Ethiopia's Climate Resilient Green Economy

National Adaptation Plan

Federal Democratic Republic of Ethiopia

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Addis Ababa, 2019

EXECUTIVE SUMMARY

Ethiopia's National Adaptation Plan (NAP-ETH) builds on ongoing efforts to address climate change in the country's development policy framework, including the Climate Resilient Green Economy (CRGE) strategy and the second Growth and Transformation Plan (GTP II), as well as sectoral climate resilience strategies and regional and municipal adaptation plans. Its goal is to reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience. NAP-ETH aims to strengthen holistic integration of climate change adaptation in Ethiopia's long-term development pathway, supported by effective institutions and governance structures, finance for implementation and capacity development and strengthened systems for disaster risk management and integration among different sectors. The plan and its implementation are guided by the principles of participation, coherent interventions, stakeholder empowerment, gender sensitivity, equitable implementation and partnership.

NAP-ETH focuses on the sectors that have been identified as most vulnerable, namely: agriculture, forestry, health, transport, power, industry, water and urban. Within these sectors, 18 adaptation options have been identified for implementation at all levels and across different development sectors, recognizing the considerable diversity in context and vulnerability across Ethiopia's regions and social groups. These options are:

1. Enhancing food security by improving agricultural productivity in a climate-smart manner.
2. Improving access to potable water.
3. Strengthening sustainable natural resource management through safeguarding landscapes and watersheds.
4. Improving soil and water harvesting and water retention mechanisms.
5. Improving human health systems through the implementation of changes based on an integrated health and environmental surveillance protocol.
6. Improving ecosystem resilience through conserving biodiversity.
7. Enhancing sustainable forest management.
8. Building social protection and livelihood options of vulnerable people.
9. Enhancing alternative and renewable power generation and management.
10. Increasing resilience of urban systems.
11. Building sustainable transport systems.
12. Developing adaptive industry systems.
13. Mainstreaming endogenous adaptation practices.
14. Developing efficient value chain and marketing systems.
15. Strengthening drought, livestock & crop insurance mechanisms.
16. Improving early warning systems.
17. Developing and using adaptation technologies.
18. Reinforcing adaptation research and development.

Over time, Ethiopia aims to proactively and iteratively pursue further integration of climate change adaptation in development policies and strategies, including macroeconomic and sectoral policies and strategies at the national level, as well as Regional and Woreda plans and strategies. To achieve this, five strategic priorities have been identified:

1. Mainstreaming climate change adaptation into development policies, plans and strategies
2. Building long-term capacities of institutional structures involved in NAP-ETH
3. Implementing effective and sustainable funding mechanisms
4. Advancing adaptation research and development in the area of climate change adaptation
5. Improving the knowledge management system for NAP-ETH

Realization of these strategic priorities is critical to enable effective implementation of the options identified above.

At the highest level, oversight of NAP-ETH is the responsibility of an Inter-Ministerial Steering Committee, a Management Committee and the Ministry of Environment, Forests and Climate Change (MEFCC). For efficiency, financing and implementation of NAP-ETH will be led by the existing CRGE mechanisms, which are in place at national, regional and Woreda levels. However, some adjustments and investments will be required to ensure that the necessary personnel and capacity are in place for effective coordination and implementation of adaptation initiatives alongside existing structures focusing on mitigation.

The estimated cost of implementing NAP-ETH over the next fifteen years is approximately US$ 6 billion per year. It is expected that these funds will be raised from a combination of financing sources, including public and private, as well as domestic and international sources.

The NAP-ETH monitoring & evaluation (M&E) system will track progress and effectiveness in achieving the anticipated adaptation outcomes. Effectiveness will be assessed in terms of the contribution for reducing vulnerability, improving adaptive capacity and supporting the wellbeing of populations and ecosystems affected by the impacts of climate change. The M&E system will support adaptive management of the implementation process, linking to the M&E systems of the CRGE, GTP II and other relevant programs such as the Productive Safety Net Program (PSNP). All actors involved in implementing NAP-ETH activities will have monitoring responsibilities within their scope of operations.

The preparation of NAP-ETH has been coordinated by MEFCC involving relevant government institutions, subject matter specialists, researchers and academicians. The NAP-ETH has been written through technical support provided by USAID-Ethiopia and United States Forest Service International Programs (USFS-IP) and International Institute for Sustainable Development (IISD)

TERMS AND ACRONYMS

BoFED	Bureau of Finance and Economic Development
CHRIPS	Climate Hazards Group InfraRed Precipitation with Station data
CIMP5	Coupled Model Intercomparison Project Phase 5
CRGE	Climate Resilient Green Economy
CSA	Central Statistics Agency
CSO	Civil Society Organization
EDRI	Ethiopian Development Research Institute
EE	Executing Entity
EEFRI	Ethiopian Environment and Forest Research Institute
EIAR	Ethiopian Institute of Agricultural Research
ENSO	El Niño Southern Oscillation
EPACC	Ethiopian Programme of Adaptation to Climate Change
EPCC	Ethiopian Panel on Climate Change
FIE	Federal Implementing Entity
GCF	Green Climate Fund
GEF	Global Environment Fund
GeoCLIM	Climate Analysis software from the United States Geological Survey
GHG	Green House Gas
GTP	Growth and Transformation Plan
ICT	Internet Computer Technology
IE	Implementing Entity
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change

ITCZ	Inter-Tropical Convergence Zone
KNMI	Koninklijk Nederlands Meteoroloisch Instituut (Royal Dutch Meteorological Institute)
M&E	Monitoring and Evaluation
MEFCC	Ministry of Environment, Forest and Climate Change
NAP	National Adaptation Plan
NAPA	National Adaptation Plan of Action
NDRMC	National Disaster Risk Management Commission
NGO	Non-Governmental Organization
NMA	National Meteorological Agency (formerly the Nat. Met. Services Agency)
NPC	National Planning Commission
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PMO	Prime Minister's Office
PSNP	Productive Safety Net Program
RCP	Regional Climate Projection
RIE	Regional Implementing Entity
SDGs	Sustainable Development Goals
SLMP	Sustainable Land Management Program
TEK	Traditional Ecological Knowledge
TNA	Technology Needs Assessment
TOR	Terms of Reference
UNDP	United Nation Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WASH	Water, Sanitation and Hygiene

Table of Contents

List of figures

List of tables

Table Annexes

INTRODUCTION

Ethiopia is vulnerable to the impacts of climate change and the unpredictability of climate variability. The country's adaptive capacity is constrained by limited livelihood options for the majority of the population, inadequate ability to withstand or absorb disasters and the prevailing biophysical shocks it faces. To address these challenges, there is a need for stronger climate change adaptation policies, programs and implementation capacity, across sectors, levels of intervention and actors (MoA 2015; MoWE 2015).

The adaptive capacity of a country can be improved by integrating climate information into planning and decision-making for development interventions, and prioritizing a focus on climate resilience across policies and programs. Ethiopia is on a good track, registering consistent and fast economic growth; transforming the agricultural, manufacturing and service sectors; developing infrastructure; and addressing the challenges of the vulnerable people. The enabling climate change policy environment supports these positive strides. Notably, the country has developed Climate Resilient Green Economy (CRGE) strategy and mainstreamed it into the second Growth and Transformation Plan (GTPII).

Ethiopian government plans to move action on climate change adaptation forward by developing and implementing this National Adaptation Plan (NAP), in an effort to bring about transformational change in the country's capacity to address the impacts of climate change. The current efforts to develop this NAP are in compliance

with Ethiopia's obligations under the Cancun Adaptation Framework (2010)[1] of the United Nations Framework Convention on Climate Change (UNFCCC). The Framework recommended that countries formulate a NAP as a means of identifying medium and long-term adaptation needs and strategies, and mandate institutional responsibility for the effective implementation of NAP strategies and programs to address those needs.

Prior to 2011 when the CRGE was adopted, Government efforts to address climate change adaptation included:

- Ethiopia's National Adaptation Plan of Action (NAPA), which identified project with short to medium-term timeframes, for implementation at regional and sectoral levels;

- Draft adaptation strategies for nine Regions and two city administrations;

- Sector adaptation strategies; and

- Ethiopia's Programme of Adaptation to Climate Change (EPACC)[2], which outlined 20 prioritized climate change related impacts and the corresponding adaptation measures or

[1]http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=4

[2]Ethiopia's Programme of Adaptation to Climate Change. Ministry of Environment and Forest, Federal Democratic Republic of Ethiopia.

responses, naming the federal level organization responsible for spearheading the implementation of the measures.

The Government also outlined its commitment to climate change adaptation in its 'Intended Nationally Determined Contribution' (INDC) submitted to the UNFCCC in June 2015. Unlike the other documents, Ethiopia's INDC summarized short to long-term programmatic efforts to address reduce vulnerability of livelihoods and landscapes to climate impacts, focusing on three key areas: droughts, floods and cross-cutting interventions.

Despite being fragmented, the above-mentioned documents incorporate identified areas of climate change impacts, an analysis of vulnerability, adaptation options and prioritized measures including projects and actions, along with related implementation cost indicators, providing a good basis for further development of adaptation plans.

During 2015, more comprehensive sector-based resilience/adaptation strategies were developed. These include climate resilience strategies for agriculture and forestry; water and energy; health, and transport. The later two adaptation strategies were draft documents yet to be finalized. These strategies each achieved three things:

1) They identified adaptation options in order to select the most promising programmatic options.
2) They appraised the options in terms of uncertainty and risk of future climate change in each sector.

3) They outlined options for building the costs of climate resilience measures into the current and future policy portfolio.

Consequently, Ethiopia is well positioned to develop NAP-ETH having strong experience from experiences of NAPA, EPACC, regional and sectoral adaptation plans and most importantly the CRGE Strategy and the INDC[3]. However, the existing adaptation plans are each characterized by one or more of the following features: timeframe, region (location) and sector. Such a piecemeal approach, however expertly done, is limited in its ability to address trans-regional and multi-sectoral issues in a long-term timeframe. As a result, the synergy required for climate change adaptation at federal level cannot be met by the current sectoral and regional resilience strategies. Therefore, this NAP-ETH sets out to address these limitations through a programmatic, multi-sectoral and long-term planning approach. In addition, NAP-ETH aligns climate change centered adaptation initiatives with ongoing development endeavors, to obtain synergies and achieve the outcomes of enhancing adaptive capacity of government, local institutions and individual women and men who are directly affected by climate change impacts on their livelihoods and the landscapes in which they live.

[3] INDC: Intended Nationally Determined Contribution is evolved to NDC: Nationally Determined Contribution

PART I

PART I – PREPARATORY PHASE, DIAGNOSTIC ANALYSIS AND RESULTS

1.1 PREPARING AND LAUNCHING THE NATIONAL ADAPTATION PLAN (NAP-ETH) PROCESS

For a country like Ethiopia, which is vulnerable to the climate change, it is imperative to implement coordinated adaptation measures. Ethiopia's commitment to create climate resilient development has been clearly articulated in its various plans and strategy documents, notably the Climate Resilient Green Economy (CRGE) strategy. Most of these documents have outlined adaptation priorities and implementation plans in the contexts of regional and sectoral development.

As noted above, the NAP-ETH is being developed in accordance with the Cancun Agreements under the UNFCCC (2010), which aim to enhance national and international action on adaptation. There are existing facilities and institutional capacities able to facilitate NAP-ETH. The country has acquired capacity to plan and implement adaptation actions and will continue to increase its overall adaptive capacity. Ethiopia's NAP initiation is part of its grand ambition of mainstreaming climate change mitigation and adaptation into its national development plans, in particular into its Growth and Transformation Plan (GTP)

NAP-ETH benefited from existing climate resilience strategies and adaptation plans to assemble the necessary information including climate data, vulnerability analysis, adaptation options, implementation approaches and monitoring and evaluation. NAP-

ETH is not a standalone plan. It intends to add value to the ongoing development efforts, which may not consciously incorporate responses to current and anticipated climate impacts. Experience has demonstrated that efforts aimed at ensuring food security, supporting livelihood improvement, enhancing infrastructural development, promoting technological advancement in climate sensitive sectors and improving market access for vulnerable people can increase human resilience to climate change, if adaptation is effectively integrated in these development initiatives (see Table 1). Furthermore, this document recognizes that some climate change mitigation activities among the many to which Ethiopia has made strong commitments can have adaptation co-benefits, if these are explicitly identified and pursued.

