infrastructure to cater for isolated Mountain communities and other rural settlements during disaster periods; • Assessment of the quality and safety of existing infrastructure and upgrade the same to climate proof standards; • Mount research and studies on the vulnerability of various forms of economic and social infrastructure to the impacts of climate change and on the development of climate proofed infrastructure; • Development of a comprehensive database on various economic and social infrastructure indicating resilience capacities and maintenance and rehabilitation needs; • Exploration of options for environmentally friendly technologies for sanitation infrastructure and enforce standards of construction of ventilated improved pit latrines (VIPs); • Improvement of the energy efficiency of buildings and fuel efficiency of motor vehicles, and adopt green technologies in the building and transport sectors. • Encouragement of the use of non-motorised modes of transport; and • Establishment of an institutional and regulatory framework to monitor and regulate transport sector GHG emissions.

G. Tourism Development

The extent to which the tourism sector could be affected by climate change vulnerabilities depends on:

- The exposure of tourist infrastructures and services to climate change hazards;
- The sensitivity of local tourist systems to the specific degree of exposure; and
- The ability of the local socioeconomic and technological system to adapt the tourism sector to climate change, including climate variability and extremes.

Climate adaptation in the tourism industry should integrate:

- Considerations to enhance positive synergies with other cross-cutting aspects such as biodiversity conservation, water management, transport facilities, energy supply and carbon neutrality;
- Considerations to mitigate natural hazards regarding control and prevention initiatives in more exposed mountain tourism areas; and
- Actions to ensure the sustainable development of the tourism sector in terms of nature and landscape protection and the planning of more long-term climate-proof tourism infrastructures or products.

Climate Change Objectives

- Development and promotion of Lesotho's biodiversity tourism by protecting, conserving and managing the country's biodiversity and ecosystems and making them more resilient to adverse impacts of climate change and climate variability;
- Development and promotion of Lesotho's cultural heritage by protecting, conserving and managing cultural heritage resources and making them more resilient to extreme weather events;

- Development of infrastructure for the protection, conservation, preservation and management of heritage assets by sheltering them from extreme weather conditions and by creating platforms for innovation, product development and marketing;
- Development of legislative guidelines to control the harvesting and bio-trade in endangered biological species and establish botanical gardens and animal zoos for educational and tourism purposes;
- Set clear protocols and procedures for tourism stakeholders and rural and other communities to observe the protection status of various flora and fauna in the country; and
- Mount awareness campaigns for promoting climate-proof tourism infrastructure that is resilient to extreme climate events.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Longer dry spells interspersed with heavy rainfall events	• Accelerated hydrological soil erosion with impacts on sensitive mountain environments, with implications on the attractiveness of mountain environments for tourism.
Heavy rainfall events on degraded soils with poor infiltration capacity	• Heavy runoff that washes away nutrients and organic matter of the top soil, with adverse impacts on biodiversity and nature-based tourism.
Changing climatic conditions and land degradation	• Changes in the biological composition and distribution; • Proliferation of invasive species; • Reduced endemism and ecotourism; and • Increased occurrence of natural hazards in tourism areas, with threats to tourism infrastructure and tourist lives.
Increases in temperatures	• Increases in forest fire occurrences; • Threats to biological endemism and associated threat to ecotourism; • Accelerated spread of invasive species; • Deterioration of tourist products or resources e.g. reduction in water quality and quantity, reduction in landscape beauty, etc.; • Reduced length of snow season and skiing opportunities; • Reduced tourism attractions; • Reduced availability of wetland grasses for craft-making; and • Destruction of rock paintings through exfoliation. (Note: The extension of the summer season and the occurrence of milder temperatures in the spring season could increase tourist destinations).
Increases in forest fire occurrences	• Threats to biodiversity and mountain endemism; and • Threats to tourism facilities and tourists.
Storms (Strong winds, rainstorms, snowstorms, thunderstorms and lightning)	• Destruction of tourism infrastructure by storms and damage to tourism products such as mountain based heritage resources. (historical caves and paintings) by landslides and rockslides.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies

Vulnerabilities resulting from climate change and variability	• Enhancement of climate change disaster risk preparedness in the mountain tourism sector through the adoption of technical measures for the protection of people and properties; • Diversification of tourism products towards activities that are less susceptible to climate variability; • Creation of interesting tourist destinations all year round and take advantage of climate change opportunities; • Controlling and management of any object of aesthetic, geological, prehistoric, archaeological, historical or scientific interest; • Reduction of the exposure of winter sports to climate change constraints by using managerial and technological adaptation options where these are environmentally and economically feasible; • Strengthening of cross-sectoral collaboration in tourism adaptation policies, in particular, exploiting positive synergies between tourism, biodiversity, environment, energy, transport and climate policies; • Ensuring meaningful involvement of local tourism stakeholders in the definition and implementation of adaptation strategies to ensure successful implementation; • Provision of appropriate information on climate change impacts, vulnerabilities and opportunities to the tourism sector; • Identification, documentation/mapping and protection of heritage sites and ecotourism destinations; • Construction of infrastructure for the conservation, preservation and easy management of heritage resources and their protection from extreme climate events; • Promotion of documentation and creation of digital platforms for innovation, product development and marketing; • Development of an appropriate curriculum that includes climate change and its possible adverse impacts on tourism; • Protection, conservation and management of cultural heritage resources and making them more resilient to extreme weather events; • Development of infrastructure for the protection, conservation, preservation and management of heritage assets by sheltering them from extreme weather events; • Development of legislative guidelines to control the harvesting and bio-trade in endangered biological species; • Establish botanical gardens and animal zoos for educational and tourism purposes; • Set clear protocols and procedures for tourism stakeholders and rural and other communities to observe the protection status of various flora and fauna; and • Mounting awareness campaigns for promoting climate-proof tourism infrastructure.

H. Biodiversity and Ecosystems

The physiographic features of Lesotho are a given natural resource that is known to provide diverse microhabitats and ecosystems that support a rich and unique biodiversity. However, the majority of households are directly dependent for their livelihoods on traditional crop farming and extensive livestock rearing under a communal land tenure system. The resultant pursuit of unsustainable land management practices has resulted in high pressures on the environment, threatening its unique biodiversity.

Climate Change Objectives

- Integration of climate change issues into biodiversity policies, strategies, plans and regulatory frameworks;

- Development and implementation of a legal framework to biodiversity (flora and fauna) and to regulate trade in endangered species;
- Conservation of vegetation cover and therefore provision of climate change resilient habitats for the country's fauna species and protection for some of the flora species;
- Protection of wetland ecosystems and watersheds in order to make them more resilient to changing climate regimes; and
- Institutional capacity building and promotion of community participation in the conservation of Lesotho's biological diversity.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Changes in the climate regime	• Change in ecological functions and therefore in the structures of ecosystems and habitats; • Changes in the distribution of the species population due to changes in habitat; • Increasing loss of habitat and reduced biodiversity (flora and fauna); • Ecological changes: lack of synchrony between food availability and stages of development; and • Diffusion of alien species, with related changes in species composition, habitat structure and function of ecosystems.
Extreme weather events, including floods, snow, lightning, wild fires, etc.	• Injuries to wild life and threats to biodiversity, including endemic species; • Extinction of animal species and vegetation varieties of economic value; • Changes in species composition, habitat structure and function of ecosystems; • Invasions by alien species and deterioration of forage quality; and • Scarcity of vegetation of economic, medicinal and nutritional value.
Increases in temperatures and frequent heat waves	• Loss of vegetation cover, extensive land degradation, poor animal nutrition and loss of biological species; • Loss of biological diversity due to heat stress; • Desiccation of wetlands and loss of wetland ecosystems; • Reduced water supply and loss of riverine ecosystems; • Reduced water supply for flora and reduced soil moisture to support flora and sub-surface ecosystems; • Increased CO_2 emissions from dead and decomposing flora and fauna; • Loss of ecosystem services (Supply of wood, shelter, building materials, medicinal plants, ornamental plants, wild vegetables) for rural communities; and • Reduction of CO_2 sinks.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Climate change induced change in ecological functions and therefore in the structures of ecosystems and their habitats	• Development, coordination and implementation of strategic plans and policies on biodiversity management; • Awareness campaigns about the mutual interdependence between climate change and protection and conservation of ecosystems and their biodiversity; • Maintenance and restoration of biodiversity and ecosystems that sustain communities' resilience and capacity to mitigate and adapt to climate change; • Recognition of the natural capital and its functions in a cross-sectoral

	framework that integrates agriculture, environment and economic policies; • Maintenance of the functionality of ecosystems that provide ecosystem services through a cross-sectoral framework that recognises ecosystem and biodiversity interdependence. • Development of management plans for protected areas, protected species and ecosystems; • Promotion, management and conservation of biodiversity in and outside their natural habitat; • Promotion of scientific research and knowledge of biodiversity and biodiversity conservation; • Determination and classification of the conservation status of plants and animal species and their ecosystems; • Undertake the bio-prospecting of biodiversity resources and control their utilization to ensure conservation; • Identification of biodiversity areas, hotspots species to be protected; • Identification and control of alien and invasive species; • Control of trans-boundary movements of biodiversity resources; • Control of international and national trade in protected biological species; • Provision of infrastructure in current public protected areas and prescription of infrastructure requirements in any other protected areas; • Establishment and maintenance of database on biodiversity; • Promotion and protection of biodiversity traditional knowledge systems; • Prevention and control of wildfires and carrying out prescribed burning inside protected areas; • Mainstream gender and traditional medicine in the planning and implementation of biodiversity and ecosystem development programmes; • Implement the National Biodiversity Strategic Action Plan targeted at the conservation and protection of vulnerable ecosystems; • Promote the establishment and capacity building of conservation groups at community level including youth, herders, traditional healers and other key natural resource users; • Development of standards and guidelines on biodiversity management; • Development of guidelines for the sustainable harvesting and utilisation of plant and animal species without compromising the food chain and quality of biodiversity; • Collection of seeds of threatened and endangered species and propagate these through the establishment of community gardens; and • Support systematic reintroduction of the lost and valuable species of plants, birds and animals to appropriate habitats.
Injuries to wild life and threats to biodiversity caused extreme weather events, including floods, snow, wild fires, etc.	• Establishment of a national zoo and wildlife rehabilitation centre; and • Establishment of National Botanical Garden and regulation of establishment of communal and individual protected areas.

I. Range Resources

Lesotho's range resources are known to be severely degraded mainly by the failure to maintain a sustainable balance between animal populations and carrying capacities. Overstocking, coupled with

spectacular forms of land degradation, uncontrolled expansion of human settlements, indiscriminate veldt burning, overharvesting for biomass energy resources, has opened the country to severe forms of vulnerability to climate change induced extreme weather events. In the rangelands sector, there has been some extensive loss of palatable and nutritious species which have rapidly given way to less palatable Karoo invader species. The situation has been exacerbated by the washing away of soil nutrients and organic matter by heavy runoff, accelerated soil erosion and associated decline in biomass production, reduced availability of soil moisture, decreased soil micro-organism activity and reduced soil biology.