Table 1 - Alignment of NAP-ETH with Ethiopia's established or ongoing development efforts

Current and ongoing development efforts	**Aims and issues complimentary with NAP-ETH**
Social-economic rural safety net and basic risk management programs, e.g., Productive Safety Net Program (PSNP)	Ensuring basic safety for vulnerable people in the face of shortage of basic needs, enhancing livelihood opportunities and developing disaster risk reduction capacities
Sector development strategies and programs, e.g. for livestock	Directing comprehensive changes in the development landscape with sector-specific and time-bound targets
Natural resource and environment strategies and programs, e.g., Sustainable Land Management program (SLMP)	Ensuring natural resource conservation system informed by sustainability criteria
Research and development strategies and programs of permanent institutions, e.g., Ethiopian Environment and Forest Research Institute (EEFRI), Ethiopian Institute of Agricultural Research (EIAR), Ethiopian Development Research Institute (EDRI) and	Supporting development oriented research and technology transfer mechanisms

Ethiopian Biodiversity Institute (EBI)	
Education development strategies and programs at all levels	Producing a critical mass of experts in various fields that can fulfill development aspiration of the country
Global development agendas e.g. Sustainable Development Goals (SDGs)	Stay on course with global initiatives by adhering to the implementation of the 17 SDG goals; exchange best practices with other similar countries and benefit from technological and financial resources thereof

The NAP-ETH may prioritize adaptation in the sectors where the CRGE focuses. However, as the NAP-ETH focuses exclusively on adaptation, it will also provide targets and an implementation plan for other sectors that are particularly vulnerable to climate change impacts.

The NAP formulation approach is designed to contribute to ongoing development initiatives and address the linkages between climate change, its impacts and relevant adaptation options (See Summary in Table 2).

Table 2 - Summary of the NAP formulation approach

Phases of NAP-ETH	**Processes and steps**
Initiation and mandate setting	• Establish high level inter-ministerial steering body to oversee the development of the NAP-ETH • Mandate MEFCC to coordinate, lead and monitor the development and implementation of the NAP-ETH at the national level • Assign multi-disciplinary technical team to develop and monitor the NAP-ETH
Identification of inputs for NAP-ETH process	• Review of climate change plans already devised for the CRGE sectors and by Ethiopia's Regions • Review other relevant documents, including the INDC (2015), Second National Communication (2015), EPACC (2010), NAPA (2008)
Preparation phases	• Identify relevant information, policy and strategy documents • Develop draft document involving relevant stakeholders • Organize consultations and targeted discussions involving staffs within

	the MEFCC • Organize external consultation with all stakeholders including sectors, regions and relevant institutions and actors
Implementation strategies	• Develop guideline to mainstream adaptation in the national planning process and into sector and regional strategies and action plans • Identify adaptation finance mobilization approaches and strategies

1.2 IDENTIFYING CLIMATE CHANGE IMPACTS, VULNERABILITY AND ADAPTATION

The Ethiopian climate change program and strategy landscapes are informed by reliable data, information, knowledge and expertise that facilitate the formulation of adaptation plans. In addition to providing the contextual framework for climate change adaptation in the country, these are required inputs for preparing the NAP-ETH.

1.2.1. IDENTIFICATION OF INFORMATION AVAILABLE AND NEEDED CAPACITIES FOR THE NAP-ETH FORMULATION PROCESS

The NAP-ETH formulation process identifies the available information to underpin an evaluation of the capacities needed to undertake comprehensive national adaptation strategies (See Table 3).

Table 3 - Information availability, status and contribution to NAP-ETH

Available sources information	**Status**	**Information and experiences obtained for NAP-ETH**
GTP II document	National five-year development plan 2016-2020	Policy instruments, indicators, and targets of green economy including some relevant to climate resilience harmonized with the GTP
Ethiopia's Second National Communication to the UNFCCC	Required comprehensive report to the UNFCCC on Ethiopia's GHG inventory, outlining mitigation and adaptation plans, released in 2015	Climate Change Impacts, Vulnerability and Adaptation options prepared in synergetic approach with sector representatives and national professionals Data used was based on a mix of Tier 1 and Tier 2 levels of IPCC GHG inventory software: 1996 and 2006
NAPA	A short term, project based plan developed in 2007, released in 2008	Climate change scenarios, vulnerability levels, adaptation options
Regional Adaptation Plans	Draft adaptation plans prepared	Adaptation options specific to sectors within

	2010/2011 for all of Ethiopia's regions and city administrations	Ethiopia's regional states
Sectoral Adaptation Plans	Draft adaptation plans prepared 2010/2011 for some key sectors at national level	Adaptation options specific to sectors
EPACC	Summary of program of adaptation prepared in 2011 based on earlier plans (e.g. Ethiopia's NAPA)	29 prioritized climate change adaptation measures, citing institutions to spearhead implementation of the measures
CRGE Strategy	Ethiopia's 20-year seminal strategic document for carbon neutral economy prepared in 2011 aimed at insuring middle income status	60 climate change mitigation options identified with some adaptation co-benefits
INDC	Ethiopia's intended contribution to GHG reduction (mitigation) and to adaptation	Major adaptation options categorized under drought, flood, and cross-sector issues

	submitted in 2015	
Climate Resilience Strategy for Agriculture and Forest Sectors	A federal-level strategy for climate resilience addressing agriculture and forest sectors prepared in 2015	Adaptation options identified that are specific to agriculture and forestry sectors
Climate Resilience Strategy for Water and Energy Sectors	A federal-level climate resilience strategy addressing water and energy sectors prepared in 2015	Adaptation options identified that are specific to water and energy sectors
Technology Need Assessment (TNA) (draft)	A draft document addressing potential technologies to be adopted by Ethiopia towards meeting its GHG emissions reduction targets prepared in 2016	Technologies for mitigation may relate to sectors sensitive to climate change impacts and help meet their adaptation requirements

The information sources indicated in Table 3 cover the key CRGE sectors and priority regions, and present available information that can contribute to the preparation of the NAP-ETH. The priority CRGE sectors are: agriculture, forestry, energy, water, transport, industry and urban/housing. Recognizing that the CRGE sectors do not include all of the sectors that are significantly affected by climate change, additional sectors are addressed in the NAP-ETH, including the health sector. In addition to incorporating all relevant adaptation sectors, synergies and overlaps have also been included. This is to address the potential disconnect that may exist between some impacted climate change sectors and areas, and the assigned administration units.

1.3 GAPS AND NEEDS OF THE ENABLING ENVIRONMENT FOR THE NAP-ETH PROCESS

The capacities needed to implement the NAP-ETH are of two kinds: capacities to develop a well-formulated plan and capacities to implement it. While the development phase requires professionally diverse technical capacities, the implementation phase demands resources and institutional capacities in addition. Table 4 presents capacities needed for preparing and implementing the NAP-ETH and determines existing gaps to be filled.

Table 4 - Capacities gap analysis

Capacities needed	**Interventions required**
Capacity to build and maintain data archives/database on impacts of climate change for agro-climatic zones, vulnerable groups and ecosystems.	• Institutionalize the climate change impact database by involving designated data collectors, e.g. the Central Statistics Agency (CSA) and planning bureaus. • Devise Knowledge Management System and institutional memory mechanism for adaptation.
Capacity to run climate models, providing predictions and scenarios, including validation with reference to on-the-ground historical data and level of assessing certainty - at national and regional scales.	• Build the capacity of Ethiopia's National Meteorology Agency (NMA) to produce precise and reliable information. • Collect and compile ground data that can augment modeling and scenario building.
Capacity to assess status of vulnerability and determine required adaptation	• Coordinate vulnerability analysis of sectors and regions, including agro-climatic zones, vulnerable groups and ecosystems.

responses for the major development sectors and for all agro-climatic zones, vulnerable groups and ecosystems.	• Compile existing vulnerability data/information collected by sectors, regions and non-state actors.
Capacity to design multi-sector adaptation programs outlining overlapping or shared responsibilities.	• Create taskforces involving institutions with overlapping/shared responsibilities. • Define specific roles for each institution with accountability and responsibility where there are overlapping/shared responsibilities.
Capacity to mobilize the public and private sector and involve it in climate change adaptation investments.	• Provide incentives for private sector actors to invest in adaptation measures/works. • Build opportunities for the private sector to participate in adaptation planning, implementation and monitoring.
Capacity for strengthened mobilization and involvement of the general public in implementing and monitoring climate resilient action.	• Encourage effective participation of the public to ensure ownership of adaptation measures/activities. • Target participation of vulnerable groups so that their particular adaptation needs are met.
Capacity for enhanced mobilization and	• Create strong partnership/network among non- state actors and others.

involvement of non-state actors including professional societies, development partners and donors.	• Involve professionals and civil society actors in adaptation planning, implementation and monitoring.
Capacity for building institutional, financial, technical and material capacity for the implementation of adaptation programs.	• Mainstream adaptation in government planning processes. • Coordinate capacity building efforts in order to develop critical mass of capacities. • Enhance capacity of sectors to attract international and domestic adaptation finances.

1.4 CURRENT AND FUTURE CLIMATE OF ETHIOPIA

1.4.1 RAINFALL PATTERNS, VARIABILITY, TRENDS AND FUTURE PROJECTIONS

Ethiopia has three rainy seasons; June–September (Kiremt), October–January (Bega), and February–May (Belg). Kiremt, which is the main rainy season for most part of Ethiopia, accounts for 50–80 percent of the total annual rainfall over the regions having high agricultural productivity and major water reservoirs. It is for this reason that the most severe droughts usually result from the failure of the Kiremt rainfall to meet Ethiopia's agricultural and water resource needs. Western and northern Ethiopia have monomodal rainfall patterns with the rainfall amount peaking in Kiremt. The temporal distribution in these monomial rainfall areas shrinks from south to north, ranging from over eight months of rain over the southwest to only three months of rain over the northwest. Regions in the Rift valley and adjoining highlands receive bimodal rainfall during Belg and Kiremt seasons. On the other hand, regions of southern Ethiopia experience a bimodal rainfall distribution during the seasons defined as Bega and Belg. These regions have two distinct dry and two distinct wet seasons. Figure 1 shows the rainfall regime of Ethiopia based on NMA Maproom (www.ethiomet.gov.et), with sample Woredas selected randomly and 10-daily rainfall distribution computed to demonstrate the rainfall regimes.

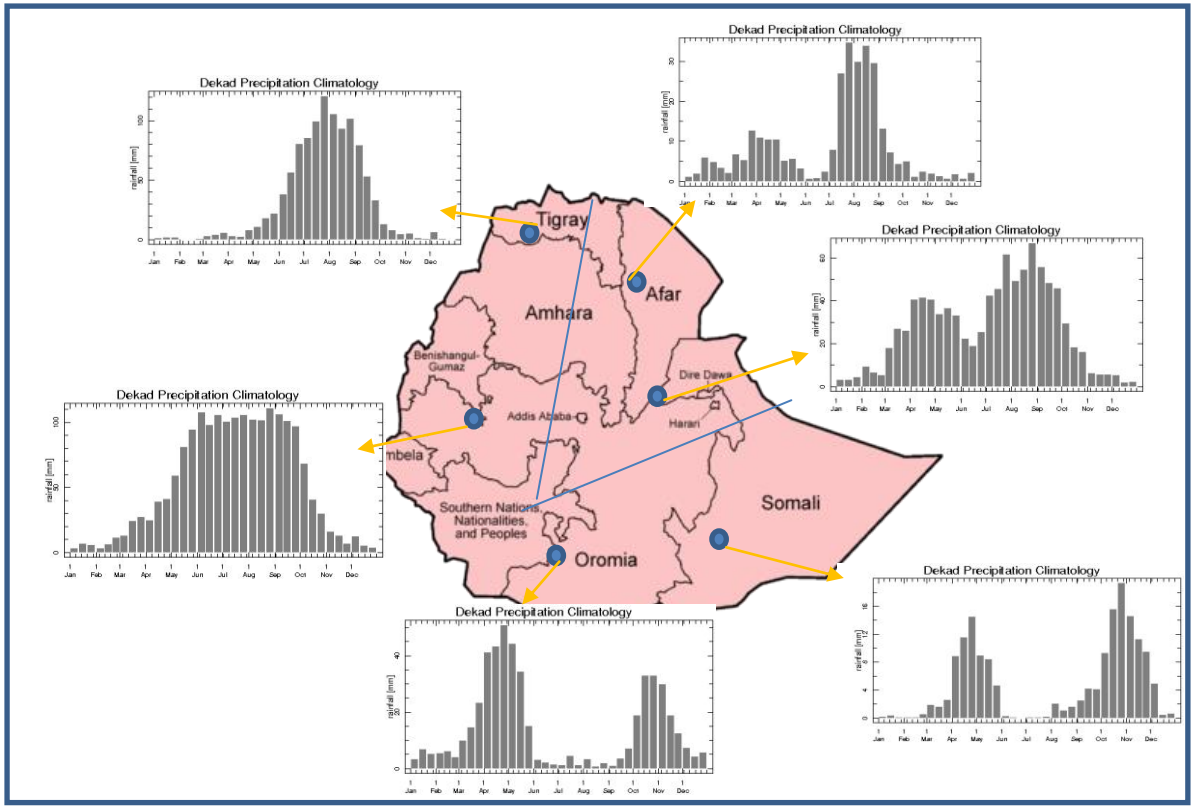


Figure 1 - Rainfall regime of Ethiopia showing sample Woredas to demonstrate the rainfall regimes

The spatial distribution of mean annual rainfall based on 1971-2000 station data climatology is shown in Figure 2 below (Koricha, 2013). It shows rainfall is characterized by large spatial variations, ranging from more than 2000 mm over some areas in the southwest to less than 250 mm to the south east and over the Afar lowlands in the northeast. The seasonal rainfall characteristics are closely associated with large scale global circulation systems, especially the south-north movement and characteristics of the Inter-Tropical Convergence Zone (ITCZ).