Climate Change Policies

- Integration of climate change issues into range resources policies, strategies, plans and regulatory frameworks;
- Enhancement of the productivity of livestock and ecosystem balances by rehabilitating and improving the quality of rangelands;
- Making rangeland resources more resilient to climate change by developing and implementing effective conservation strategies;
- Raising public awareness and promoting community and stakeholder active participation in rangeland resources management;
- Enhancement of the aesthetic beauty of the landscape in order to increase opportunities for recreation and ecotourism; and
- Improvement of income opportunities and livelihoods of rural communities.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Climate change induced land degradation	• A shift in ecosystem boundaries, including changes in species composition and biodiversity; • Increased risks of flooding and landslides resulting from degraded ecosystems; • Reduced capacity of mountain ecosystems to generate ecosystem goods and services (freshwater, timber, medicinal plants, and protection from landslides and flooding) for the benefit of local communities; • Increased exposure of local communities to hazards such as floods, landslides, drought and food insecurity; • Destruction of microenvironments in which palatable grass species flourish; • Loss of protective vegetation cover; • Loss of palatable range species and replacement by less palatable and invader species; • Decline in biomass production; and • Deterioration of top soil and accelerated soil erosion.
Prolonged drought, erratic rainfall as well as early and late frost	• Deterioration and poor condition of rangelands; • Changes in distribution of rangeland species, with more tolerant species such as Karoo bushes increase in abundance. • Poor yields of rangelands - Loss of rangeland quantity and quality leading to: ○ Loss of income from the sale of livestock; ○ Loss of utilization opportunities to honour social and cultural obligations; ○ Loss of water purification qualities and therefore negative impact on water exports to South Africa; ○ Loss of aesthetic beauty and associated opportunities for ecotourism development; ○ Loss of use for those rangeland resources that provide

	medicinal services and income from those that are items of bio-trade; ○ Loss of species diversity and wildlife habitats; ○ Loss of soil stability - Reduced protection of the land from heavy rainfall, overland runoff and wind; ○ Loss of hydrological function or water holding capacity and flow regulatory function of the land; and ○ Disruption of the nutrient cycle between plants and animals. • Shortage of rangeland resources such as wild vegetables, livestock grazing, thatch, handicraft grasses, fuel wood, traditional medicines and water for traditional rituals.
Increases in temperature and heat waves	• Destruction of rangelands by veldt fires; and • Poor range condition resulting from desiccation of the top soil and plant nutrients.
Heavy rainfall events on fragile soils of the mountain region	• Heavy loss of top soil through erosion and therefore reduced area for range cover; and • Wash away of soil nutrients and species seeds.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Range vulnerabilities resulting from climate change induced land degradation	• Development of appropriate adaptation policy and adaptation strategies for range rehabilitation of degraded rangeland resources; • Promotion of effective stakeholder participation in the planning and implementation of rangeland adaptation and management programmes; • Promotion of an integrated approach to the planning and management of adaptation programmes for the recovery of rangeland resources; • Development and facilitation of the implementation of grazing management plans that incorporate rest, rotation and variations of deferment of grazing areas; • Review and/or strengthen existing guidelines and grazing control regulations for the sustainable management of range resources; • Strengthening existing and resuscitate dormant Range Management Associations (RMAs) and, where necessary, promote the establishment of new ones; • Restoration of degraded rangelands through ecologically sound methods with the active participation of stakeholders, including communities and herders; • Provision of relevant information and education, including indigenous knowledge, on the planning, implementation and sustainable management of range resources; • Establishment of an appropriate structure for the coordination of relevant environmental management stakeholders, including local authorities, the private sector and other organizations that are engaged in environmental protection programmes; • Prohibition of utilization of rangeland resources by stock that are deemed unproductive and unsuitable; • Engagement of stakeholders of the livestock industry to improve governance and reduce livestock numbers; and • Development of man-made ecosystems in the rangelands; • Review and promote local structures to be equipped with skills for effective management and control of rangelands resource exploitation; • Work in collaboration with relevant authorities to strengthen curriculum in tertiary institutions to integrate Climate Change and

	Range Science; • Promotion of opportunities for the private sector, NGOs and CBOs involvement in the development and management of rangeland resources; • Mainstreaming of gender and traditional medicine in the planning and implementation of rangeland management programmes; • Devising and implementing mechanisms for mandatory compensation for the utilisation of rangeland resources (environmental services/ecosystem services), e.g. the gazing levy; • Designation of hot spots for conservation and protection of threatened and endangered species; • Development of guidelines and procedures to be followed when developments/infrastructural works deemed destructive to rangeland resources e.g. mining and road construction, are to be undertaken, and for restoration of disturbed rangeland resources.
Rangelands vulnerability resulting from droughts, increases in temperature and heat waves	• Promotion of irrigated fodder production for stall feeding; • Research into breeding drought resilient livestock breeds; • Research into pathogens, and/or their vectors, which may cause risks for the health of animal populations; • Catchment protection with forests; • Protection of wetlands and other water sources; • Grassing of the rangelands for regeneration; • Development of a national fire policy for rangelands management; • Support for range and related research (rangelands situation and alternative strategies) to inform strategy development and decision-making processes; • Promotion of collaborative research with local and international research partners, institutions and individuals; • Development of a national rangeland inventory and computation of the current and future stocking levels and recommended carrying capacities; • Development of guidelines on cattle-post adjudication for the protection of wetland resources; • Determination of the level of exploitation of range resources and effects of mitigation measures; • Monitoring of rangelands on regular basis and establishment of a reporting system to capture rangelands programme implementation; • Determination of rangeland health status and recommendation of appropriate remedial measures for full recovery; and • Enhancement of the resilience of rangeland resources by fostering the diversification of alternative livelihood coping strategies in order to reduce communities' dependence on cattle posts and wetland areas for grazing and other activities.

J. Mining

Climate Change Objectives

- Promotion of a conducive, environmentally sustainable, socio-economic inclusive and resilient mining sector in Lesotho;
- Promotion of a climate change conscious, adaptation responsive and compliant governance system in the mining sector;
- Improve the policy and legal frameworks in order to address emerging issues, such as environmental sustainability, and adopt the best international practices;

- Drawing up comprehensive regulations and enforcement procedures for mining companies' compliance with environmental and social responsibilities; and
- The establishment of an Environmental Protection Fund for mine closure environmental and social rehabilitation.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Climate change induced extreme weather events	• Exacerbation of adverse impacts on the natural environment's biodiversity and ecosystems; • Exacerbation of air and water pollution and increased threats to occupational health and safety; • Exposure of local communities to adverse environmental and social consequences; • Inundation/water logging of mines and disruption of mining activities, exacerbating local environmental degradation, e.g. bleaching and mine tailings; • Damage to energy supply infrastructure which often leads to disruptions of operations; • Threats to downstream damage to the environment from runaway sludge from damaged sludge dams; • Threats to downstream riverine systems resulting from sludge leakages and water pollution; • Appropriation of community assets in the form of croplands, rangelands, biomass sources, medicinal sources, wild vegetables, etc. • Increased hydrological soil erosion from overflowing reservoirs; • Changes of species composition caused by noise pollution, particularly on wet days; • Increased competition for drinking water resources with local communities and livestock; • Threats to wetlands and sponges and their biodiversity and ecosystems in the Mountains region; and • Possibilities of oil pollution from plant and equipment.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Vulnerabilities resulting from climate change induced extreme events	<u>Environmental protection</u> • Mainstreaming/ integration of climate change into mining policies, legal frameworks, strategies and plans; • Ensuring that environmental and social impact assessments (ESIAs) and environmental management plans (EMPs) are compiled before licensing; • Drawing up comprehensive regulations and enforcement procedures for the monitoring of compliance with environmental responsibilities; • Conducting environmental audits to evaluate the performance of existing mines, and identification of areas that need improvement; • Making provision for an <u>Environmental Protection Fund</u> for mine closure environmental and social rehabilitation; • Ensuring that mine closure obligations and procedures, including contributions to the Environmental Protection Fund and securing funds for mine closure rehabilitation, are complied with; • Taking all steps necessary to ensure that the mining industry upholds the highest standards of environmental protection and

	employs best practice; • Ensure flood control measures, including the development of downstream early warning systems to regulate environmental damage; • Promote mining sector investments in clean energy generation and other initiatives; and • Encourage participation of the mining sector in water harvesting and recycling programs. <u>Community participation and involvement</u> • Ensuring the participation of local communities in issues and decisions of material interest to them and at every stage of the mining cycle; • Making inclusive and informed community consultations part of licensing conditions; • Ensuring that mining companies work in strategic partnerships with local communities during the planning and implementation of Corporate Social Responsibility plans and other community development projects; • Development of guidelines for use by mining companies and local communities in developing Corporate Social Responsibility plans; and • Ensuring that mining companies, in consultation with local communities, develop post-mine closure plans for the post-mine closure of environmental and socio-economic sustainability of local communities. <u>Occupational health and safety</u> • Setting-up obligatory standards and regulations, and compliance procedures for upholding the highest standards of occupational health and safety; • Capacitating, skilling and appropriately equipping Government agencies that are tasked with monitoring, supervising and enforcing compliance with set standards in occupational health and safety; and • Conducting regular training and awareness campaigns of occupational health and safety. <u>Human rights</u> • Promoting and facilitating the participation of women in mining through the removal of obstacles which are impeding their involvement; • Curbing the incidence of child labour in Lesotho's mining industry; • Proactively engaging mining communities in programmes for preventing child labour in mining; and • Domesticating and enforcing International Labour Organization (ILO) conventions on decent working conditions and regulations against child labour and human rights abuses.

K. Manufacturing

Like elsewhere in the world, manufacturing establishments in Lesotho have a high carbon footprint, implying that the manufacturing sector will inevitably be affected by any future climate change regulatory regime. To avoid the creation of a carbon constrained economy and future reputational risks to local companies, therefore, manufacturing establishments should begin to confront the risks and opportunities that climate change presents. So far, there is no systematic consideration of the ecological, economic and social effects of climate change in factory planning. This is particularly the case with manufacturing operations that result in significant, direct greenhouse gas (GHG) emissions and those whose operations

are highly energy intensive. Of note are garment and textile industries, flour milling, brick and kiln operations, and beverage making establishments.

The vulnerability of manufacturing to climate change emanates from the fact that it is highly dependent on climate sensitive sectors such as energy, agriculture, water and transport. Since climate predictions indicate that these sectors will be adversely affected by extreme weather events (such as heat waves, floods, droughts, wind and snow storms), the future is likely to witness an increase in the risk of damage to industrial plants, products and infrastructure, as well as supply chain disruptions. On the other hand, as a major GHG emitter, manufacturing is also considered to be a big contributor to climate change. Carbon emissions and chemical and waste water effluent discharges from manufacturing establishments are not only underlying causes of climate change but sources of toxins that are dangerous to human and animal health. They have also been associated with extensive ecosystem damages and high levels of toxicity in riverine ecologies.

Climate Change Objectives

- To create a platform for the development of a low carbon, sustainable economy as part of Lesotho's obligations under international protocols and agreements that aim at mitigating global GHG emissions;
- To promote international co-operation and international competitiveness in a sector where there is increasing international pressure to reduce GHG emissions and advance sustainability;
- To build climate change resilience in a sector that carries a big potential in terms of contribution to GDP and employment;
- To integrate climate change issues into industrial policies, strategies, plans and regulatory frameworks; and
- To protect the health of the population and ecosystems by monitoring and controlling industrial emissions and effluents.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Climate change induced extreme weather events (such as heat waves, floods, winds, droughts, and storms)	• Energy supply interruptions resulting in energy supply fluctuations or blackouts; • Greater resource inputs scarcity (such as water and raw materials); • Greater risk of plant, product and infrastructure damage and supply chain disruptions from extreme weather events; • Accelerated deterioration of materials and equipment; • Higher production costs (e.g. higher insurance premiums due to increased costs associated with more frequent extreme weather events); • Damage to riverine ecologies by toxic industrial chemical residues and waste water; • High levels of pollution of drinking water sources for both humans and animals; • Increased air pollution and associated diseases; • Compromised standards of occupational health and safety; and • Environmental pollution resulting from the use of energy inefficient processes and environmentally damaging products;

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Vulnerabilities	• Ensuring industrial buildings and infrastructure can cope with

resulting from extreme weather events	extreme climate events such as heavier downpours, strong winds, snowstorms, etc.; • Undertaking climate risk assessments to improve planning and decision-making: → Physical risks to manufacturing resources; → Infrastructure risks; → Business and regulatory risks; → Market risks; and • Incorporating expected climate impacts in planning and decision-making, such as location of factories.
Vulnerabilities resulting from GHG emissions	• An assessment of each manufacturing establishment's carbon emissions profile; • Identification and assessment of pollution sources, prioritization of pollution management, and development and application of environmentally sound technologies; • Undertaking an energy audit of the manufacturing facilities and processes, and implementing those energy efficient actions with the shortest payback time; • Producing new climate-friendly products and technologies; • Reduction of electricity use and emissions by introducing energy efficiency; • Installing energy-efficient lighting by replacing incandescent lamps with compact fluorescent lamps or light emitting diodes (LEDs); • Remanufacturing from recovered, possibly already recycled products; • Promotion of industrial ecology where one manufacturer's waste serves as another's feedstock or is used as an input to the production process; • Cutting emissions by developing onsite renewable power generation in the form of solar panels and wind turbines; • Introduction of a cleaner national energy mix; • Maintaining equipment regularly to prevent efficiency losses and reduce heat losses or gains; • Increasing the productive use of materials, water and energy in industrial production through dematerialization of products and value chains, use of materials with longer service lifetime, and replacement of virgin materials with recycled materials; • Recycling, reuse and recovery of materials, energy and water and use of materials, water and energy from sustainably managed and/or low impact sources; • Minimizing environmental impact by reducing the generation of wastes and emissions; • Application of advanced process technologies with higher efficiency, proficiency and specificity; • Making waste management environmentally sound by enhancing liquid waste management, improving the management of chemical wastes and hazards and using highly efficient and effective solid waste incinerators; • Minimization of risks associated with production, use and disposal of chemicals through phasing out of toxic and other environmentally harmful substances; • Prevention of unintended formation and emissions of POPs and other hazardous pollutants; • Replacement of risky chemical processes with non-chemical or safer alternative chemical processes; • Regular monitoring of industrial operations to assess progress in controlling emissions and managing effluents, solid waste and grey water; and

	• Capacity building in factory planning and industrial process development, as well as in industrial effluent treatment and pollution assessment, control and management.

L. Housing Shelter

Extreme events that are associated with climate change pose serious threats to human settlements, making this sector one of the most vulnerable in the economy. The impacts depend on factors such as location, topography, housing designs, materials used, and other socioeconomic factors such as occupancy. Settlements that are located in flood prone areas, on wetlands, on discharge routes, in areas where there is poor drainage and downstream of dam reservoirs are at greater risk from climate hazards. Also very prone are informal settlements and those that are located in lightning belts and wind storm or tornado routes. In Lesotho, the vulnerability of human settlements is exacerbated by poor planning and lack of enforcement of adherence to standards, poor infrastructure (roads and bridges), particularly in peri-urban and rural areas, and inadequate climate proofing. Extreme weather events will not only cause damage to housing properties, including contents thereof and other properties, but result in injuries and fatalities to humans and animals, leading to higher maintenance budgets and higher insurance premiums.

Climate Change Objectives

- To Integrate climate change into human settlements policies, strategies, plans and regulatory frameworks;
- To build resilience by ensuring that human settlements are located clear of areas that are prone to climate change disasters, such as flood plains, culvert discharge points, below dam walls, etc.;
- To mount awareness campaigns about potential disasters that are associated with climate change extreme events;
- To build capacity in settlements planning, ensuring that they adhere to recommended housing standards and drainage structures;
- To introduce changes in the design of infrastructure, e.g. enhancement of the designs of roads, bridges and drainage systems to suit emerging climatic conditions; and
- To ensure that a programme of climate proofing existing and future human settlements is introduced, resourced and promoted.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Droughts, high temperatures and heat waves	• Shortage of appropriate biomass materials (poles and thatch) for construction of traditional housing structures; • The gradual disappearance the knowledge of good designs (safety and comfort) of traditional housing structures; • Increased costs of inputs for traditional housing structures; • Displacement of rural people who cannot cope and who end up settling in peri-urban areas in unplanned settlements with scanty basic services; • Proliferation of substandard corrugated roof structures and corrugated iron houses nationwide; • Expansion of unplanned urban and peri-urban settlements with inadequate basic services; • Injuries, heat-related fatalities and increased homelessness; • Compromised resilience to adverse climate change impacts; and • Increase in energy demand through increased use of air conditioning and other cooling systems.
Climate change induced extreme weather	• Damage or destruction of housing infrastructure by erosion and storms;

events - heavy torrents, floods, cold fronts, strong winds, tornadoes	• Threats of increased flooding, accelerated erosion, landslides and deterioration of housing infrastructure, as well as decrease in the overall quality of housing; • Threats of displacement of people and communities, creating environmental refugees; • Exposure of highly vulnerable rural migrant populations to the risks of trafficking and other forms of exploitation; • Rapid migration triggered infrastructure and housing needs that outpace governments' ability to respond; • Location of poor migrants on difficult or undesirable land in urban areas that is more likely to be in low-lying areas, on steep slopes, in ravines, and in other risk-prone areas exposed to extreme conditions such as floods and landslides; • Failure of rural migrants to afford standard building materials or upgraded structures due to low and unstable incomes as well as limited access to housing finance; • Vulnerability to wind damage and flooding of poor quality migrant housing built with substandard materials; and • Vulnerability of migrant populations since they are politically weak and usually live on land illegally and therefore cannot advocate for better protection from extreme weather conditions.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Vulnerabilities resulting from general changes in the climate regime	• Mainstreaming climate change into land use planning and ensure that the impacts of climate change are considered when planning for settlements and designing infrastructure; • Development of effective information, monitoring and assessment tools to evaluate the resilience of settlements to climate change, provision of guidance to planners and identifying priorities for implementing climate change responses; • Development and production of higher resolution climate change scenarios or vulnerability maps that can provide climate information to be integrated into medium-and long-term urban and rural development plans; • Design and implementation of economic and livelihood diversification programmes in rural areas; • Ensuring access to sustainable energy services in the housing sector and introduce energy efficiency in buildings; and • Use of energy efficient lighting and equipment and deployment of renewable energy in powering building electrical loads.
Vulnerabilities resulting from climate change induced extreme weather events	• Consideration of the specific micro climatic condition of the site in designing buildings - orientation and shape of the building, general wind direction and selection of building materials; • Ensuring access to emergency shelters in order to contain potential humanitarian emergencies and save lives; • Preparedness to help impacted families repair their homes or facilitation for the same families to stay or return to their homes, and thus reduce the burden on emergency response systems; • Preparedness to normalise educational, health and other public services after the disaster; • Making shelter designs that are stronger and better able to withstand climate change storms; • Provision of support policies and solutions for poor households to build storm and flood resilient houses; • Fortification of future safe housing initiatives targeting the poor and

	near poor for whom housing loans are often out of reach; • Capacity building and strengthening of skills that are required for the design and implementation of climate resilient housing programmes; and • Prioritization of vulnerable households, particularly poor households, female headed households, vulnerable children, people living with disability, elderly persons, people living with HIV and AIDS, etc.

M. National Heritage

Wikipedia defines natural heritage as "the sum total of the elements of biodiversity, including flora and fauna, ecosystems and geological structures". On the other hand, heritage is defined as "that which is inherited from past generations, maintained in the present, and bestowed to future generations", while cultural heritage refers to "the legacy of physical artefacts and intangible attributes of a group or society that are inherited from the past generations, maintained in the present and bestowed for the benefit of future generations". National heritage is therefore defined by the English Oxford Living Dictionary as" Items of special historical or cultural significance handed down from generation to generation of the nation as a whole".

Included as items of national heritage are: flora and fauna, landscapes, fossils and relics, rock paintings, national customs and traditions; crafts, technology and innovations, traditional arts, historical monuments, historical buildings; etc. Also included are abstract or intangible elements such as norms and mores; indigenous knowledge systems; aesthetics; and historical, cultural, scientific and economic values which need to be sustainably preserved as resources for present and future generations. In this regard, national heritage gives each nation a unique characteristic and a source of pride and identity. Also included as part of national heritage are traditional strategies that have enabled nations to adapt to their changing environments, particularly to conditions related to climate change and associated extreme weather events.

Lesotho's national heritage is already suffering severe strains whose causes can be traced back to the era of colonial domination. These, amongst others, include environmental degradation, loss of indigenous knowledge systems, encroachment by media disseminated Western value systems and poverty. The future climate change scenarios over the country predict further vulnerabilities in which the way people relate to or interact with their environment will change, leaving a void for future generations to refer to. Conscious efforts should therefore be made to build the resilience of Lesotho's national heritage for the benefit of present and future generations. However, the protection of cultural heritage sites is proving to be very difficult since they are very diverse. The key to successful preservation is to reduce stress from unsustainable activities that may aggravate the negative impacts of climate change on heritage resources.

Climate Change Objectives

- To Integrate climate change into national heritage policies, strategies, plans and regulatory frameworks;
- To build resilience for national heritage resources to withstand pressures from climate change extreme weather events;
- To build capacity for the sustainable preservation of national heritage resources for present and future generations to enjoy a broad range of cultural goods, services and activities;
- To conduct research and development of indigenous knowledge systems involving traditional strategies of building natural and cultural heritage resilience to adverse impacts of climate change as part of the preservation process;

- To develop effective information and educational tools and mount campaigns for the revival and preservation of Lesotho's national heritage and to build its resilience to the adverse impacts of climate change; and
- To develop mechanisms to safeguard cultural artefacts and other heritage resources against climate change impacts.

Vulnerabilities and Risks

Climate Change Event	Vulnerabilities/Risks/Opportunities
Droughts, high temperatures, heat waves and extreme weather events such as flooding, soil erosion and storms	• Changes in cultural diversity and socio-cultural interactions as communities are forced to change their work habits and ways of life to compete for resources or to migrate elsewhere; • Desertification, deterioration of permafrost and the decay of cultural landscapes; • Damage to archaeological sites by torrential rains, floods, windstorms, etc.; • Deterioration of built cultural heritage resources such as recession of façades in limestone or marble, soiling of stone surfaces, metal corrosion, biomass accumulation on façades, etc.; • Shifts in terrestrial biodiversity heritage resources as species shift ranges, changes in the timing of biological cycles, increased migration of pests and proliferation of invasive species to larger areas; • Increased biological infestation of organic building materials such as traditional thatch roofs; • Destruction of heritage sites and resources by torrential rains, floods, strong winds, fires, etc.; • Damage to heritage structures that are sensitive to sandstorms by the abrasion of sand over years; • The prevention of further desertification and similar soil degradation is crucial to the protection of nearby cultural heritage sites from the effects of climate change; • Damage to heritage sites and resources (tourism products) by climate change related desertification and land/soil degradation; • Possible diversion of tourists to alternative destinations following damage or destruction of tourism products by climate change related extreme events; • Loss of intangible cultural heritage, social structures, and traditional knowledge that has been passed on by forefathers as a result of climate change related migrations from rural to urban areas; • Loss of suitable habitats for some species of plants and animals, causing some of them to become stressed and, possibly, extinct; • Rising future air and water temperatures could magnify existing pollution problems, putting greater pressure on species of invertebrates, fish and plants; and • Negative impacts on existing food webs which support fish and bird life in rivers.

Possible Mitigation/Adaptation Strategies

Vulnerabilities/Risks	Mitigation/Adaptation Strategies
Vulnerabilities associated with extreme weather events	• Application of provisions from various areas of environmental law such as heritage conservation law, pollution law, land use law, construction law, water law, environmental impact assessment law, and planning law, etc. in an integrated way with the aim to formulate a comprehensive system of instruments and enforcement

	mechanisms to mitigate and adapt to the effects of climate change on heritage properties and resources; • Monitoring, reporting and adapting to climate change effects through environmentally sound choices and decisions at the household, community, institutional and corporate levels; • Promotion of the adaptation to climate change through global and regional strategies and local management plans; • Sharing knowledge and best practices, including research results, communication resources, educational and training resources, capacity building programmes, networking, etc. • Introduction of climate smart improvement of ecosystems - biodiversity, indigenous forests, rangelands, wetlands and fauna; • Adoption of sound policies and governance frameworks for land management and usage; • Mainstreaming gender and capacity building in improving sustainable land management; • Creation of buffer zones and improving drainage systems around heritage sites; • Promotion of research and development of indigenous knowledge systems involving traditional strategies of building natural and cultural heritage resilience to adverse impacts of climate change as part of the preservation process; • Enactment of legislation and regulations for the protection of traditional and intellectual property rights of local communities - intellectual property, genetic resources, traditional knowledge and folklore; • Mounting information and educational campaigns for the revival and preservation of Lesotho's national heritage, and to build its resilience to the adverse impacts of climate change; • Development of mechanisms to safeguard cultural artefacts and other heritage resources against climate change impacts; • Prevention of desertification and similar land and soil degradation in order to protect cultural heritage sites and resources from the effects of climate change; • Involvement of local communities in the monitoring of the health of their ecosystems for expeditious corrective actions; • Promote the use of traditional knowledge and values in the management of land resources, conservation, utilization and management plans for forests, woodlands, rangelands, wetlands, and other areas that have vegetation cover; and • Promotion of the active participation of local communities in the process of planning and management of natural resources and ecosystems in their own areas as a strategy for conservation.