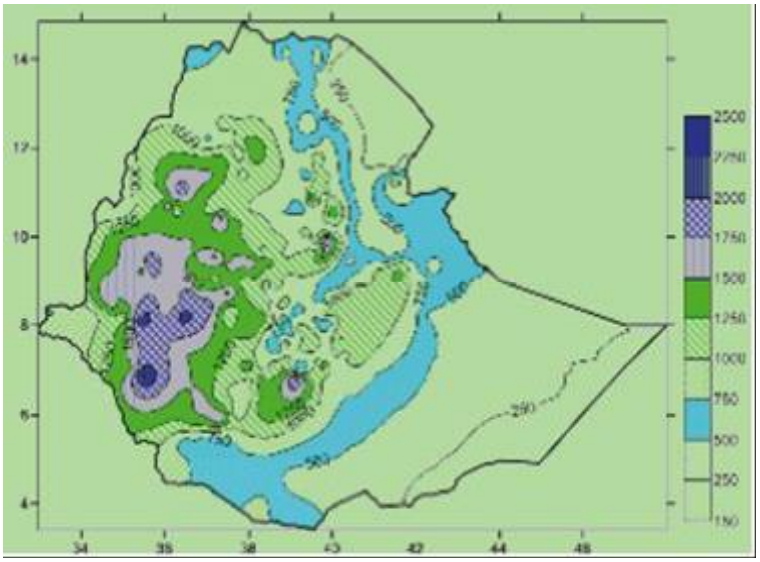


Figure 2 - Spatial Distribution of Mean Annual Rainfall in millimeters (1971-2000)

1.4.2. OBSERVED RAINFALL VARIABILITY

Rainfall variability is high over the eastern half of the country as compared to the western half. Figure 3 presents the coefficient of variation for annual rainfall, which shows increased variability from the southwest part of Ethiopia, where spatial rainfall distribution is maximum, to all directions following the decrease in rainfall amount. The coefficient of variations, which are computed using GeoCLIM tools, shows that Belg rainfall variability is comparably higher over the northern and eastern part of Belg rain benefiting part of Ethiopia (areas that get rainfall in March, April and May months shown in Figure 2).

1.4.3. OBSERVED RAINFALL TREND

Observed rainfall year to year (inter-annual) variability and trend computed based on NMA station annual rainfall data averaged for the whole of Ethiopia is shown in the Figure 3 below (computed using GeoCLIM tools). The year to year variability is largely influenced by ENSO, where in general terms, El-Nino results in a rainfall deficit compared to the average, while La-Nina results in a positive anomaly on the annual rainfall amount. For example, moderate to strong El-Nino years such as 1963-64, 1972-73, 1982-83, 1991-92, 2002-03, 2009-10 all showed annual rainfall deficit as compared to 1961-1990 average. (*Note: coefficient of variation for annual rainfall is an index of climate risk - it means % of variability year to year, with the higher the co-efficient (i.e., the higher the number) the more variation, the more likelihood of fluctuation in precipitation.*

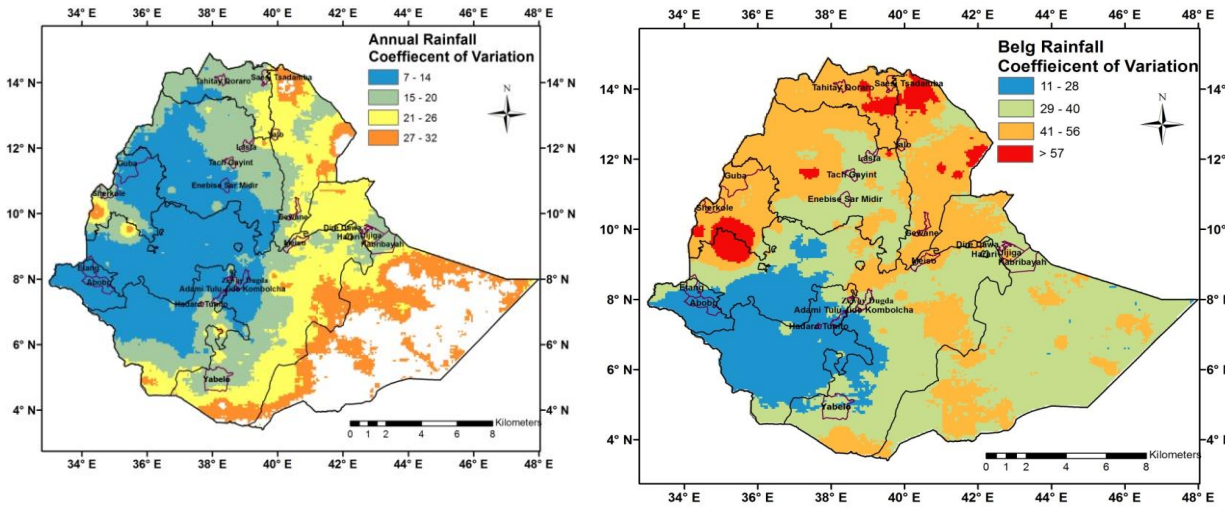


Figure 3- Annual and Belg rainfall coefficient of variation

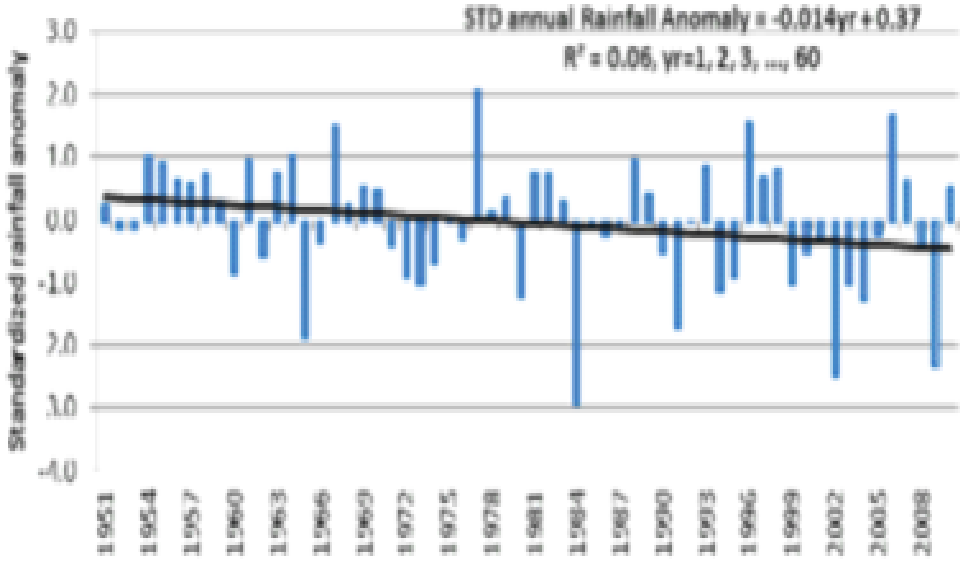


Figure 4 - Standardized annual rainfall anomaly - 1951-2010 in relation to 1961-1990 average.

The trend line in Figure 4 shows a slight decrease in annual rainfall over the whole of Ethiopia. Though the average rainfall

shows a decreasing trend on an annual time scale for the whole of the country, the trend varies from region to region and from season to season. Observed rainfall decrease for the Belg area, especially the northeast and eastern part, is prominent as compared to other seasons. Figures 5 shows the spatial distribution of observed rainfall tend in mm/decade for Belg season for the period 1981 to 2014, produced using GeoCLIM tool using CHRIPS data set (Funk, 2015). The regions in the northern Rift valley and the adjoining highlands where observed rainfall is highly variable also showed decreasing rainfall trends. Figure 6 shows change in March to September rainfall (Belg and Kiremt combined) between 1997-2013 average and 1981-1996 average, which also shows that a decreasing trend has been observed in the area east of the Rift valley, while other parts of the country showed either a slight increase or no change. Thus, areas with high current variability showed a trend of rainfall decrease, particularly during Belg, and further increases in variability

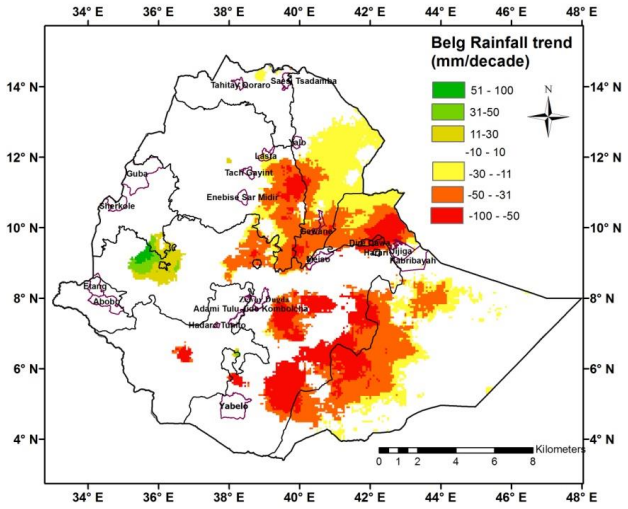


Figure 5 - Rainfall trend over Ethiopia (1981-2014)

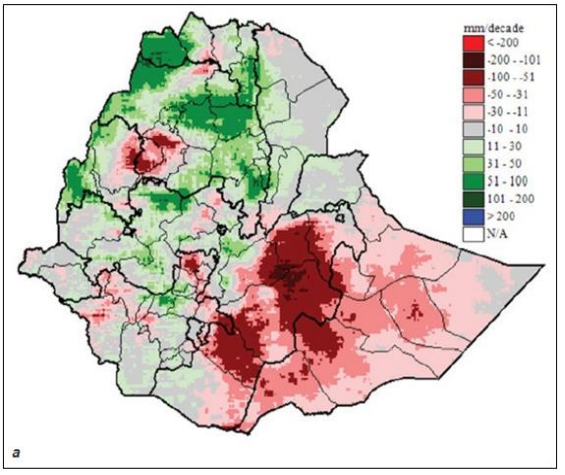


Figure 6 - Change in average rainfall over the March-September season, comparing averages for 1997-2013 with 1981-1996

1.4.4. RAINFALL PROJECTIONS

The Ethiopian Panel on Climate Change (EPCC) (2015) developed rainfall projections using Coupled Climate Inter-comparison Project 5 (CMIP5) model ensemble-based average percentage change of rainfall over Ethiopia during the 21st century. The models projected that annual precipitation for all RCPs will increase by 4% to 12% by 2100 compared to the 1975–2005 baseline. The response of different parts of the country to different RCPs is slightly different. The percentage increase is high over northern part of Ethiopia under RCP2.6 scenario and over southern and east-southern part of the country under RCP4.5 and RCP8.5 scenarios. Figure 7, below, shows the percentage change of rainfall under RCP2.6 (upper), RCP4.5 (middle) and RCP8.5 (bottom) scenarios over Ethiopia with respect to the historical period (1975- 2005) mean for the near-term (2006-2036, left column), for the mid-term (2037-2067, middle column) and for the end-term (2068-2099, right column) relative to the baseline period (1975-2005) mean for the RCP2.6 (top row), RCP4.5 (middle row) and RCP8.5 (bottom row) (EPACC, 2015).