Appendix 3 The Environmental Impact Assessment Process[25]

Section 113 of the Environment Act 2008 gives the Minister powers to make regulations to direct the implementation of various provisions of the law. EIA Guidelines that were drafted in 2002 within the framework of the Environment Act 2001 were formally adopted in 2010[26]. These guidelines, which detail out the EIA process, are currently under review in order to align their provisions with those of the Environment Act 2008. Plans are also underway to develop sector-specific guidelines that will address specific activities such as construction projects.

Guided by a host of principles of environmental management and international conventions and treaties, Section 3(2) of Part II of the Environmental Act 2008 sets out 16 principles of environmental management upon which the law is founded. Of interest is a requirement that the preparation of EIAs is a mandatory requirement for all proposed projects or activities that are likely to result in adverse or deleterious impacts on the environment or natural resources, and that the costs of environmental damage should be borne by those whose activities cause such damage.

The EIA is defined as a study to identify, predict, evaluate and communicate information about the impacts of a proposed project on the environment, and to detail out the necessary mitigation measures prior to project approval and implementation[27]. On the other hand, the primary objective of the EIA process is to promote sustainable livelihoods by integrating environmental issues into development planning. Other objectives are:

- To ensure that environmental and socio-economic costs and benefits of development activities are identified at the early stages of the planning process so that potential adverse impacts are either avoided or mitigated and potential benefits enhanced on time;
- To provide decision-making tools and information for the development of a management plan;
- To provide a framework for broader participation; and
- To generate information for monitoring, auditing, evaluating and enforcing mechanisms.

Although not all development activities have been brought into the EIA loop, the importance of conducting EIAs for all development activities with negative potential impacts on the physical and social environment is now fully institutionalized as a strategy for promoting sustainable development in the country[28]. In accordance with the guidelines, the EIA process should go through the following steps:

Step 1: Screening of Development Activity
This step involves ascertaining with the Department of the Environment at the beginning of planning and design whether:

- The development activity or project, depending on the scale, nature and location, is subject to a full or partial EIA process in terms of Section 19(1) of the Environment Act; and
- The qualifications and experiences of the consultants who will be proposed to undertake EIA studies, should these be necessary, are acceptable to the DOE.

Step 2: The Project Brief
A project brief is a scoping document that enables DOE staff to determine whether to issue an EIA licence to a development activity or project that falls under Part A of the First Schedule or to demand a full EIA[29]. In accordance with Section 6.3.3 of the Guidelines, a project brief requires public participation by interested or affected parties or individuals. The suggested contents of a project brief are listed under Section 20(1) of the Environment Act. After reviewing the project brief, DOE can make the following decisions:

- Approve the project without or with conditions;
- Request for more information on certain areas of the brief;
- Initiate public participation by affected communities; and

[25] This Annex was sourced mainly from the ***SADC Environmental Legislation Handbook 2012*** and the DOE ***Guidelines for Environmental Impact Assessment, 2010***

[26] Department of Environment (2010), ***Guidelines for Environmental Impact Assessment,*** Ministry of Environment, Tourism and Culture

[27] Department of Environment (2010) ***EIA Guidelines for Lesotho***, p.7

[28] Mokhehle, L. and Diab, R (March 2001), "*Evolution of environmental impact assessment in a small developing country: a review of Lesotho case studies from 1980 to 1999*" in ***Impact Assessment and Project Appraisal***, 19:1, 9-18, DOI: 10.3152/147154601781767249, p.17

[29] Walmsley, B. and Patel, S. (2012), ***SADC Environmental Legislation Handbook 2012***, Chapter 6, p.135

- Request a full EIA to be conducted.

Step 3: The EIA Statement
A development project or activity may fall into a category in which an environmental impact assessment study is required or may be one of those for which DOE has determined in accordance with section 20(5) that an environmental impact study should be undertaken. Usually undertaken by DOE approved consultants, this study culminates in an Environmental Impact Statement (EIS) whose detailed structure is specified in Section 20 (7) of the Environment Act 2008. If the EIS is deemed complete by the DOE, they may invite the public or affected persons to make comments. They may also hold public hearings for affected parties. Many donors will prefer a full public consultation process.

EIA Decisions
DOE can only make decisions based on complete and sometimes in-depth information. It is the duty of project promoters to ensure that they gather adequate and complete information at own cost. If the information is deemed inadequate, the promoters could be required to conduct more investigations and analysis, gather more information or conduct additional public participation. In cases where the DOE issues an EIA license, such license may be conditional, requiring that implementers should mitigate deleterious impacts and promote sound environmental management practices, with the conditions for approval being clearly spelt out in the license.

EIS decisions must be made in accordance with environmental policy, legal, planning, and administrative requirements and where an EIS is rejected, DOE must transparently supply reasons for such a decision to enable the promoter to appeal the decision. The legal framework also provides a framework for monitoring and auditing the implementation of approved development activities and projects and to impose fines in cases where non-compliance is identified.

Appendix 4 The National Project Cycle Management Process[30]

Introduction

The institution that is mandated to scrutinize the socio-economic impacts of development proposals and coordinate investment plans of all public sector institutions is the Public Sector Investment Committee (PSIC) of the Ministry of Development Planning whose Secretariat is the Department of Project Cycle Management (DPCM) of the same ministry. Whether projects are funded or not, and whether they are externally funded or not, all projects must be subjected to a screening and appraisal process before approval. The approved projects are then consolidated into the national Public Sector Investment Programme (PSIP). Expenditure can only be incurred on those projects that appear in the PSIP and are linked to the Ministry of Finance's Integrated Financial Management Information System **(**IFMIS).

The project cycle management is an iterative process between Ministerial Planning Units (MPUs) and DPCM before a project proposal is finalized and submitted to the PSIC for appraisal and approval. The process is divided into two stages for which there are templates: The Concept Note and the Project Proposal.

The Concept Note

The Concept Note comprises 3-5 pages of a project idea with adequate information to enable the DPCM to make a preliminary judgement about the likely technical, institutional and economic viability of the proposed project. It is generally designed to answer 3 questions:

- *What are the objectives of the project?*
- *Is the proposed project the best way to address these objectives?*
- *Is the link between the project and its objectives convincing?*

The suggested template for the Project Note is shown on table 1 below.

Table 1 Template for the Project Concept

Item	Content
Project Title	The title should be unambiguous and unique
Responsible Agency	Identify the agency responsible for managing the project
Brief Description	Summarise briefly (not more than 4 lines) the scope of works of the project (i.e. describe the activities to be undertaken)
Background	Describe the present situation and indicate why it is unsatisfactory
Purpose	Demonstrate that the project is relevant to national and sectoral policy. Relate to NSDP
Location	Indicate the physical location(s) of the project (and of beneficiaries if different)
Technical Description	Provide a more detailed description of the physical content of the project
Benefits	Describe and attempt to quantify the expected benefits and the intended beneficiaries
Relevant Information	Indicate the relationship to other projects and any significant implications for other agencies
Cost estimates	Provide a table showing the estimated capital cost (avoiding spurious accuracy), the expected recurrent requirements to service and maintain the completed project and any manpower implications. The table should show the phasing of capital costs (based on the logical sequence of tasks) and the likely completion year (which is assumed to be the year in which additional recurrent costs will be incurred). The profile should clearly indicate the basis for the cost estimates (source of information and the date at which they were produced). They should include an explicit provision of 20% for contingencies.

Source: DPCM 2016

The Project Proposal

Once a project's Concept Note has been approved by PSIC, the second stage of the project cycle, detailed work of project design and preparation, can then begin. For small-scale and less complex projects, this task is usually undertaken by staff of MPUs following a template provided by the DPCM (PSIP Form 1), while for larger and more complex projects, this is done by external consultants as feasibility studies and detailed project memoranda. Various agencies use different terminologies for project documents as shown on table 2 below:

[30] Projects in the transport sector have been used as examples in this template.

Table 2 Types of Project Documents by Funding Agency

Terminology	Funding Agencies/Remarks
PSIP Form 1	Government financed projects and EFA projects that are included in the Government accounting system
Project Memoranda	Larger and more complex projects funded as above
Signed Project Document	Projects funded by UN agencies, particularly UNDP and FAO
Staff Appraisal Report/Financing Agreement	Project proposals prepared by visiting missions for the World Bank and ADB
Financing Agreement	EU funded projects
Compact	Millennium Challenge Account funded projects (USA)

Source: DPCM, 2016

In developing project documents, local ownership of development programmes and projects is fundamental to ensuring relevance, effectiveness and sustainability. On the other hand, there is no strict format for a project proposal, each document being guided by specific circumstances. However, in all situations, PSIP Form 1 should be completed to accompany either the project memorandum, staff appraisal report or financing agreement.

Assessment of Project Costs
For transport infrastructure projects, cost estimates normally come from design engineers or from specialists in various project activities or components. The costs must be comprehensively itemised and various alternative solutions to achieve project objectives should be considered. The costs should incorporate:

- Comprehensive construction costs;
- The costs of undertaking anticipated environmental management activities, including compensation, if any, that are associated with each project alternative; and
- All external costs that are associated with each project alternative.

Assessment of Project Benefits
There is usually a wide range of benefits that are associated with access infrastructure projects, some of which cannot be subjected to quantitative analyses. The following categories of benefits should be comprehensively considered:

- Savings in vehicle operating costs (VOCs), a figure that can only be derived from projections of vehicular traffic levels on both the current and upgraded roads to the future, considering the traffic generation effect of the upgraded road;
- Savings in road maintenance and rehabilitation costs;
- Savings in time and in monetary terms between the ferry option which includes a no travel option during floods on the one hand, and the year-round crossing introduced by a new footbridge;
- Savings in the costs of accessing socio-economic services by rural communities resulting from the reduction in travel time, the lowering of transport costs, the location of service points in the local neighbourhood, and the lowering of costs by increased competition.

Transport infrastructure projects generally relax constraints to access and therefore by encouraging the location of investments and service centres within the local neighbourhood, by enhancing transport services to neighbourhood areas that are currently under-served, and by improving public transport, lowering transport costs and enabling many to access distantly located socio-economic services, they are a critical strategy in poverty alleviation. The incremental benefits of these changes can be estimated using budget figures of relevant institutions, failing which there should be detailed qualitative analyses.

To calculate savings in VOCs, traffic projections must be made on the current traffic levels before the upgrading and on the upgraded road that incorporates the traffic generation factor. These projections are then converted into VOCs using VOC parameters that are generated by the Lesotho Road Management System (LRMS) in the Network Planning Division of the Roads Directorate. Savings in road maintenance and rehabilitation costs are also estimated using maintenance and rehabilitation parameters of the Roads Directorate for various surfaces and footbridges. Other benefits that should be considered include the impacts of access infrastructure on gender relations, on children and other vulnerable social groups like orphans, herd boys, those infected with HIV and AIDS, the poorest of the poor, etc.