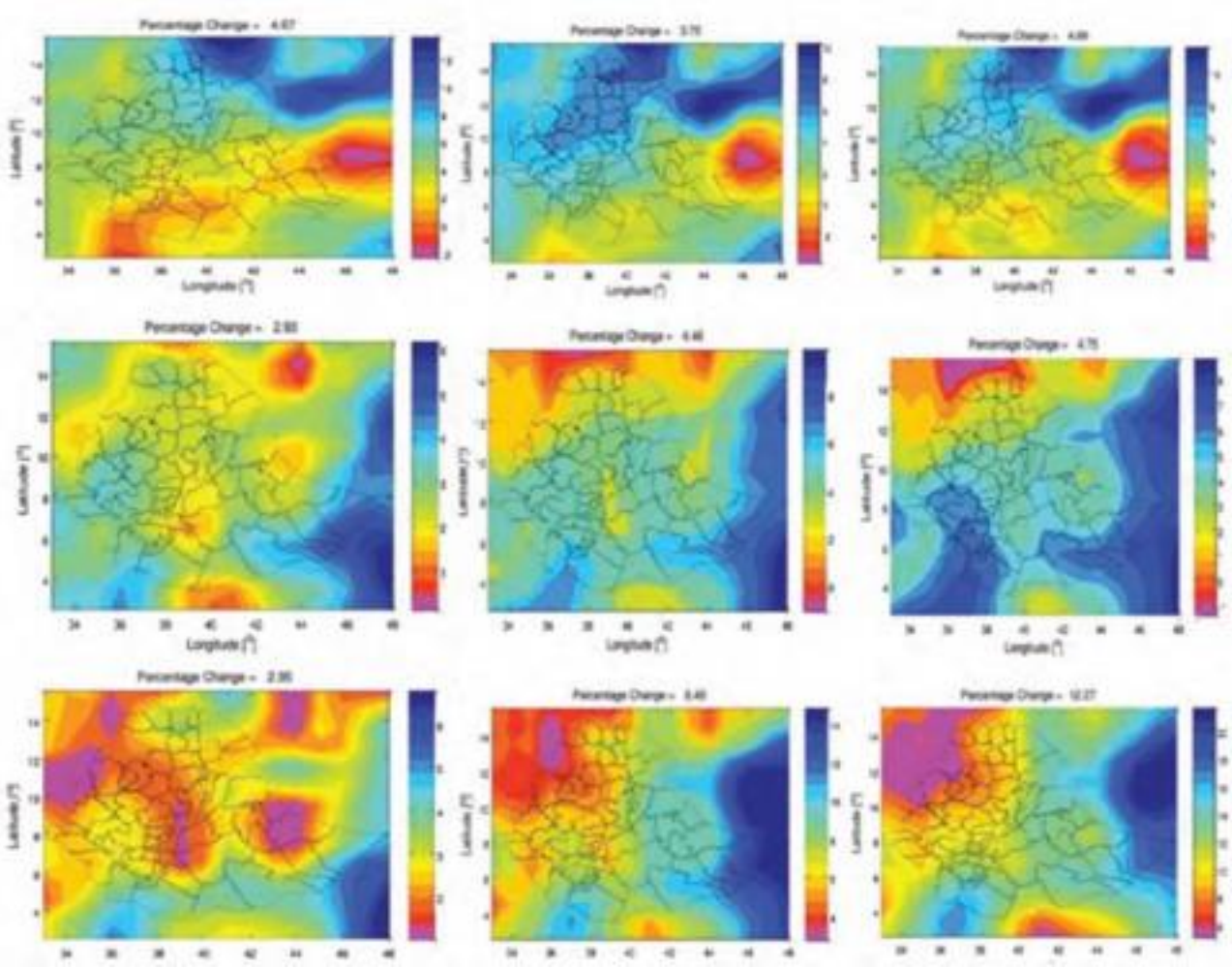


Figure 7 - ***Percentage change in rainfall over Ethiopia under 3 regional climate scenarios for three future time periods relative to the baseline period (1975-2005) and mean rainfall for the three regional climate scenarios.***

Time series of both historical and projected annual average rainfall of Ethiopia under different RCPs are shown in Figure 8 below (data based on *multi-modal ensemble - KNMI)*. On a country aggregate, the projected change in annual average rainfall

will lie mostly above zero but not exceeding 10-20% as compared to the baseline (1986-2005 average) for the 21st Century.

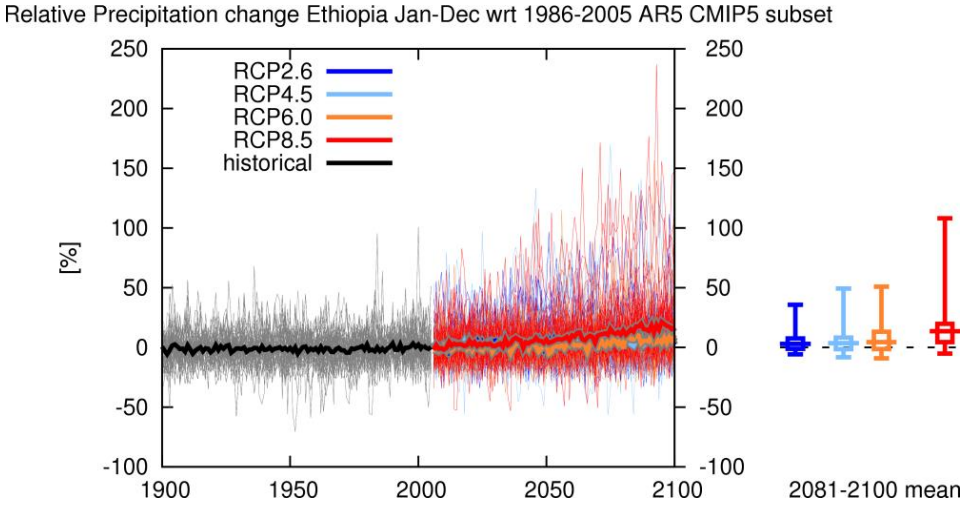


Figure 8 - Mean Annual rainfall anomaly Observed and Projection in °C (1900-2100), Relative to 1886-2005

1.4.5 TEMPERATURE CLIMATOLOGY, TREND AND FUTURE PROJECTIONS

Ethiopia's average temperature is mild for its tropical latitude because of topography, with considerable variation over the country based on altitude. The historic mean annual temperature distribution over the country varies from about 10°C over the highlands of northwest, central and southeast to about 35°C over northeastern lowlands (NMSA, 2001). Recent mean annual temperatures of the country, computed for the 1981-2010 period, also showed similar patterns, with higher temperatures confined over the lowland areas of the northeast and southeast, as well as the western lowland periphery (See Figure 9, computed using GeoCLIM tools). Mean annual temperatures range in this recent

analysis range between 15 and 20°C in the highlands, while the low-lying regions experience a range of temperature between 25 and 30°C.

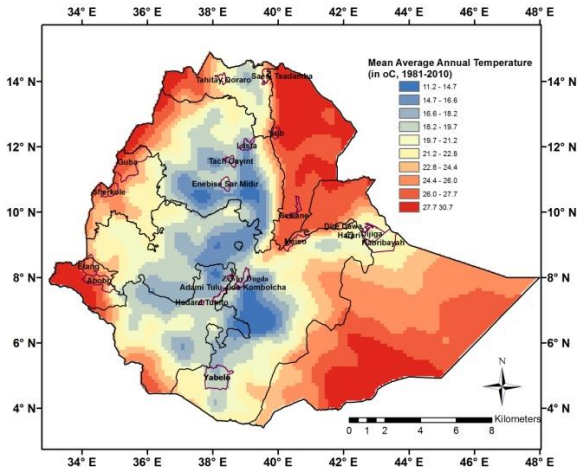


Figure 9 - Mean annual surface temperature in °C

1.4.6. OBSERVED TEMPERATURE TREND

Computed temperature trend based on NMA station minimum and maximum temperature data averaged for central and northeastern Ethiopia showed an increasing trend for the period 1951 to 2010 as compared to 1961-1990 (Figure 10). Minimum temperature increased at a rate of ranging from 0.12^{o}C over the North East to 0.41^{o}C over central Ethiopia in a decade. Further, central minimum temperature trend showed higher increasing trend than its maximum temperature, which means morning cool temperature became milder than before. This analysis is consistent with CRGE study.

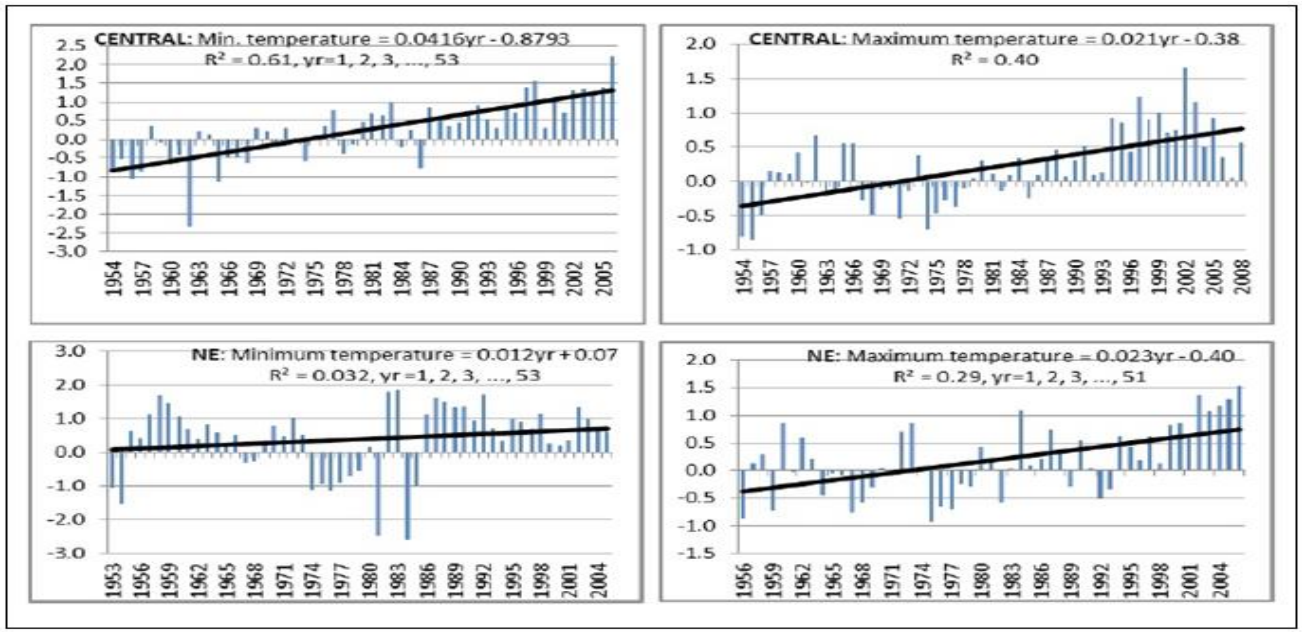


Figure 10 - Inter-annual variation of the mean minimum (Left) and maximum temperature (Right) for Central Ethiopia (Top Row) and North Eastern Ethiopia (Bottom Row)

The spatial distribution of observed average surface temperature trend computed from CHRIPS data using GeoCLIM tool also shows an overall increasing trend reaching up to 0.44^{o}C/decade in central north, northwest and western part of southern Ethiopia (See Figure 11).