The Choice of Discount Rate
A convenient way to compare and add up costs and benefits that accrue at different periods from a project is to calculate their present value, which expresses them as an equivalent amount of today's Maloti through a process called discounting. This process converts the Loti value of costs and benefits accruing from a project in different time periods to their present value. The value of future Maloti relative to current Maloti is expressed in terms of a time preference rate or a discount rate. The rate of time preference for public projects is often referred to as the rate of social time preference or the social discount rate. It is always lower than the time preference for

private investment because society has a longer-term investment perspective than an individual.

There are two main approaches to the calculation of the social discount rate: (a) the social opportunity cost of capital and (b) the social rate of time preference. The former has been widely used by leading development banks such as the World Bank and the Asian Development Bank. With real discount rates ranging from 10% to 12%, the fundamental assumption is that in developing countries the governments tend to crowd out the private sector. However, applying such high discount rates may discourage investments in projects whose benefit streams accrue over long time periods as is typical with public infrastructure projects. A number of scholars (Lopez:2008; Warusawitharana: 2014, etc.), have now recommended the use of lower social discount rates that mirror the real interest rates at which developing countries borrow money.

Many scholars[31] have recommended the use of social discount rates that mirror the real interest rates at which developing countries borrow money from development banks. Following this recommendation, a social discount rate of 5%[32] which represents the yield-to-maturity of recent issuance of dollar denominated sovereign debt by selected developing countries, with maturity greater than 5 years[33] is recommended for use in all public sector projects in Lesotho[34].

Following the above recommendation, it is recommended that development practitioners in Lesotho should adopt a social discount rate of 5%[35] which represents the yield-to-maturity of recent issuance of dollar denominated sovereign debt by selected developing countries in the US financial markets, with maturity greater than 5 years[36].

Economic Decision-Making Tools
Many economic decision-making tools are usually used to measure a single project's worth or to compare the economic values of two or more projects. The common tools that are applied on transport infrastructure projects and are mandatory in accordance with DPCM requirements include the benefit-cost ratio, the net present value and the economic internal rate of return. The following are formulae used to calculate these measures:

A. The benefit-cost ratio:

$R = \Sigma[B_t/(1+r)^t]/\Sigma[C_t/(1+r)^t]$

Where:

B_i = The benefits of the project in year t, where t = 0 to n
C_i = The costs of the project in year t, where t = 0 to n
r = The discount rate (5%)
n = The projected lifetime of a project in years.

B. The net present value:

$NPV = \Sigma[(B_t-C_t)/(1+r)^t]$,

Where:

B_i = The benefits of the project in year t, where t = 0 to n
C_i = The costs of the project in year t, where t = 0 to n
r = The chosen discount rate (5%)
n = The projected lifetime of a project in years.

C. The economic internal rate of return:

$0 = \Sigma[(B_t-C_t)/(1+EIRR)^t]$

Where:

B_i = The benefits of the project in year t, where t = 0 to n
C_i = The costs of the project in year t, where t = 0 to n
EIRR = The economic internal rate of return
n = The projected lifetime of a project in years.
0 = Zero

[31] Lopez:2008; Warusawitharana: 2014, etc.
[32] The average yield of 7% adjusted for US inflation.
[33] Warusawitharana, M. (2014), ***The Social Discount Rate in Developing countries***, The World bank
[34] This social discount rate is consistent with the 4.4% that was recommended by Lopez (2008) for projects whose horizon was 25 years[34].
[35] The average yield of 7% adjusted for US inflation.
[36] Warusawitharana, M. (2014), ***The Social Discount Rate in Developing countries***, The World bank

Appendix 5 Climate Change Decision Support Tool List

Application Name, Host/Contributor	Website
ADAPT, ICLEI	http://icleiusa.org/tools/adapt/
AgroClimate, USDA and Southeast Climate Consortium	http://agroclimate.org/tools.php
Beach-fx, US Army Corp of Engineers	http://hera.pmcl.com/beachfx/software.aspx
Biofuels Atlas, National Renewable Energy Laboratory	https://maps.nrel.gov/biofuels-atlas/
California Urban Footprint, Southern California Association of Governments	http://sp.scag.ca.gov/Lists/Videos/DispForm.aspx?ID=1
CanVis, NOAA Digital Coast	http://coast.noaa.gov/digitalcoast/tools/canvis
Carbon Storage in Forests, EPA	http://cfpub.epa.gov/roe/indicator.cfm?i=86#3
Climate Change Explorer Tool, White House	http://toolkit.climate.gov/
Climate Wizard, The Nature Conservancy	http://climatewizard.org/
ClimateSmart - NYC, TPL	http://206.169.56.66/NYC_ClimateSmartCities/
CropScape, National Agricultural Statistics Services	http://nassgeodata.gmu.edu/CropScape/
EcoSmart Landscapes, USFS and UC Davis	http://www.ecosmartlandscapes.org/
EPA Facility Level Information on GHG Tool (FLIGHT), EPA	http://ghgdata.epa.gov/
Economic and Human Impact of Natural Hazards, HVRI, University of South Carolina	http://webra.cas.sc.edu/hvri/koshland/index.html
Forests to Faucents, USFS	http://www.arcgis.com/home/webmap/viewer.html
Habitat Priority Planner, NOAA Coastal Services Centre	http://coast.noaa.gov/digitalcoast/tools/hpp
HAZUS, FEMA	http://www.fema.gov/hazus
Healthy Connected Chattanooga, TPL	http://tplgis.org/Healthy_Connected_Chattanooga/
I-Heat Evaluation and Assessment Tool, BioMedware, Inc. and Univ. of Michigan	http://www.biomedware.com/I-Heat/IHeatViewer.html
Integrated Hazards Assessment Tool (IHAT), University of South Carolina	http://webra.cas.sc.edu/hvri/ihat/index.html#
Interactive precipitation map, Natural Resources Conservation Service	http://www.wcc.nrcs.usda.gov/webmap/index.html
InVEST, Natural Capital Project	http://www.naturalcapitalproject.org/invest/
i-Tree Canopy, US Forest Service	http://www.itreetools.org/canopy/
Jamaica Bay Decision Support Tool, Science and Resilience Institute of Jamaica Bay, RAND	-
Louisville Urban Tree Canopy Assessment, City of Louisville	https://www.cartotronics.com/UTC_Viewer_Louisville/
Milwaukee Green Infrastructure DST, Metropolitan Sewerage District, Climate Interactive	http://maps.milwaukee.gov/SilverlightViewer_1_7/Viewer.html

Minneapolis Resilience Map, City of Minneapolis	http://cityoflakes.maps.arcgis.com/apps/MapTour/index.html
OPAL, Natural Capitol Project	http://www.naturalcapitalproject.org/tools/#opal
Resilient Communities, ESRI	http://www.esri.com/industries/government/resilient-communities
RIOS, Natural Capital Project	http://www.naturalcapitalproject.org/tools/#opal
Scenarios Network for Alaska and Arctic Planning, International Arctic Research Centre	https://www.snap.uaf.edu/sites/all/modules/snap_map_tool/maps.html
Silicon Valley 2.0, Santa Clara County	https://www.sccgov.org/sites/osp/Pages/sv2.aspx
Urban Adaptation Support Tool, European Commission, EU, Covenant of Mayors	http://climate-adapt.eea.europa.eu/tools/map-viewer
Urban Climate Adaptation Tool (CAT), Oak Ridge National Laboratory	https://udi.ornl.gov/content/urban-climate-adaptation-tool-urban-cat
VegScape - Vegetation Condition Explorer, USDA's National Agricultural Statistics Survey	http://nassgeodata.gmu.edu/VegScape/
Water Supply Stress Index Ecosystem Services Model, USFS	http://www.forestthreats.org/research/tools/WaSSI

Source: Ernst C. and Blaha K. (2015), ***Decision support tools for climate change planning***, The Trust for Public Land, Appendix B

Appendix 6 Members of the National Climate Change Committee

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Source: Lesotho Meteorological Services, January 2018.

Appendix 7 Environmental and Socio-economic Indicator Framework for Climate Change

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List of Possible Climate Change Indicators

Indicator	Definition of Indicator	Data/Verification Source	Frequency of data Collection	Unit of Measurement	Disaggregation
Outcome/Impact Indicators					
A. Agriculture					
Crop diversification to reduce susceptibilities	Yields per hectare	BOS crop surveys	Annually	Kg	Crop
Adoption of conservation agriculture	Ha under conservation agriculture	BOS crop surveys	Bi-annually	Ha	region
Introduction of improved breeds/varieties	No. of breeds/varieties introduced	Agriculture research reports	Monthly	Number	District
Supplementary irrigation development	Ha under supplemental irrigation	Agriculture Irrigation reports	Bi-annually	Ha	District
Water harvesting	No. of water harvesting structures	MFRSC reports	Monthly	Number	Type
Catchment protection with tree planting	Ha planted with trees	MFRSC reports	Monthly	Ha	Region
Protection of wetlands	No. of wetlands physically/socially protected	MFRSC reports	Quarterly	Number	Region
Grassing of rangelands	Ha of grassed rangelands	MFRSC reports	Monthly	Ha	Region
Supplementary feeding of livestock	No. of farmers reporting supplementary feeding	BOS livestock surveys	Annually	Number	Region
Adoption of climate smart agriculture	Percent of farmers adopting climate smart agriculture	Agriculture research reports	Annually	Percent	Region
Capacity-building for smart agriculture	Percent of extension agents/farmers trained	Agriculture Field Services	Annually	Percent	Region
Documentation of indigenous knowledge	No. of climate adaptation practices documented	Agricultural Research reports	Annually	Number	Region
Expansion of area under fodder crops	Hectares under fodder crops	BOS crop surveys	Annually	Hectare	Region
Introducing climate tolerant breeds/varieties	No. of tolerant breeds/crop varieties introduced	Agriculture Livestock/Crops	Annually	Number	Region
Acreage under diversified agricultural practices	Hectares under diversified agricultural practices	Agriculture Crops Division	Annually	Hectare	Region
Tree planting and pasture reseeding	Hectares planted and reseeded	MFRSC reports	Monthly	Hectare	Region
Destocking the range	No. of animals per category	BOS livestock surveys	Annually	Number	Type
Adoption of indigenous genetic resources	No. of livestock farmers adopting	Agriculture livestock	Monthly	Number	Region
Surveillance for animal disease control	No. of surveillance trips per year	Agriculture Livestock	Monthly	Number	Region
Adaptive research through trials	No. of trials conducted and farmers trained	Agriculture Research	Annual	Number	Region
Conservation agriculture trials	No. of conservation agriculture trials	Agriculture Research	Quarterly	Number	Region
Timely agricultural operations	Percent of farmers adhering to timely operations	Commissioned agric surveys	Annually	Percent	Region
Dissemination of drought tolerant crops var.	Percent of farmers adopting drought tolerant varieties	Agriculture Research	Quarterly	Percent	Region
Minimisation of moisture loss for crops	Percent of farmers reducing row spacing	Agriculture Research	Quarterly	Percent	Region

Augmentation of nitrogen	% of farmers reporting crop rotation and intercropping	Commissioned agric surveys	Quarterly	Percent	Region
Conservation of genetic resources	Number of traditional crops/livestock genes conserved	Agriculture Research	Annually	Number	-
The application of organic manure	% of farmers reporting the application of organic manure	BOS crop surveys	Annually	Percent	Region
Introduction of gene banks/botanical gardens	No. of gene banks/seed banks/zoos/botanical gardens	Agriculture Crops/Biodiversity	Annually	Number	Type
B. Water Resources					
Building capacity for risk assessment/solutions	No. of people trained in risk assessment and solutions	MOW & LMS	Annually	Number	Field
Accessibility of climate science to communities	No. of community training sessions held	LMS/Climate Change Unit	Annually	Number	District
Communities awareness of CC adaptation	No. of community training sessions held	LMS/Climate Change Unit	Annually	Number	District
Capacity building for water management	No. of water professionals trained in climate change	MOW & LMS	Annually	Number	Gender
Awareness campaigns and consultations	No. of climate change workshops/dialogues held	MOW/CCU/LMS	Annually	Number	-
Research & developm. of indigenous knowledge	No. of research project commissioned	MOW/CCU/LMS	Annually	Number	Region
Mobilization of resources for CC adaptation	No. of water sector investment promotions held	MOW/CCU/LMS	Annually	Number	-
Increase of water storage capacity	Capacity of water storage nationwide in m^3	MOW/WASCO	Monthly	M^3	District
Addressing vulnerabilities of water & sanitation	No. of water and sanitation systems climate proofed	MOW/WASCO	Annually	Number	District
Building capacity for climate change integration	No. of trained staff in water resources institutions	MOW/WASCO.CCTC	Annually	-	Gender
Dev. and strengthening of infrastructure	Amount of investments in water development & use	MOW/WASCO.CCTC	Annually	Maloti	District
Strengthening monitoring methods	No. of reports for surface and ground water & riv. flows	MOW/WASCO.CCTC	Annually	Number	Region
Provision of irrigation water	Capacity of irrigation water supplied/allowed in m^3	MOW/WASCO	Monthly	M^3	District
Development of new ground water sources	No. of ground water sources secured	MOW/RWS	Annually	Number	District
Diversification of water sources	Percent of HHs by main source of drinking water	BOS household surveys	Annually	Percent	District
Reduction of negative impacts of floods	No. of flood control structures built	MOW reports	Annually	Number	Districts
Strengthening of hydro-climate station networks	No. of stations established/rehabilitated/upgraded	LMS/LHDA/MOW	Annually	Number	District
Increase of national water storage capacity	No. of water reservoirs constructed	MOW/LHDA/MFRSC	Annually	Number	Region
Increase of resilience through mapping	No. of drought/flood prone areas mapped	MOW/LHDA/MFRSC	Annually	Number	Region
Sector and ecosystem vulnerability assessment	No. of sectors and ecosystems assessed for vulnerability	MOW/LHDA/MFRSC	Annually	Number	Region
Precipitation/flow forecasting/monitoring	No. of m^3 per second	MOW/LHDA/WASCO	Daily	Number	Region
Vital minimum flow downstream major dams	No. of m^3 per second	MOW/LHDA/WASCO	Daily	Number	Region
Flood and drought monitoring	Days of floods/droughts in a year	MOW/LHDA	Daily	Days	Region
Awareness raising with affected communities	No. of sessions held with event affected communities	MOW/LHDA	Annually	Number	Region
Water allocation for different users	Percent water allocation to different users	MOW/LHDA	Daily	Percent	Region

Protection of ground water sources	No. of ground water sources protected	MOW/LHDA/RWS	Annually	Number	Region
Water quality control	Percent water quality deviation from the WHO standard	MOW/LHDA/RWS	Monthly	Percent	Region
Use of grey water for agricultural purposes	M^3 of grey water used for agriculture	Agriculture Irrigation	Monthly	M^3	Region
Strengthening water monitoring capacity	No of professionals trained in monitoring & analysis	MOW/LHDA/WASCO	Annually	Number	-
Mobilizing technical assistance	No. of technical assistance personnel recruited	MOW/LHDA/WASCO	Annually	Number	-
Water sector reviews and evaluations	No. of sector adaptation reviews and evaluations held	MOW/LHDA/WASCO/RWS	Annually	Number	-
Rural water supply infrastructure investments	% of rural popn covered with improved water supply	RWS/LHDA	Monthly	Percent	District
Promotion of water harvesting techniques	No. of water harvesting structures built	MOW/LHDA/MFRSC	Monthly	Number	District
Catchment protection	Hectares subjected to catchment protection	MFRSC/ LHDA	Monthly	Hectare	District
Promotion of recycling techniques	M^3 of grey water recycled for reuse	MOW/WASCO	Monthly	M^3	Urban
Human resources capacity-building	Number of professionals trained in CC adaptation	MOW/LHDA/WASCO/RWS	Annually	Number	Gender
Institutional capacity-building - technology	Investments in sector institutional capacity-building	MOW/LHDA/WASCO/RWS	Annually	Maloti	-
Institutional capacity-building - Data integrity	Investments in data collection and management	MOW/LHDA/WASCO/RWS	Annually	Maloti	-
Economic evaluation of adaptation options	Number of adaptation options economically evaluated	MOW/LHDA/WASCO/RWS	Annually	Number	-
C. Energy					
Dev. and promotion of renewable energies	No of promotion/testing sessions held	DOE/ATS/DST	Annually	Number	-
Promotion of renewable energy sources	No of awareness campaigns mounted	DOE/ATS/DST	Annually	Number	-
Development of energy-efficient technologies	No. of technology-efficient low carbon items developed	DOE/ATS/DST			
Demand side energy efficiency management	Average electricity consumption per customer	LEC	Monthly	kWh	District
Rationalizing energy use by sector	Average electricity consumption per sector	LEC	Monthly	kWh	Sector
Strengthening emergency preparedness	Time taken for response and recovery	LEC	Monthly	Hrs/min	District
Load forecasting using climate information	Percent deviations from load forecasts	LEC	Monthly	Percent	District
Modelled climate change impacts on assets	Forecast climate impact costs by sector	DOE/LEC/CCU/LMS	Annual	Maloti	Sector
Improving energy efficiency in buildings	Amount of energy consumption per month	DOE/LEC	Monthly	kWh	Sector
Training emergency response teams	No. of staff trained in emergency response	DOE/LEC	Monthly	Number	Gender
Training in data management & modelling	No. of staff trained in data management & modelling	DOE/LEC/CCU/LMS	Annual	Number	Gender
Development of backup logistics and plans	No. of power supply interruptions	DOE/LEC	Monthly	Number	Area
Development of power sector service standards	Percent of deviation from established standards	DOE/LEC/CCU	Monthly	Percent	District
Collaboration with international institutions	No. of collaborative meetings attended	DOE/LEC/CCU	Annually	Number	-
Promotion of research and development	No. of research studies commissioned	DOE/LEC/CCU	Annually	Number	-

Reduction of pressure on biomass energy source	No. of energy efficient technologies distributed/sold	DOE/LEC/CCU	Annually	Number	Type
Private sector involvement in renewable energy	No. of private companies involved in renewable energy	DOE/LEC/CCU/MOTI	Annually	Number	Activity
Expansion of distribution infrastructure	No. of rural homes connected to the grid	DOE/LEC/CCU	Annually	Number	District
Reduction of levies/taxes on components	Value of imports of renewable energy components	DOE/MOT/LRA	Annually	Maloti	-
D. Forestry					
Increased resilience through mixed forests	Hectares of forests with mixed gene pools	MFRSC	Annually	Hectare	Region
Reliable monitoring of damage occurrence	Percent of forests that are damaged	MFRSC	Annually	Percent	Region
Dissemination of inform. to local communities	No. of dissemination sessions held per year	MFRSC	Annually	Number	Region
Building resilience by extending regeneration	Hectares of regenerated forests	MFRSC	Annually	Hectare	Region
Participation in forest development programmes	Percent female participation in forest dev. programmes	MFRSC	Annually	Percent	Region
Measures to increase forest resilience/stability	Hectares of forests with surviving trees	MFRSC	Annually	Hectare	Region
Climate smart community land use practices	No. trained in climate smart land use practices	MFRSC/MoLGC	Annually	Number	District
Alternative sources of domestic fuels	Percent of HHs adopting cleaner sources of energy	BOS HH surveys/DOE	Annually	Percent	Region
Strengthening capacity for nat. resource management	No. of professionals trained in nat. resources manage.	MFRSC/ MoLGC	Annually	Number	Region
Advancement of forest tree management skills	No. of community level training sessions held	MFRSC/ MoLGC	Annually	Number	District
Promotion of plantation dev. and management	Hectares of forest plantations established	MFRSC/ MoLGC	Annually	Hectare	District
Enrichment planting in degraded forest reserves	Hectares of degraded forests enriched	MFRSC/ MoLGC	Annually	Hectare	District
Enhancement of afforestation and reforestation	Hectares afforested/reforested	MFRSC/ MoLGC	Annually	Hectare	District
Support for agro-forestry programmes	Hectares under agro-forestry	MFRSC/ MoLGC	Annually	Hectare	District
Establishment of bio-reserves for conservation	No. of bio-reserves established	MFRSC/ MoLGC	Annually	Hectare	Region
Community involvement in forest management	No. of communities involved in nat. resource managem.	MFRSC/ MoLGC	Annually	Number	Region
Research on the impacts of CC on forests	No. of forest research projects mounted	MFRSC/ MoLGC	Annually	Number	Region
E Human and Animal Health					
Strengthening air pollution monitoring systems	No. of surveillance and monitoring posts established	MOH/MoLGC	Monthly	Number	Urban
Establishment of an early warning system	Time taken for response, risk analysis & information	MOH/MoLGC	Annually	Hrs/min	Region
Public information campaigns/dissemination	No. of information sessions mounted	MOH/MoLGC	Annually	Number	Region
Prioritizing dual purpose adaptation measures	No. of adaptation options with mitigation characteristics	MOH/MoLGC	Annually	Number	Urban
Decrease of biomass particulate emissions	No of staff trained to control biomass particul. emissions	MOH/MoLGC/MFRSC	Annually	Number	Gender
Adsorption of pollutants and carbon sinking	No. of staff trained in soil management practices	Agriculture Crops/MoLGC	Annually	Number	Gender
Support for research on pollution and its impacts	No. of pollution research projects mounted	MOH/MoLGC	Annually	number	-

A carbon tax on used vehicle imports	Amount of tax revenues collected from used vehicles	LRA/MoPWT/LMPS	Annually	Maloti	District
Creation/maintenance of a pollution database	No of sentinel points below WHO guidelines (PM_{10})	MOH/MoLGC	Monthly	Number	Urban
Tree planting for provision of shade	No of HHs/institutions planting trees for shade	MOH/MoLGC	Annually	Number	District
Promotion of HH food security	No. of months taken before reserves are exhausted	MOH/MoLGC/CCTC	Annually	Number	District
Improvement of food security at the HH level	No of HHs facing food insecurity	MOH/MoLGC/CCTC	Annually	Number	District
Promotion of fortified foods	No. of fortified food items for women and children	MTI/MOH/CCTC	Annually	Number	District
Food-borne and food-related disease prevention	No. of food samples analysed	MTI/MOH/CCTC	Annually	Number	Type
Public campaigns for a healthy environment	No. of public sessions held	MOH/ CCTC	Annually	Number	District
Surveillance for environmental disease outbreaks	No. of surveillance and monitoring visits undertaken	MOH/ CCTC	Annually	Number	Region
Community-based nutritional care and support	No. of vulnerable women and children supported	MOH/ CCTC	Annually	Number	Region
Child nutrition screening and counselling	No. of surveillance and monitoring visits undertaken	MOH/ CCTC	Annually	Number	Region
Emergence preparedness and response	Time taken for response, risk analysis & information	MOH/MoLGC	Annually	Hrs/min	Region
Promotion of food quality and safety research	No. of research projects commissioned	MOH/ CCTC	Annually	Number	-
Strengthening public awareness campaigns	No. of staff trained in food quality and safety	MOH/ CCTC/MoLGC	Annually	Number	District
Strengthening emergency preparedness & resp.	No. of staff trained in emergency management	MOH/ CCTC/MoLGC	Annually	Number	District
Climate proofing of health infrastructure	No. of health facilities with climate proofed facilities	MOH/MoPWT/CCTC	Annually	Number	District
Promotion of indigenous knowledge systems	No. of traditional medicines researched & documented	MOH/ CCTC/MoLGC	Annually	Number	Region
Establishment of conservation botanical gardens	No. of conservation botanical gardens established	MOH/ CCTC/MoLGC	Annually	Number	Region
Improving access to health services	No. of health posts opened in vulnerable areas	MOH/ CCTC/MoLGC	Annually	Number	Region
F. Infrastructure and Transport					
Identification of local infrastructure risks	No. of infrastructure types assessed for CC risks	MoPWT/MoLGC	Annually	Number	Types
Climate proofing building codes and regulations	No. of infrastructure types with climate proofed codes	MoPWT/CCTC/MoLGC	Annually	Number	District
Prevention and management of natural hazards	No of transport managers trained in risk management	MoPWT/CCTC/MoLGC/LCCTC	Annually	Number	District
Introd. of a stakeholder risk dialogue process	No. of stakeholder risk dialogue meetings held	MoPWT/CCTC/MoLGC/LCCTC	Annually	Number	District
Strengthening of individual preparedness	No. of public awareness campaigns mounted	MoPWT/CCTC/MoLGC/LCCTC	Annually	Number	District
Ensuring vertical coordination of CC adaptation	No. of stakeholder coordination meetings held	MoPWT/CCTC/MoLGC/LCCTC	Annually	Number	-
Conducting surveys of public buildings	No. of building inspection surveys conducted	MoPWT/MoLGC	Annually	Number	District
Capacity-building in infrastructure institutions	No. of staff trained in infrastructure risk reduction	MoPWT/CCTC	Annually	Number	Gender
Fostering coordination with the private sector	No. of public-private cooperation meetings held	MoPWT/CCTC/MoLGC/LCCTC	Annually	Number	-
Strengthening detection and early warning syst.	No. of regular inspection surveys conducted	MoPWT/MoLGC	Annually	Number	District