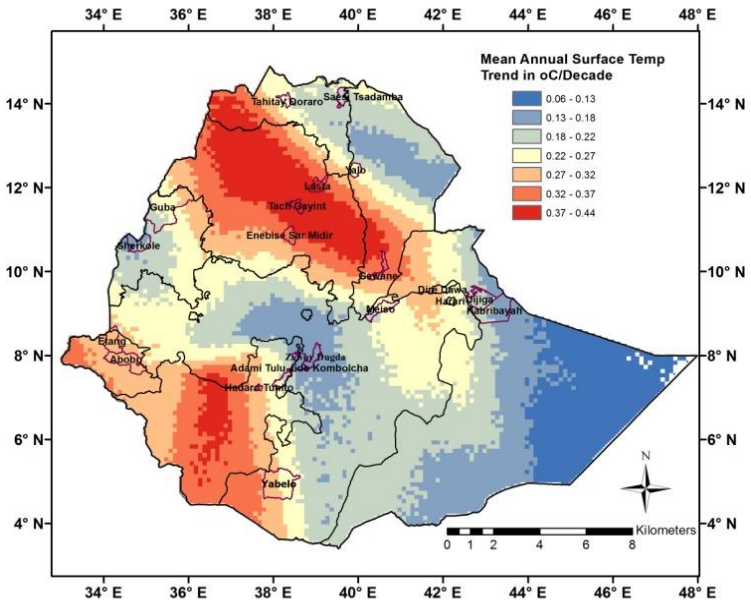


Figure 11 - Mean annual temperature trend in °C/Decade

1.4.6 PROJECTED TEMPERATURES OVER ETHIOPIA

The EPCC projections indicate temperatures increases from -0.5° to 6°C 2100 relative to the 1975-2005 baseline period for all the RCPs. Figure 12 shows the projected change in annual mean temperature under RCP2.6 (upper), RCP4.5 (middle) and RCP8.5 (bottom) scenarios: approximately 1°C, 2°C and 5°C, respectively

(EPCC 2015). Figure 13 shows the annual temperature average time series of both historical and projected CIMP5 model over Ethiopia: the mean annual temperature observed and Projection in ^{o}C (1900-2100), relative to 1886-2005 based on multi-modal ensemble (KNMI). It shows a consistent warming trend under all RCP scenarios. The expected mean annual temperature change by the end of 21st century under the RCP2.6 (Blue line) is 1°C, while under RCP8.5 (Red line) the predicted change is above 4.8°C.

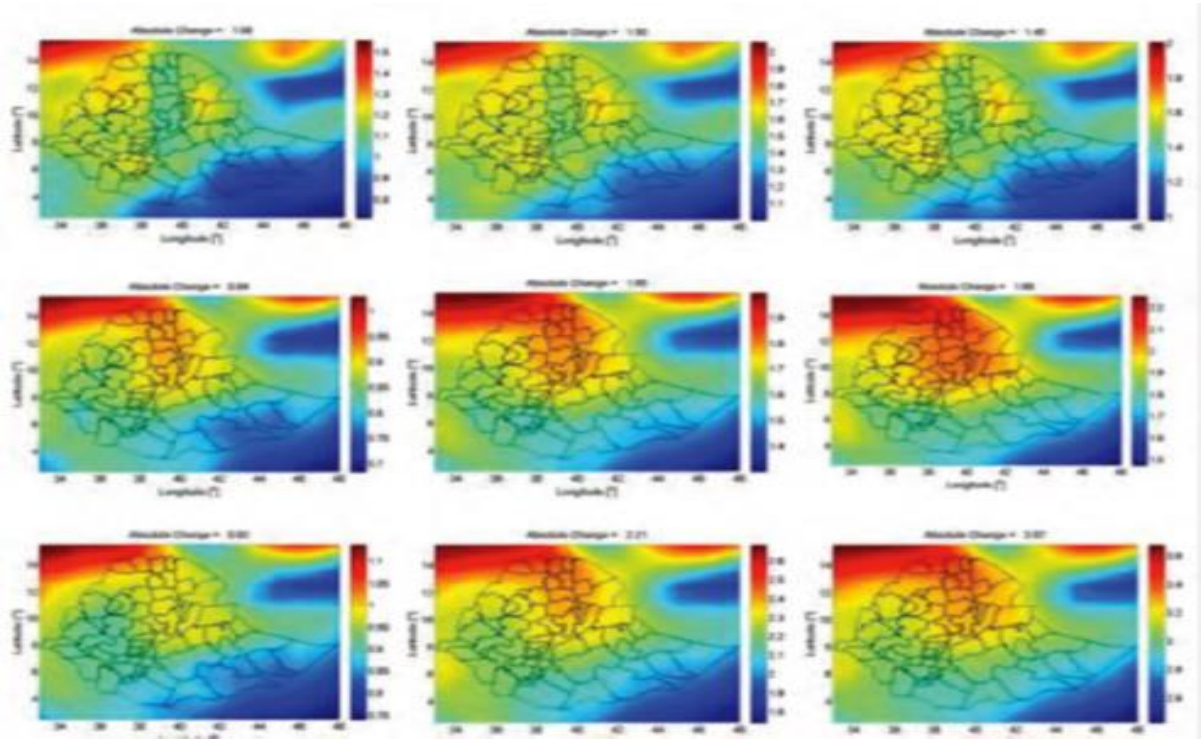


Figure 12- Change in annual mean temperature over Ethiopia under scenarios from the historical period (1975-2005)

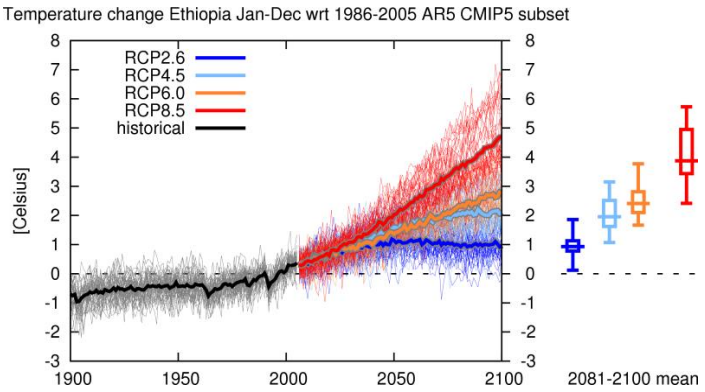


Figure 13 - Mean Annual Temperature Observed and Projection in ^{o}C (1900-2100), relative to 1886-2005

1.4.7. OBSERVED CLIMATE EXTREMES

In Ethiopia, drought has historically had significant social and economic effects that have been documented by NMSA (1996). In terms of number of population, it has been documented by EM-DAT (2011) that a substantial number of drought occurrences have affected millions of Ethiopians since 1965 (Figure 14). Recent events include the drought of 2003, which affected approximately 12,600,000 people in Tigray, Oromiya, Amhara, Somali and Afar Regions. Similarly in 2015 over 10,000,000 people in Somali and Afar Regions were affected. The highest mortality due to drought was in 1983, when approximately 300,000 people died.

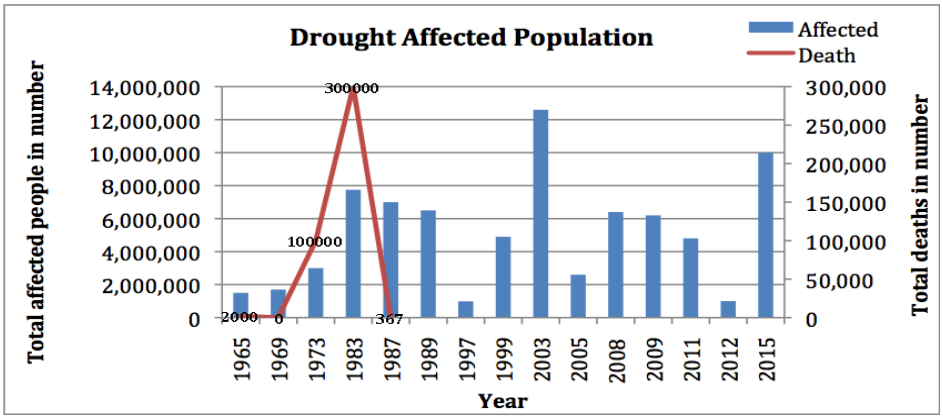


Figure 14 - Number of Population Affected by Major Drought in Ethiopia

In contrast, floods occur more frequently, but tend to affect fewer numbers of people. Significant events occurred in 1990, when 350,000 were affected, and 2006, affecting 450,000 people (Figure 15). The number of deaths due to flooding peaked in 2006.

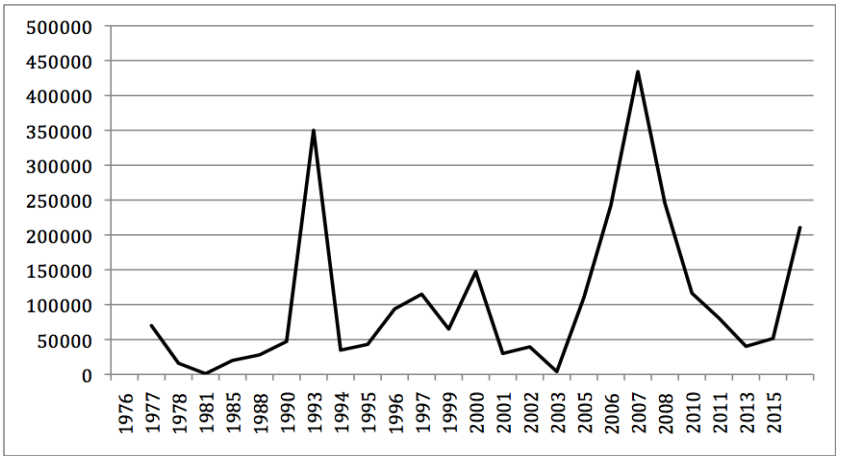


Figure 15 - Number of Population Affected by Flood in Ethiopia

1.5 DEVELOPMENT NEEDS AND CLIMATE VULNERABILITIES

With its CRGE strategy and GTP II, Ethiopia aims to achieve middle-income status by 2025 while developing a green (low emissions) economy. GTP-II argues that reaching its goals require significant investments to boost agricultural productivity, strengthen the industrial base and foster export-oriented growth. However, Ethiopia - as a country and its people - has been the subject of costly natural disasters in its long history. Droughts, floods, human and livestock diseases, crop diseases and pests, hailstorms and wildfires (specific to some regions) are the major climate-related hazards in the country, affecting the livelihoods of significant numbers of people. Moreover, experience has shown that the country is exposed to unpredictable rains including the complete failure of rains, seasonal shifts in rainfall patterns and shortage of rainfall (drought) and this uncertainty is expected to

increase with climate change. Overall, the anticipated changes in temperature and rainfall as a result of climate change are expected to exert direct and indirect impacts on all elements of human wellbeing. This history and limited capacity to adapt to climate risk, uncertainty and change over time has made the country and its people vulnerable to the current and anticipated impacts of climate change.

The diverse agro-ecologic zones in the country demonstrate different levels of sensitivity to climate change impacts. While the lowlands are generally sensitive to increased temperatures and prolonged drought, the highlands are impacted from intense and irregular rainfall. Consequently lowland pastoralist societies and their animals are exposed to increased risk, and agricultural productivity in the highlands is decreased. From a sectoral point of view, climate-sensitive development sectors/systems in Ethiopia include agriculture, livestock, infrastructure, health, water and energy resources, forestry, and livelihoods. The agriculture sector for instance is sensitive even to small variations in weather conditions due to its heavy dependence on rain. Vulnerability in this sector is exacerbated by poor farming practices and low adoption of agricultural inputs. Although empirical studies are yet to accumulate, Ethiopia's forest sector is also experiencing difficulties in terms of natural regeneration, increased forest fire, disease and pest prevalence during the past few decades. See Table 5 for more information on sectoral climate impacts.

Table 5 - Priority sectors vulnerable to climate change and its impacts

Sectors	Climate risks	Potential impacts
Agriculture (crop and livestock)	Frequent droughts and occasional floods Seasonal shift in rainfall and temperature regime Extreme events including heat waves. Storms	• Shortening of crop plant maturity period • Expanding crop diseases • Low productivity of soils and animals • Increase in crop failure • Decrease in livestock feed availability and quality • Reduced animal health, growth and reproduction • Increase in distribution of some infectious diseases • Increased in decomposition rate of organic matter • Contracting of pastoral zones across the country • Increase in livestock death
Forestry	Increase in temperature, flood, landslide, frost, and extreme events including heat waves, and storms	• Expansion of tropical dry forests and the disappearance of lower mountain wet forests; • Increased biodiversity loss • Increased loss of indigenous species and decline of natural regeneration • Expansion of toxic weeds • Increased prevalence of forest fires, • Increased emission, • Increase in diseases, pests • Increase in GHGs in the atmosphere

		• Desertification
Health	Increase in temperature and drought frequency, and extreme events, including heat waves, and storms	• Increase of vector borne diseases • Increase in water borne diseases • Severe malnutrition • Increase in flood incidence, displacement
Transport	Increase in temperature and flooding	• Increase in infrastructural design costs, • Damage of roads, bridges, rail road's and airport landings
Power	Increased temperature, frequent and extended of drought, flood	• The impact of erosion and silting problem on hydropower dams • Upstream degradation of natural resources results in increased silting of hydropower dams • Scarcity of water reduces the generation of energy • Physical damage of dams
Industry	Increase in temperature, and rainfall variability	• Natural resources degradation leads to resource scarcity, leads to raw material limitations affecting industrial development/systems • Infrastructural damage • Increase in incidence of fire • Increase in costs • Declining productivity • Increase environmental pollution
Water	Increase in temperature; decline in soil	• Decrease in availability of potable water • Increase in water pollution

	moisture and ground water levels	• Decline in water supply • Increase in damage and decline on aquatic habitat and life forms
Urban	Increased droughts and flood	• Increase in hunger and famine • Intensifying migration of rural dwellers to towns • Damage on urban infrastructure (e.g., roads, building) • Increased both solid and liquid waste accumulation

The increased demand on natural resources as a result of population pressure and poor conservation management has strained the functioning of the natural system. The resulting shortage of resources to address basic human needs and the inability of the natural ecosystem to respond threatens people with a high degree of risk and increased vulnerability. In addition, deforestation, landslides, pest infestations, soil erosion and water pollution are among the environmental problems that have emerged in the country, creating further challenges for rural livelihoods. Progress on development also influences vulnerability. According to WDRP (2015), inadequate provision of veterinary service and drugs, shortage of drinking water for both human and livestock, shortage of pasture, prevalence of malaria, sanitation problems, lack of pure drinking water for human, lack of health facilities and drugs for humans, lack of infrastructure such as access to road and electricity, and migration

are also some of the factors that make the community vulnerable to climate and disaster risks.