Dev. of a seamlessly integrated transport system	Length of the transport system by type	MoPWT/MoLGC	Annually	Km	District
Expansion of access infrastructure & communication	No. of footbridges built, length of roads upgraded, etc	MoPWT/CCTC/MoLGC/LCCTC	Annually	No./km	District
Climate proofing of infrastructure	No./km of infrastructure climate proofed	MoPWT/CCTC/MoLGC/LCCTC	Annually	No./km	District
Mounting research on climate proofing needs	No. of studies climate proofing studies commissioned	MoPWT/MoLGC	Annually	Number	-
Dev. of a comprehensive resilience database	No. of infrastructure units captured in the database	MoPWT/MoLGC	Annually	Number	Type
Env. friendly sanitation technologies	No. of ventilated pit latrines built to standard	RWS/ MoLGC /LCCTC	Annually	Number	District
Improvement in energy efficiency of buildings	Amount of savings in electricity	LEC/MoPWT/MoLGC	Monthly	kWh	District
Monitoring transport sector GHG emissions	No. of sentinel monitoring points established	MoPWT/MoLGC/DOE/CCTC	Monthly	Number	District
G. Tourism Development					
Enhancement of disaster risk preparedness	No. of tech. measures for tourism risk aversion	LTB/DOT/DMA/LDF	Annually	Number	Region
Diversification of tourism products	No of alternative tourism products developed	LTB/DOT/LHDA/MoLGC	Annually	Number	Region
Creation of year-round tourism products	No. of year-round tourism products created	LTB/DOT/LHDA/MoLGC	Annually	Number	Region
Controlling and management of heritage sites	No. of heritage sites secured, controlled and managed	LTB/LHDA/MTEC	Annually	Number	Region
Strengthening cross-sectoral coordination	No. of tourism coordination meetings held	LTB/LHDA/MTEC	Annually	Number	-
Strengthening stakeholder involvement	No. of stakeholder consultation meetings held	LTB/LHDA/MTEC	Annually	Number	District
Provision of information on climate change	No. of climate change risks and impacts briefings held	LTB/LHDA/MTEC/LMS/CCTC	Annually	Number	District
Development of heritage and ecotourism sites	No. of sites developed and/or protected	LTB/LHDA/MTEC/ CCTC	Annually	Number	District
Climate proofing of heritage/ecotourism sites	No. of sites climate proofed for extreme climate events	LTB/LHDA/MTEC/ CCTC	Annually	Number	District
Creation of digital platforms for tourism support	No of tourism products promoted from digital platforms	LTB/LHDA/MTEC/ CCTC	Annually	Number	District
Development of appropriate school curricula	No of schools implementation of the revised curricula	LTB/LHDA/MTEC/ CCTC	Annually	Number	District
Development of management infrastructure	No. of heritage sites with management infrastructure	LTB/LHDA/MTEC/MoPWT	Annually	Number	District
Dev. of legislative framework for bio-trade	Value of bio-trade handled through normal channels	LTB/LHDA/MTEC/MTI	Annually	Maloti	-
Establishment of botanical gardens and zoos	No. of botanical gardens and zoos established	MFRSC/LHDA/MTEC/MoLGC	Annually	Number	District
Dissemination of information on protected species	No. of municipalities with lists of protected species	MFRSC/LHDA/MTEC/MoLGC	Annually	Number	Munic.
Awareness campaigns for climate-proofing	No of tourist destinations with climate-proofed infrast.	LHDA/MTEC/MoPWT	Annually	Number	District
H. Biodiversity and Ecosystems					
Awareness campaigns on biodiversity conservation	No. of biodiversity conservation campaign sessions held	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Restoration of biodiversity and ecosystems	No. of species and ecosystems restored & maintained	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Setting up a sectoral coordination mechanism	No. of coordination meetings held	MTEC/MFRSC/CCTC/LHDA	Annually	Number	-
Dev. of management plans for protection	No. of protected ecosystems with management plans	MTEC/MFRSC/CCTC/LHDA	Annually	Number	District

Protection of species outside their nat. habitats	No. of species protected outside their natural habitats	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Research into biodiversity and conservation	No. of studies approved and funded	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Conservation statuses of flora and fauna	No. of species classified by conservation status	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Type
Bio-surveys and resources utilization	No. of species surveyed and number protected	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Control of alien and invasive species	Hectares cleared of alien and invasive species	MTEC/MFRSC/CCTC/LHDA	Annually	Hectare	Region
Control of trans-boundary species movements	No. of cases of illegal export/imports of species	MTEC/LRA/MTI/LMPS	Annually	Number	-
Infrastructure provision in protected areas	No. of areas in infrastructure has been provided	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Establishment and maintenance of a database	No. of species captured in the database	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Document. of traditional knowledge systems	No of species with completed documentation	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Prevention and control of wild fires	No. of reported wild fires	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Mainstreaming gender & traditional medicine	No. of documents mainstreaming gender/trad. medicine	MTEC/MFRSC/CCTC/LHDA	Annually	Number	-
Implementation of the Bio-Strategic Action Plan	Percent implementation of the Plan actions	MTEC/MFRSC/CCTC/LHDA	Annually	Percent	-
Capacity-building of comm. conservation groups	No. of training sessions held at community level	MTEC/MFRSC/CCTC/LHDA	Annually	Number	District
Dev. of guidelines on biodiversity management	No. of staff trained on new biodiversity man. guidelines	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Gender
Dev. of guidelines for sustainable harvesting	No. of threatened/endangered species	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Propagation of seeds for endangered species	Hectares planted with endangered/threatened species	MTEC/MFRSC/CCTC/LHDA	Annually	Hectare	Region
Reintroduction of lost/valuable species	No. of lost species reintroduced in their habitats	MTEC/MFRSC/CCTC/LHDA	Annually	Number	Region
Est. of a national zoo & rehabilitation centre	No. of fauna species introduced in the zoo	MTEC/MFRSC/CCTC/LHDA	Annually	Number	-
Est. of a national botanical garden	No. of flora species introduced in the garden	MTEC/MFRSC/CCTC/LHDA	Annually	Number	-
I. Range Resources					
Rehabilitation of range resources	Hectares of that is rangelands rehabilitated	MFRSC/MoLGC/LHDA/CCTC	Annual	Hectare	Region
Promotion of stakeholder participation	No. of participation forums meetings held	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Promotion of an integrated approach	No. of integrated adaptation measures introduced	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Implementation of rotational grazing plans	No. of grazing associations implementing grazing plans	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Strengthening grazing control regulations	No. of community training sessions held	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Resuscitation and creation of RMAs.	No. of RMAs resuscitated/created	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Restoration of degraded rangelands	Hectares restored using ecologically sound methods	MFRSC/MoLGC/LHDA/CCTC	Annual	Hectare	Region
Provision of Information and education	No. trained in sustainable managem. of range resources	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Gender
Establishment of coordination mechanisms	No. of coordination meetings held	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Exclusion of unproductive/unsuitable livestock	No. of unproductive/unsuitable excluded from the range	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District

Stakeholder engagement for good governance	No. of stakeholder meetings held	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Development of man-made ecosystems	Hectares of man-made ecosystems developed	MFRSC/MoLGC/LHDA/CCTC	Annual	Hectare	District
Promotion and equipping local structures	No. of range management local structures created	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Strengthening curriculum in tertiary schools	No of tertiary schools adopting the range curriculum	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Promotion of private sector participation	No. of private companies/civil society organ. mobilized	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Mainstreaming gender & traditional medicine	No. of documents mainstreaming gender/trad. medicine	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	-
Compensation for utilisation of range resources	Amount of revenue from the grazing levy	MFRSC/MoLGC/LHDA/CCTC	Annual	Rand	District
Designation of conservation hot spots	No. of conservation & protection hot spots identified	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Dev. of regulations for infrastructure projects	No. of infrastructure projects complying with regulations	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Promotion of irrigated fodder production	Hectares put under irrigated fodder production	MFRSC/MoLGC/LHDA/CCTC	Annual	Hectare	Region
Breeding drought resilient livestock breeds	No. of drought resilient breeds adopted	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Research into animal disease risks	No. of research projects commissioned	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	-
Catchment protection with forests	Hectares put under forests	MFRSC/MoLGC/LHDA/CCTC	Annual	Hectare	District
Protection of wetlands and other water sources	Number of water sources protected	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Grassing of rangelands for regeneration	Hectares of rangelands grassed	MFRSC/MoLGC/LHDA/CCTC	Annual	Hectare	Region
Dev. of a national fire policy for rangelands	No. of veldt fire occurrences	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	District
Rangelands research for informed management	No. of research projects commissioned	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Promotion of collaborative research	No. of national & international research collaborations	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	-
Development of national rangeland inventory	No. of sentinel sites covered per year	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Cattle post adjudication guidelines	No of cattle posts adjudicated per year	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Determination of level of range exploitation	Scale of range condition	MFRSC/MoLGC/LHDA/CCTC	Annual	Scale	Region
Regular monitoring of rangelands condition	No. of monitoring trips	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
Determination of rangeland health status	Remedial action required	MFRSC/MoLGC/LHDA/CCTC	Annual	Action	Region
Alternative livelihood coping strategies	No. of alternative livelihood coping strategies promoted	MFRSC/MoLGC/LHDA/CCTC	Annual	Number	Region
J. Mining					
Conducting ESIAs and developing EMPs	No. of ESIAs and EMPs considered and approved	DOE/MoMG/CCTC/MOM	Annual	Number	-
Monitoring of compliance with EMPs	No. of activity inspections conducted	DOE/MoMG/CCTC/MOM	Annual	Number	Mine
Evaluation of the environmental performance	No. of environmental audits conducted	DOE/MoMG/CCTC/MOM	Annual	Number	-
Environmental Protection Fund for closure	Amount accruing the EPF for env. and soc. rehabilitation	DOE/MoMG/CCTC/MOM	Annual	Maloti	-
Compliance with EPF regulations	No. of companies complying with contributions	DOE/MoMG/CCTC/MOM	Annual	Number	-