The ability to withstand the gradual and/or catastrophic impacts of climate change is a function of an individual's resilience, structural qualities, the strength of communities, and organizational and institutional strength. Vulnerability of communities to climate risks needs to be analyzed across Woredas and by region and sector, and included in the NAP-ETH strategy. This analysis must take into account the variations in topography and climate regimes, as well as heterogeneity in social, cultural and economic factors. Gender is a key consideration, recognizing that women may be particularly vulnerable to climate change due to socio-economic inequalities that limit their adaptive capacity. With significant numbers of people in Ethiopia living in conditions of chronic food insecurity, building resilience and adaptive capacity for vulnerable communities and groups is critical.

Some short term or seasonal coping mechanisms employed by communities in response to climate hazards include: selling more livestock than usual; consumption of crops rather than sale; seeking alternative jobs; eating wild food and tubers; reducing expenditure on non-essential items; migrating for seasonal labor; eating wild fruit and tubers; borrowing money; seeking elders to support conflict resolution (specific to Afar, Somali and Oromia regions); supporting draught oxen power and seed; giving milk cows to neighbors; increasing working hours; sending children for

work; selling of non-productive assets; limiting portion size of meals; and relying on less preferred and cheap foods. See Annex 1 for further details. While these coping mechanisms have helped communities in the short term they are insufficient and unsustainable; improved strategies are needed for long-term adaptation and to build resilience.

According to research findings NDRMC (2015) different technologies for adaptation interventions can be identified. These include: adequate providing agricultural inputs (fertilizers, pesticides and improved varieties of seeds); enhancing extension services; constructing flood protection structures; developing infrastructure such as access to road and electricity; constructing health facilities and providing medicine for both human and livestock, developing irrigation schemes and enhancing soil and water conservation measures. To be effective, these technologies must be complemented with efforts to promote adaptive capacity, including access to information and support for flexible and forward-looking decision-making (ACCRA, undated).

PART II

PART II: NATIONAL ADAPTATION PLAN OF ETHIOPIA (NAP-ETH)

2.1 VISION AND STRATEGIC GUIDELINES

2.1.1. NAP-ETH VISION

The Ethiopia NAP (NAP-ETH) vision is to create climate change impact resilient development for Ethiopia and its people.

2.1.2. SCOPE OF NAP-ETH

The scope of NAP-ETH embraces development and service sectors with particular reference to agriculture, forestry, water, energy, transport, urban, industry, health and education.

2.1.3. PURPOSE OF NAP-ETH

1) Strengthen Ethiopia's overall adaptation strategy, through a strategic review of current national, regional and sectoral strategies and recent experience, using UNFCCC guidelines, and prepare Ethiopia's adaptation policy framework to guide the country to address adaptation needs currently not being addressed, readying Ethiopia to access global climate finance;
2) Bridge adaptation requirements across sectors and regions by identifying overlapping jurisdictions and missing links between different themes/sectors and geographical regions. This ultimately seeks to synergize adaptation actions that can ensure pulling all efforts and resources together;
3) Situate Ethiopia's overall adaptation strategy into the country's climate strategy landscape through review of

existing policies and plans, conducting a gap analysis using UNFCCC guidelines and elaborating the current climate change policies and plans;

4) Facilitate implementation of Ethiopia's adaptation strategy by aligning it with the institutional framework of Ethiopia's major climate change strategies and programs including the CRGE strategy, GTP II and other relevant strategies.

2.2 NATIONAL DEVELOPMENT PATH

Ethiopia aims to reaching middle-income status before 2025 and a carbon neutral economy by 2030. With a 15-year timeframe, 2016- 2030, and a 150 billion USD budget, the Climate Resilient Green Economy (CRGE) strategy is targeted to achieve green or low emissions economic growth that is resilient in the context of the adverse effects of climate change. The CRGE Strategy is considered fairly unique in terms of its integration of economic and climate change goals. The CRGE Strategy consists of a Climate Resilience (CR) component and a Green Economy (GE) component, and adaptation and mitigation programmes are prioritized within the Strategy, with the CR component focusing on climate change adaptation.

The 'Green Economy' component of the CRGE strategy is based on four pillars:

1) Improving crop and livestock production practices for higher food security and farmer income while reducing emissions;

2) Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks;
3) Expanding electricity generation from renewable sources of energy for domestic and regional markets;
4) Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings.

With regards to adaptation, Ethiopia intends to undertake adaptation initiatives that will reduce the vulnerability of its population, environment and economy to the adverse effects of climate change, within the context on its CRGE Strategy. Ethiopia's Intended Nationally Determined Contribution (INDC) declared to the international community:

> "Ethiopia's long-term goal is to ensure adaptation to climate change is fully mainstreamed into development activities. This will reduce vulnerability and contribute to an economic growth path that is resilient to climate change and extreme weather events.
>
> "Because climate change will affect all geographic areas of the country, its solution requires the participation of the entire population, especially farmers and pastoralists. Parallel to this, Ethiopia's response to climate change aims to integrate actions that improve the status of women and the welfare of children. Furthermore, measures to address climate change will be planned and implemented in a

> manner that addresses the wellbeing of the elderly, persons with disabilities and environmental refugees."[4]

Moving towards its long-term adaptation goal, Ethiopia's main effort up to and beyond 2020 is to increase resilience and reduce vulnerability of livelihoods and landscapes in three key areas; drought, floods and other cross-cutting interventions.

Ethiopia's overarching national development strategies and plans, sectoral strategies, and guidelines are still to be exhaustively analyzed for integration of climate change adaptation. To date these are being implemented through such programmes as Plan for Accelerated and Sustained Development to End Poverty (PASDEP), Growth and Transformation Plan 1 (GTP I), SLMP, PSNP, and Water, Sanitation and Hygiene National Strategy (WASH). The working assumption is that these programmes directly or indirectly are addressing issues of resilience and adaptation, however with the emergence of climate change in the country's development narratives and the adoption of the CRGE strategy, adaptation must be emphasized in a more concerted way.

GTP II (2016-2020) has mainstreamed CRGE to implement its four pillars: modernization of agriculture, industrialization, transformation and foreign trade development. Based on the

[4] Intended Nationally Determined Contribution (INDC) of the Federal Democratic Republic of Ethiopia – accessible at http://www4.unfccc.int/submissions/INDC/Published%20Documents/Ethiopia/1/INDC-Ethiopia-100615.pdf

strategic directions of GTP I, GTP II aspires to lead economic development in order to bring about structural change and transformation and serve as the basis for all sectoral plans.

The basic directions of GTP II are these:

1) Sustain the rapid, broad based and equitable economic growth and development witnessed during the last decade including through GTP I;
2) Increase productive capacity and efficiency to reach the economy's productive possibility frontier through rapidly improving the quality, productivity and competitiveness of productive sectors, especially agriculture and manufacturing industries;
3) Enhance the transformation of the domestic private sector to enable it to become a capable development force;
4) Build the capacity of the domestic construction industry, bridge critical infrastructure gaps with a particular focus on ensuring the provision of quality infrastructure services;
5) Proactively manage the on-going rapid urbanization to unlock its potential for sustained rapid growth and structural transformation of the economy;
6) Accelerate human development and technological capacity building, and ensure its sustainability;
7) Continue to build democratic and developmental good governance through enhancing implementation capacity of public institutions and actively engaging citizens;

8) Promote women and youth empowerment, ensure their effective participation in the development and democratization process and enable them to equitably benefit from the outcomes of development;
9) Build a climate resilient green economy.

2.3 GUIDING PRINCIPLES OF THE NAP-ETH

Implementation of the NAP-ETH will be governed by the following specific guiding principles, which are based on relevant and appropriate policies, and strategic guidance documents at the national, regional and sectoral levels. They are as follows:

1. **Participation**: successful implementation of the NAP-ETH depends on broad participation by stakeholders such as Federal Ministerial offices, Regional Bureaus, NGOs, private sector entities, academic institutions and bilateral and multilateral donors;
2. **Coherent interventions**: this principle requires actions to be carried out in a coherent and concerted manner in order to obtain more tangible results;
3. **Stakeholder empowerment**: stakeholder empowerment is a vital step in terms of achieving results;
4. **Gender sensitivity**: the adaptation options identified in the NAP-ETH will be relevant and will have significant impact if both men and women participate in and benefit from the action. Women are given due attention because they are often more vulnerable to changes in climate;
5. **Equitable implementation:** the need for equitable

implementation of the NAP-ETH at the social and environmental level is vital in order to safeguard the coherence, continuity and sustainability of interventions;

6. **Principle of partnership:** permanent dialogue needs to be established between the representatives of various groups of stakeholders in the sector.

2.4 FEATURES OF THE NAP-ETH

The following are key features of the NAP for Ethiopia:

1. **Flexible**: the implementation of currently prioritized adaptation options will be pragmatically adjusted based on the prevailing environment, while new options will be added and prioritized;

2. **Multi-level variable outputs**: the NAP-ETH comprises a single federal planning document for climate change adaptation that is multi-sectoral and cross regional, and will align with strategies of the CRGE sectors at national and regional levels;

3. **Implemented on a rolling basis**: new priorities that emerge will be integrated in development plans as progress is made in resolving capacity shortage, in mobilizing investment and in integrating policy;

4. **Ambitious**: it will not be limited by currently available resources, targets, assessments or technical and human

resources capacity, instead encouraging partners and backers to rally around long-term objectives;

5. **Mainstreamed**: NAP-ETH will be mainstreamed in the national planning process and budget cycle at all levels;

6. **Existing institutional foundation**: NAP-ETH will be implemented by the existing CRGE institutional foundation of Ministries, Departments, Agencies and Bureaus at federal, sectoral and regional levels.

2.5 OBJECTIVES OF NAP

The objectives of NAP-ETH fall within the NAP objectives outlined by the Cancun Adaptation Framework 2010:

1. To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience to enhance economic development;
2. To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programs and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

Based on the above internationally accepted objectives of the NAP, the specific long-term adaptation objectives of the NAP-ETH are the following:

1) Integrate currently disparate sectoral and regional adaptation initiatives in order to mainstream climate change adaptation holistically within Ethiopia's long term development path;

2) Mainstream and institutionalize the implementation of climate change adaptation in the country's development governance structures to insure continuity and consistency of pragmatic efforts, and by strengthening the institutional memory;

3) Mobilize resources from public and private climate finance sources and from both domestic and international sources to enable the country to implement its climate change adaptation initiatives and to develop appropriate technical, material and expert capacities;

4) Establish resilient systems that can withstand disasters and risks imposed by climate change through building collaborative partnerships among the relevant stakeholders and enhancing the thematic integration among different development sectors.

2.6 ADAPTATION OPTIONS AND STRATEGIC PRIORITIES

The degree of climate change impacts depends on the level of vulnerability, which in turn depends on the adaptive capacity of the country and the people. Alternative adaptation options can be listed for climate change impacts on development sectors and geographical regions.

NAP-ETH's adaptation options are summarized from sectoral,

regional and federal lists and show short, medium and long-term time scales; they are then disaggregated into relevant thematic areas. The thematic areas are constructed programmatically, incorporating cross-sectoral, trans-regional considerations, are synergistic, and also have long implementation time frames.

Within each option it is expected that adaptation opportunities will be found in the comprehensive layers of activities, including:

- **Planning and guidelines:** undertaking thoughtful and pragmatic planning with lists of alternative actions and implementation guidelines;
- **Technology and methods**: identifying and selecting enabling technologies and methods for the efficient implementation of adaptation activities;
- **Design and infrastructure**: ensuring adherence to designs that take into account emerging climate change impacts and create resilient infrastructures;
- **Systems building:** enhancing partnerships, integrating stakeholders horizontally and vertically, insuring adaptation activities feed into overall resilience and add value to each other's contribution;
- **Knowledge management:** enhancing research and development, integrating indigenous and contemporary knowledge, and registering acquired experiences;
- **Institutional memory:** creating knowledge and experience databases.

2.6.1 NAP-ETH ADAPTATION OPTIONS

This document has identified 18 major adaptation options that will be implemented at all levels in the country and across different development sectors. The listed options are defined to address major challenges of the country that are easily exacerbated by climate change impacts. More detailed information about the prioritization and approach will be prepared during the planning and implementation phase of each option and by respective sectors.

1. **Enhancing food security through improving agricultural productivity in a climate smart manner**. This adaptation option will focus on enhancing crop and livestock productivity by selecting resistant and tolerant varieties through switching and/or diversification, selection and breeding and by diversifying varieties. Specific to crops, effective systems for increased use of organic fertilizers and appropriate mechanization will be implemented. A strong system of monitoring of crops for diseases and pests will be implemented. For livestock, improved breeding and feeding systems and improved pasture/grazing management will be realized along with enhanced veterinary services. For both crops and livestock enhanced water availability, use of appropriate agricultural technologies and enhanced soil and water conservation methods will be employed.

2. **Improving access to potable water.** This adaptation option strives to attain balance between demand and supply of

potable water in the context of water conservation. Access to improved water, sanitation and health systems will be enhanced; efficient use of water will be promoted; water supply and sanitation maps will be developed; small-scale wind and solar pumps will be used to increase water availability.

3. **Strengthening sustainable natural resources management through safeguarding landscapes and watersheds.** This adaptation option will have multi-sectoral and trans-regional implications including: a focus on energy – safeguarding hydropower dams; a focus on water – improving ground water recharge; a focus on health – minimizing downstream flood risks; and a focus on agriculture – rehabilitating degraded lands.

4. **Improving soil water harvesting and water retention mechanisms.** This adaptation option will increase irrigation agriculture; improve systems for soil moisture retention in arid environments; develop water infrastructures for vulnerable people; improve water allocation and transfer governance; and implement diversified water harvesting technologies.

5. **Improving human health systems through the implementation of changes based on an integrated health and environmental surveillance protocol.** This adaptation option will embrace actions from disease surveillance to

promote evidence based policy decisions. Strengthening health systems will prepare them to deal with gradual changes and sudden shocks. Further emphasis will be given to climate sensitive disease prevention and management; improving emergency medical service; balancing high population growth rate with the economic growth; managing indoor air pollution; and improving basic health services, especially the health extension system.

6. **Improving ecosystem resilience through conserving biodiversity.** This adaptation option will strive to enhance natural resilience to the adverse impacts of climate change by enhancing healthy and well-functioning ecosystems. This option uses biodiversity conservation including agro-biodiversity and ecosystem services as an overall adaptation strategy. Diverse ecosystem conservation including mountains, watersheds, dry forests, tropical high forests, and rangelands will be implemented. Agro-diversity conservation and management in different agro-climatic zones will be implemented.

7. **Enhancing sustainable forest management.** This adaptation option will strive to create enabling situations for sustainable management of forest resources and its contribution to the livelihoods of forest dependent communities in particular and the national economy at large. The benefits of doing this will be twofold: enhancing the adaptive capacity of forests and forest landscapes and improving forest-based incomes and the

national economy. It is imperative to promote value added commercialization of timber and non-timber forest products along with payment for ecosystem services. In particular, the contribution of forest resources to other production sectors, mainly energy, agriculture and industry will be acknowledged and mainstreamed. Commercial afforestation and reforestation practices will be promoted. Wide scale promotion of forest health activities will be planned and implemented. Further, participatory forest management and community-based rehabilitation of degraded forests will be implemented.

8. **Building social protection and livelihood options of vulnerable people.** This adaptation option will give special emphasis to women, children and impoverished communities by putting in place safety net schemes, supporting asset creation, improving access to credit, promoting livelihood diversification and arranging voluntary resettlement/ migration.

9. **Enhancing alternative and renewable power generation and management.** This adaptation option will emphasize the sustainability of the power sector by enhancing ways of ensuring that power generation capacity withstands climate change impacts; by insuring diverse energy mix; by improving energy efficiency; and by accelerating access to off-grid energy.

10. **Increasing resilience of urban systems.** This adaptation option will address increasing the provision of housing; improving housing conditions; enhancing urban greenery; and improving urban infrastructure. Urban land planning and management will be given due emphasis. In addition, urban administration and management programmes will engage in promoting efficient household/urban waste management system.

11. **Building sustainable transport system.** This adaptation option will emphasize protecting and improving the lifespan of transport infrastructure. Transportation design and safety standards will be reviewed and adaptation-oriented asset management systems will be implemented. Furthermore, adequate transport system will facilitate the movement of aid and support to climate change-affected communities.

12. **Developing adaptive industry systems.** This adaptation option will enhance climate smart production systems and products through proper positioning of industrial parks and efficient supply of raw materials. Industrial waste management will be improved for e-wastes, liquid waste, and solid wastes. Efficient logistics will be enhanced to haul raw materials and deliver industrial products. To achieve these results, formal finance institutions will be appropriately strengthened at all administrative and management levels.

13. **Mainstreaming endogenous adaptation practices.** This adaptation option will emphasize recognition of traditional ecological knowledge (TEK) systems, such as local climate change adaptation practices, skills and institutions. Through participatory processes, these practices will be identified, standardized, integrated, scaled-up and incorporated into the implementation of adaptation action and programmes.

14. **Developing efficient value chain and marketing systems.** This adaptation option will focus on improving the resilience of value chains for livestock, crops, and forest products, and products from other sectors in order to facilitate improved production and marketing.

15. **Strengthening drought, livestock and crop insurance mechanisms.** This adaptation option will promote preparedness related to risk reduction and create insurance schemes for anticipated climate risks, including drought and flood leading to crop failure.

16. **Improving early warning systems.** This adaptation option will enhance planning for disaster and climate risk management; reinforce early warning systems related to both quick and slow onset disasters; and install knowledge management system, climate information exchange systems and enhanced networking capabilities, which are all vital for effective data sharing and decision making.

17. **Developing and using adaptation technologies.** This adaptation option will cover materials, methods, equipment and diverse forms of knowledge to strengthen climate change adaptation capacities. Diverse technologies that enhance climate change adaptation capacities will be pursued related to: flood control, infrastructural design, agricultural productivity, resource conservation, efficient management techniques and information management systems.

18. **Reinforcing adaptation research and development.** This adaptation option will emphasize the building of databases, and increasing the knowledge and wisdom/lessons learned portfolio from adaptation experiences of different sectors and regional states. Meteorological data will be compiled and analyzed continuously and consistently; multidisciplinary research on climate change vulnerability and impacts will be carried out; decision support systems will be devised and arranged. Environmental education will be promoted; public awareness schemes will be enhanced; extension system (including radio) will be improved to more effectively reach rural and remote people and communities, as well as highly vulnerable people and communities.

2.6.2 STRATEGIC PRIORITIES

The impact of climate change varies across geographic areas and social groups depending on environmental, ecological and socio-economic resilience of the specific area and group. The level of urgency of the climate impacts on development sectors depends

on the sector's vulnerabilities and inherent or improved adaptive capacities. Development sectors often overlap and are cross regional, which strongly suggests that federally determined adaptation frameworks and programmes (enabling environment) tied to known and priority adaptation options need to serve the country both across sectors and across regions. In view of the need for mid- to long-term adaptation planning it is very important to balance Ethiopia's evolving climate change resilience against the anticipated climate change scenarios so that the extent of adaptation can be anticipated as accurately as possible, the scale and scope of adaptation can be understood and supported with resources, and the depth of local and area-wide impact (e.g., across an agro-ecological zone) can be fully appreciated by policy, financial and program planners.

To be able to devise the priority adaptation options four major variables or criteria are taken into account:

1. A strong internationally-agreed understanding of the purpose of national adaptation plans (Section 2.3);
2. A strong understanding of Ethiopia's prevailing development needs and challenges together with robust assessments of the current and emerging impacts of climate change (Sections 1.5 and 2.2);
3. A strong understanding of the drivers of vulnerability and the need for adaptation in the context of increasing climate change and climate risk;
4. Scalable criteria for priority setting, including:

a) number of climate resilient targets addressed

b) contribution to poverty alleviation and ensuring food security;

c) ability to generate household and national income;

d) improving the capacity at all level of governments;

e) alignment with investment activities in the country;

f) cost effectiveness; and

g) sensitivity to vulnerable groups, including gender and youth,

h) sensitivity to vulnerable ecosystems; and

h) size of mitigation and other co-benefits.

Strategic priorities will be articulated in the NAP-ETH that will incorporate the priority adaptation options that can directly tackle most prevailing conditions of vulnerability and build resilience in the face of the expected increase in impacts of climate change including increased climate variability.

2.7 NAP-ETH COSTS

In the 15 years NAP-ETH implementation period (2016- 2030) the country needs nearly USD 6 Billion per annum (USD 90 Billion total) to be divided proportionally between the 18 adaptation options/programs. This annual average agrees with adaptation cost estimate for Ethiopia.

1. The costs of NAP-ETH were based on the following inputs:

- Sectoral adaptation cost estimates for agriculture, forestry, water and energy;
- Growth and Transformation Plan (GTP) II sector by sector disaggregated budget;
- Urban poverty reduction project budget;
- Productive Safety Net Program (PSNP) budget;
- Sustainable Land Management (SLM) budget;
- Disaster risk budget (assumed 2 disasters will happen during the NAP-ETH period);
- Annual budget 2016 allocated for implementation of Sustainable Development Goals (SDG);

2. Annual averages of the aforementioned budgets/costs were calculated and factored by 40%;
3. The 40% factor is assumed to cover adaptation activities (assessment, planning, implementation, monitoring and evaluation). In addition to anticipated adaptation activities, it is assumed that mainstream development work contributes to adaptation by reducing underlying causes of vulnerability. Additionally, some mitigation/green economy engagements are assumed to have adaptation co-benefits;
4. NAP-ETH costs will be determined along with the implementation strategies and action plans to be prepared henceforth; and
5. Finance for the NAP-ETH will be mobilized from domestic (public and private sources) and global adaptation related climate finance.

The calculation of adaptation cost estimates is yet to be more refined. As costs are updated, attention will be paid to the requirements of climate finance institutions (e.g., the Green Climate Fund) and their methodologies for determining adaptation costs, so that Ethiopia will be more able to readily access these financial resources over time.

2.8 INCORPORATING ADAPTATION INTO DEVELOPMENT POLICIES AND STRATEGIES

It is vitally important for climate change adaptations to be proactively incorporated into development policies and strategies. Macroeconomic and sectoral policies and strategies, which are currently in force, as well as Regional strategies and Woreda plans, should be revised or updated regularly and at least as necessary to ensure that they incorporate climate change adaptations appropriately and effectively. Future development policies and strategies should also anticipate the need to incorporate climate change adaptation appropriately and effectively on regular basis.

Ethiopia has made a good effort to undertake some preliminary work to incorporate climate change adaptation into development policies and strategies in general, under the CRGE strategy and the GTP-II, in particular. However as critical adaptation requirements are more clearly understood, these strategies along with sectoral and regional strategies and plans will have to be amended to mainstream adaptation, and perhaps supplementary plans will need to be developed and authorized for

implementation on an interim basis in some cases. See Figure 16, below, to understand how programmes are mainstreamed into the holistic development strategy of the country and how NAP-ETH will benefit from the ongoing development strategies and plans.