Establishment of early warning system	Average time taken for response, risk analysis & inform.	DOE/CCTC/MOM	Monthly	Hrs/min	Mine
Investments in clean energy generation	Amount invested in clean energy generation	DOE/CCTC/MOM	Annual	Maloti	Mine
Participation in water harvesting/recycling	No. of mines participating in water harvesting/recycling	DOE/CCTC/MOM	Annual	Number	-
Encouragement of community participation	No. of participation forum meetings held	DOE/CCTC/MOM	Annual	Number	Mine
Inclusive community consultations	No. of community consultations undertaken	DOE/CCTC/MOM	Annual	Number	Mine
Community Partic. in social plan implementation	No. of tasks involving community participation	DOE/CCTC/MOM	Annual	Number	Mine
Developing guidelines for social planning	No. of mines following guidelines	DOE/CCTC/MOM	Annual	Number	-
Post-mine environ. & social sustainability	No. of mines with post-mine closure plans	DOE/CCTC/MOM	Annual	Number	-
Standards of occupational health and safety	No. of mines complying with standards and procedures	DOE/CCTC/MOM	Annual	Number	-
Capacity building for monitoring & inspection	No. of staff trained in monitoring and inspection	DOE/CCTC/MOM	Annual	Number	Gender
Regular training in occup. health and safety	No. of occupational health and safety courses offered	DOE/CCTC/MOM	Annual	Number	Mine
Female participation in the mining industry	No. of female employees in the staff complement	DOE/CCTC/MOM	Annual	Number	Mine
Curbing child labour in the mining industry	No. of child employees in the staff complement	DOE/CCTC/MOM	Annual	Number	Mine
Domesticating and enforcing ILO conventions	No. of ILO conventions domesticated & enforced	MOM/CCTC/MOLE			
K. Manufacturing					
Climate proofing of industrial buildings	No. of companies housed in climate proofed buildings	MTI/DOE/LNDC/CCTC	Annual	Number	District
Undertaking climate risk assessments	No. of companies reporting climate risk assessments	MTI/DOE/LNDC/CCTC	Annual	Number	District
Assessments of carbon emissions profiles	No. of carbon emissions profiles assessments made	MTI/DOE/LNDC/CCTC	Annual	Number	District
Pollution Control and measures	No. of compan. tested for pollution & control measures	MTI/DOE/LNDC/CCTC	Annual	Number	District
Implementation of energy efficiency actions	No. of manufacturing energy audits undertaken	MTI/DOE/LNDC/CCTC	Annual	Number	District
Production of climate-friendly products	No. of climate-friendly products produced	MTI/DOE/LNDC/CCTC	Annual	Number	Type
Installation of energy efficient lighting	Investment in energy-efficient lighting	MTI/DOE/LNDC/CCTC	Annual	Maloti	Industry
Adopting remanufacturing strategies	No. of companies remanufacturing some products	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Promotion of industrial ecology	No. of companies using waste from other companies	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Cutting emissions through renewable energy	No. of companies with onsite renewable energy plants	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Adoption of a cleaner national energy mix	No. of customers using cleaner energy sources	MTI/DOE/LNDC/CCTC	Annual	Number	Source
Regular maintenance of plant & equipment	No. of times plant and equipment are maintained	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Increasing the productive use of materials	No. of companies dematerializing products & processes	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Recycling, reuse and recovery of materials	No. of companies reporting recycling/reuse/recovery	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Reduction of waste and emissions	No. of companies using efficient processes/clean energy	MTI/DOE/LNDC/CCTC	Annual	Number	Industry

Environmentally sound waste management	No. of comp. applying environmentally-sound practices	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Control of environmentally harmful substances	No. of companies minimising the risks of toxic chemicals	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Prevention of unintended emissions of POPs	No. of comp. preventing emissions of POPs/hazards	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Replacement of risky chemical processes	No. of comp. replacing risky chemical processes	MTI/DOE/LNDC/CCTC	Annual	Number	Industry
Monitoring of emissions/effluents/solid waste	No. of industrial inspections	MTI/DOE/LNDC/CCTC	Monthly	Number	Industry
Capacity building for industrial planning	No. trained in industrial planning/pollution control	MTI/DOE/LNDC/CCTC	Annual	Number	Gender
L. Housing Shelter					
Evaluation of resilience of settlements to CC	No. of settlements evaluated per year	MoLGC/CCTC/MoPWT	Annual	Number	District
Dev. of high resolution vulnerability maps	No of settlements mapped per year	MoLGC/CCTC/MoPWT	Annual	Number	District
Introduction of energy efficiency in buildings	No. of buildings climate proofed per year	MoLGC/CCTC/MoPWT	Annual	Number	District
Use of efficient energy sources	No. of buildings with efficient/renewable energy sources	MoLGC/CCTC/MoPWT	Annual	Number	District
Incorporation of micro climatic conditions	No. of designs incorporating microclimatic conditions	MoLGC/CCTC/MoPWT	Annual	Number	District
Ensuring to emergency shelters	No. of shelters identified for emergencies	MoLGC/CCTC/MoPWT	Annual	Number	District
Reduction of burden on response systems	No. of HHs assisted to rebuild their homes	MoLGC/CCTC/MoPWT	Annual	Number	District
Preparedness to normalise social services	No. of social service agencies relocate for access	MoLGC/CCTC/MoPWT	Annual	Number	Type
Climate proofing shelter designs	No. of climate proofed designs disseminated	MoLGC/CCTC/MoPWT	Annual	Number	District
Capacity-strengthening for resilient housing	No. of trained for the design of climate resilient housing	MoLGC/CCTC/MoPWT	Annual	Number	District
Prioritization of vulnerable households	No. of vulnerable Household beneficiaries	MoLGC/CCTC/MoPWT	Annual	Number	District
M. National Heritage					
Monitoring adaptation impacts at all levels	No. of monitoring reports compiled per year	MTEC/CCTC/MoPWT/LHDA	Annual	Number	District
Promotion of the adaptation of heritage sites	No. of global and regional awareness meetings attended	MTEC/CCTC/MoPWT/LHDA	Annual	Number	-
Sharing knowledge and best practices	No. of capacity-building initiatives attended	MTEC/CCTC/MoPWT/LHDA	Annual	Number	-
Climate smart improvement of ecosystems	No. of climate smart projects introduced	MTEC/CCTC/MoPWT/LHDA	Annual	Number	Region
Mainstreaming gender in sustainable land managem.	No. of females in sustainable land management positions	MTEC/CCTC/MoPWT/LHDA	Annual	Number	District
Improving drainage around heritage sites	No of heritage sites protected using drainage upgrades	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District
Promotion of research and development	No. of research projects commissioned	MTEC/CCTC/MoPWT/LHDA	Annual	Number	-
Public information and educational campaigns	No. of information dissemination forums organized	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District
Conservation of heritage resources	No. of cultural artefacts and other resources safeguarded	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District
Protection of cultural heritage sites	No. of land/soil conservation structure erected	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District
Community involvement in ecosystem monitoring	No. of communities monitoring local ecosystems	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District

Applic. of traditional knowledge in conserv.		No. of communities applying traditional knowledge	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District
Promotion of community participation		No. of participatory conservation meetings held	MTEC/LCCTC/MoPWT/LHDA	Annual	Number	District
Process Indicators						
A. Agriculture	Identification of CC risks and vulnerabilities	Development of climate screening guidelines	NCCCC	Once-off	-	Region
	Reduction of CC risks and vulnerabilities	Inventorization of local/traditional breeds/varieties	MTEC/NCCCC	Once-off	-	region
	Reduction of CC risks and vulnerabilities	Redesigning of livestock housing units	Agricultural Research	Ongoing	-	Region
	Introduction of risk transfer schemes	Introduction of agricultural insurance	MOF/MAFS	Once-off	-	-
	Econ. implications of adaptation options	Evaluation of econ. implications of adaptation options	NCCCC	Annually	-	Region
	Improvem. and harmonization of research	Harmonization of smart agriculture research activities	MAFS/CCTC	Ongoing	-	-
	Dev, of environmentally friendly irrigation	Dev. of environmentally friendly irrigation system	Agriculture Research	Ongoing	-	-
	Building resilience against diseases	Improvement of early warning systems	Agriculture Research	Ongoing	-	-
B. Water Resources	Assessment of risks and vulnerabilities	Assessm. of risks and vulnerabilities under diff. scenarios	MOW/WASCO/CCTC	Ongoing	-	Region
	Integration of CC risks into water policies	Integration of CC risks into water policies and plans	MOW/WASCO.CCTC	Ongoing	-	-
	Technological upgrades	Technological upgrades of measuring systems	MOW/WASCO.CCTC	Ongoing	-	District
	Promotion of resilience-building policies	Integration of policies, institutional & fiscal responses	MOW/WASCO.CCTC	Ongoing	-	-
	Data development for decision-making	Develop data systems for decision and policy-making	MOW/WASCO.CCTC	Ongoing	-	-
	Climate modelling of future uncertainty	Future climate modelling for planning & decision-making	MOW/WASCO.CCTC	Ongoing	-	-
	Data improvement for decision-making	Improvement of the quality of hydrological data	MOW/WASCO.CCTC	Ongoing	-	-
	Early warning system	Provision of reliable and timely information on disasters	MOW/WASCO.CCTC	Ongoing	-	District
	Optimisation of water use across sectors	Introduction of the integrated water resources manag.	MOW/WASCO.CCTC	Ongoing	-	-
	Further highlands water development	Further support for highlands water deve. projects	MOW/WASCO.CCTC	Ongoing	-	-
	Lowlands Water Supply Project (LWSP)	Continued development of the LWSP	MOW/WASCO.CCTC	Ongoing	-	-
C. Energy	Integration of Renewable energy policies	Dev. and mainstreaming of renewable energy policies	DoE/MFRSC/LEC/CCTC	Ongoing	-	-
	Management of physical hazards	Development of practices and tools to manage hazards	DoE/MFRSC/LEC/CCTC	Ongoing	-	-
	Climate proofing assets and operations	Making assets and processes more climate resilient	DoE/MFRSC/LEC/CCTC/LMS	Ongoing	-	-
	Modelling climate impacts onto assets	Modelling climate impacts onto existing & plan. assets	DoE/MFRSC/LEC/CCTC/LMS	Ongoing	-	-
	Dev. of frameworks for expanded particip.	Dev. of regulatory frameworks for energy security	DoE/MFRSC/LEC/CCTC	Ongoing	-	-

D. Hum./Animal Health	Strengthening pollution control policies	Strength. and mainstreaming of pollution control policies	MOH/MTI/MoLGC/DOT/DOE	Ongoing	-	-
	Aligning pollution mitigation policies	Aligning local and global pollution mitigation policies	MOH/MTI/MoLGC/DOT/DOE	Ongoing	-	-
	National emergencies for emergencies	Strengthening emergency preparedness and response	MOH/MTI/MoLGC/DOT/DOE	Ongoing	-	-
	Institutional preparedness for disasters	Strength. preparedness for health emergencies/disasters	MOH/MoLGC/DOE	Ongoing	-	-
	Guidelines on health emergencies/disasters	Develop guidelines and protocols on health emergencies	MOH/MoLGC/DOE	Ongoing	-	-
	Decentralization of health services	Decentralize health care infrastructure and services	MOH/MoPWT/MoLGC	Ongoing	-	-
	Promotion of health access	Construction of health facilities in remote/isolated areas	MOH/MoPWT/MoLGC	Ongoing	-	-
E. Other Sectors	Dev. of policies and strategic plans	Dev. of biodiversity policies and strategic plans	DOE/CCTC/LMS	Ongoing	-	-
	Range rehabilitation and restoration	Dev. of policies and adaptation strategies for rangelands	MFRSC	Ongoing	-	-
	Mainstreaming CC in mining policies	Mainstreaming CC in mining policies and frameworks	MoM/CCTC/LMS	Ongoing	-	-
	Integration of CC into manufacturing plans	Integration of CC into manufact. policies & decisions	MTI/CCTC/LMS	Ongoing	-	-
	Use of enforcement mechanisms	Integrated legislative protection of heritage resources	MTEC/CCTC/LMS/LMPS	Ongoing	-	-
	Policies and frameworks for land manage.	Adoption of sound policies & frameworks	MoLGC/MTEC	Ongoing	-	-
	Protection of intellectual property	Enactment of intellectual property legislation	MTEC/MoLGC/Law Office	Ongoing	-	-