PART III

PART III: IMPLEMENTATION

3.1 INSTITUTIONAL GOVERNANCE AND STRUCTURE TO IMPLEMENT THE NAP-ETH

Effective governance is believed to play a significant role in ensuring the successful implementation of the objectives of the National Adaptation Plan. The existing CRGE structure is used as the governance structure for the implementation of NAP-ETH. The design of the CRGE Facility builds on international best practice, and has been tailored to the unique circumstances and needs of Ethiopia. The CRGE architecture has been developed to enable a programmatic and transformative approach for implementing relevant activities that minimizes the transaction costs, fragmentation and duplication associated with a project-based approach. The system was created to help convert the CRGE vision into practical action on the ground.

The governance structure of CRGE (see Figure 17) has captured coordinating, implementing, and executing entities at all government administration levels - from the Federal to Regional to Woreda administrative levels. However it has not exhaustively incorporated all coordinating, implementing, and executing entities, such as social sectors which have been involved in climate adaptation activities - including Ministry of Health, Ministry of Labor and Social Affairs, Disaster & Risk Management commission and relevant others. As well, the CRGE structure does not include dedicated capacity on

adaptation/climate resilience at many government administration levels.

It is not advisable to create new and independent NAP-ETH governance structure; rather, it is recommended to use the existing CRGE governance structures with some modifications (incorporating entities which were not been included) due to the following reasons:

- The name and arrangement of the existing structure is inclusive of both adaptation and mitigation, however a stronger and increasing emphasis on adaptation/climate resilience is required

- Capacity and procedures are needed to make demarcation line between adaptation and mitigation and co-benefits, for purposes of ensuring policy clarity, planning, funding, M&E and reporting related to adaptation/climate resilience

- To avoid unnecessary duplication of structures that could be managed in one structure

In the governance structure, implementation of NAP-ETH as a whole falls under the mandate of the various sectoral institutions, such as the Ministry of Environment, Forest and Climate Change (MEFCC), Ministry of Agriculture and Natural Resource, Ministry of Livestock and Fishery Development, Ministry of Industry, Ministry of Water, Irrigation and Electricity, Ministry of Transport, Ministry of Housing and Urban Development and

other sectors, commissions/agencies, research and academic institutions, NGOs, CSO, and private sector actors. The MEFCC holds responsibility for coordination of the implementation of the NAP-ETH, and for coordination of required follow up actions.

The NAP-ETH is aligned with the existing policy decision-making structures for the CRGE initiative and with the broader Government planning processes. It ensures that different parts of Government are properly integrated into the NAP-ETH's governance mechanisms; and that its governance mechanisms are transparent so that stakeholders can express concerns or opinions at appropriate points in the decision-making processes.

The specific expected responsibilities of the various bodies involved in NAP-ETH implementation and governance are described below.

Roles and Responsibilities of Inter-Ministerial Steering Committee:

- As Chair of the Inter- Ministerial Steering Committee, the PMO provides overall guidance to the work conducted with respect to the NAP-ETH, and facilitates high-level decision making that determines what is required of NAP-ETH;
- Sets priorities and establish the necessary legal and institutional frameworks;

- Strengthens the implementation of all existing policies and programmes that could reduce vulnerability to climate change;
- Oversees cross-regional common interests arising during NAP-ETH implementation.

Roles and Responsibilities of the Management Committee:

- Sets the operational direction of NAP-ETH in order to ensure alignment with the CRGE Strategy and the GTP;
- Evaluates NAP-ETH implementation, as well as the activities of all sectors and avoid duplication of efforts and improve its effectiveness;
- Provides final approval and financing allocation and maintain oversight of financial management Review and approve the Annual Consolidated Reports submitted by IEs.

Roles and Responsibilities of CRGE Facility:

- The MEFCC and Ministry of Finance and Economic Cooperation is primarily responsible for mobilizing funding both from domestic and international sources, in collaboration with counterparts in the various sectors and stakeholders;
- Authorises the release of funds from the national and international account for approved priority resilient activities from the CRGE Facility Account;

- Presents technical and financial reports of NAP-ETH to the Management Committee for evaluation and approval.

Roles and Responsibilities of Ministry of Environment, Forest and Climate Change:

- Leads and provides strong Coordination for the implementation of NAP-ETH;
- Undertakes studies and research, and develop systems and action plans to ensure the successful implementation of NAP-ETH;
- Puts forward new initiatives and proposals that are designed to improve the incorporation of climate change adaptations into development policies and strategies;
- Consolidates and aggregates projects/programme performance data from across Regional Implementation Entities (IEs) and federal-level Executing Entities (EEs) and generates quarterly (progress) and annual (performance assessment) adaptation reports.

Roles and Responsibilities of Ministry of Finance and Economic Cooperation:

- Makes operational a Facility that performs the effective promotion, financing, implementation and monitoring and evaluation of actions that meet the objectives of the CRGE strategy;
- Holds full programmatic and financial accountability, on behalf of the Government, for implemented actions;

- Releases funds from the CRGE Facility Account to line ministries and Regional Bureaus of Finance and Economic Development (BOFED) pursuant to the decision of the Management Committee and in compliance with the National Regulatory Framework.

Roles and Responsibilities of Federal Implementing Entities (FIEs-*Line Ministries)*:

- Coordinates the implementation of sectoral and sub-sectoral activities
- Implement NAP-ETH successfully;
- Prepares and submits monitoring reports to MEFCC on a regional basis.
- Designs, establishes and staffs their respective Environment and Climate Change Coordinating Unit;
- Designs and establishes the MRV system per sector.

Roles and Responsibilities of National Planning Commission:

- The NPC has the leading role in the planning process for the NAP-ETH;
- The NPC considers adopting NAP-ETH impact level indicators throughout the GTP periods and actively participate in M&E of NAP-ETH implementation performance.

Roles and Responsibilities of research and academic institutions and National Agencies (NMA and CSA):

- Academic and research institutions undertake studies and researches, to develop systems and models for the successful implementation of NAP-ETH;
- The National Meteorology Agency (NMA) has the role of developing climate models, prediction and scenarios, and seasonal forecasts, clarifying the level of uncertainty for each agro-ecological zones in Ethiopia;
- The Central Statistical Agency (CSA) holds and collects climate related data, which can serve to populate some resilient activities indicators, through data base on impact of climate change for each agro-climate zone and vulnerable groups.

Roles and Responsibilities of Regional Inter-Bureaus Committee[5]:

- Regional Bureau of Environment and Forests and Regional Bureau of Finance and Economic Development will chair the Regional Inter-Bureaus committee;
- Provides general directions and guidance on Regional NAP implementation;

[5] Regional Inter-Bureaus Committee is changed to Regional Steering Committee

- Oversees the implementation of CRGE in general and Regional NAP-ETH implementation in particular;
- Evaluates Regional NAP-ETH implementation and avoid duplication of efforts and improve its effectiveness and efficiency;
- Examines and approves Regional outcome reports, activity reports and financial reports.

Roles and Responsibilities of Regional Bureaus:

- Responsible for Prioritization and implementation of the strategic adaptation options of their respective Region Bureaus;
- Monitors and evaluates Regional, Zonal (where appropriate) and Wereda levels performances during implementation of NAP-ETH;
- Designs mechanisms and mobilizes climate finance in their respective Bureaus
- Prepares and submits monitoring reports to their respective coordinating sector.

Roles and Responsibilities of Woreda Inter-office[6] Committee

- WoEF and WoFED will chair the woreda inter-office committee;

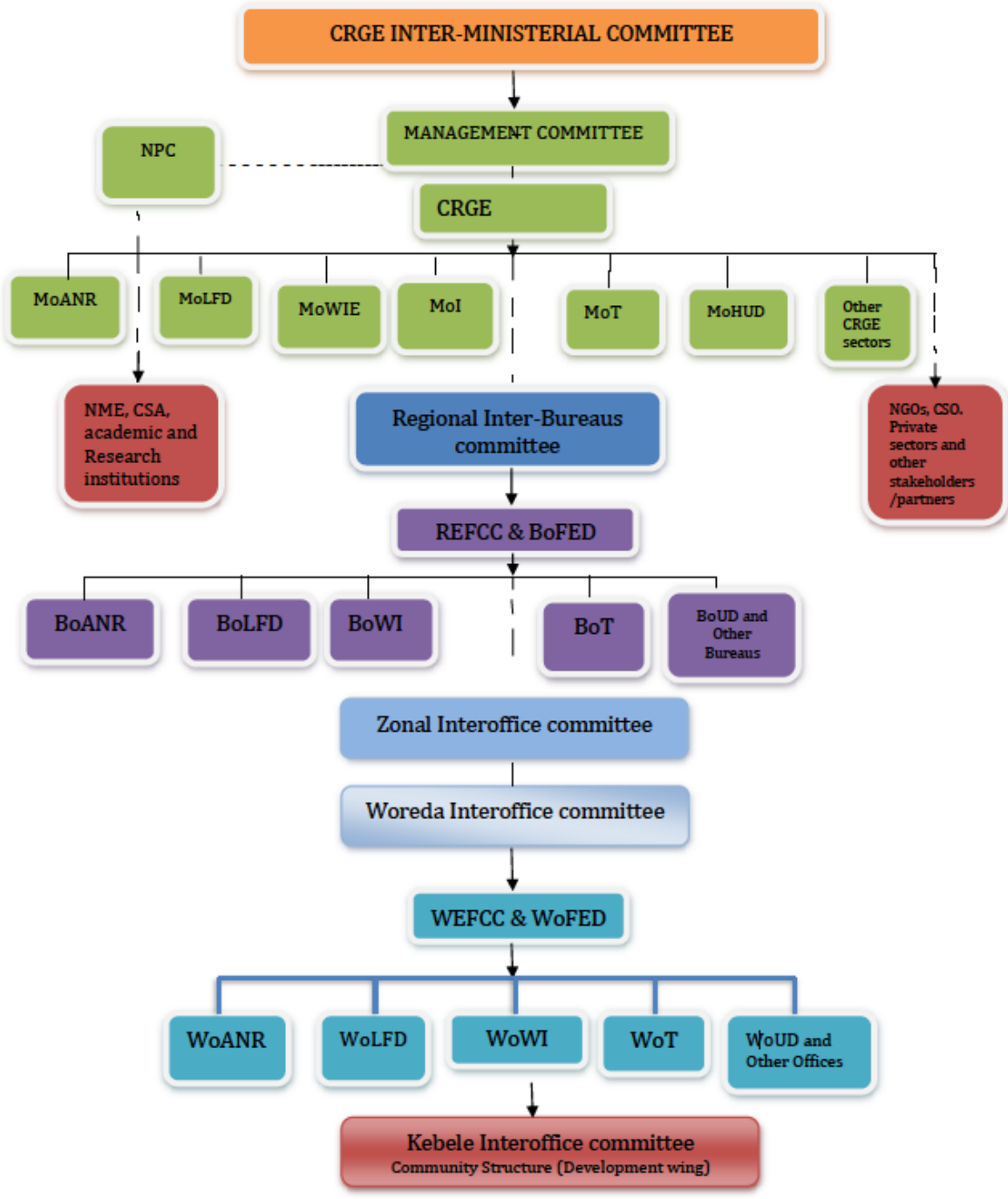
[6] Woreda Inter-office Committee is changed to Woreda Steering Committee

- Oversees the implementation of CRGE in general and woreda NAP-ETH in particular;
- Evaluates NAP-ETH implementation at Woreda level, and coordinates efforts to avoid duplication and improve the effectiveness and efficiency Woreda offices, Kebeles and community structures;
- Executes and monitors NAP-ETH projects/programmes in the Woredas.

Roles and Responsibilities of Woreda Offices:

- Responsible for prioritization and implementation of the strategic adaptation options of their respective Woreda officials;
- Monitors and evaluates office level performances during implementation of NAP-ETH;
- Designs mechanism and mobilizes climate finance in their respective officials
- Prepares and submits monitoring reports to their respective coordinating Bureaus.

Figure 16 - NAP-ETH governance arrangements



3.1.2 COLLABORATION BETWEEN THE GOVERNMENT AND ITS PARTNERS

Collaboration between the government and its financial and technical partners in relation to the National Adaptation Plan should be maintained on the basis of the structural arrangements described above. Initial collaboration between these stakeholders could take place in the form of a round table of donors with a view to mobilizing funding, followed by other meetings to review funding mobilized, progress made, problems encountered and proposed solutions.

3.2 MOBILIZATION OF TECHNICAL AND FINANCIAL RESOURCES

The CRGE Strategy recognizes that most bilateral and multilateral climate funds need a medium through which funds may be channeled to support climate related activities and thus this must be provided for by instituting activities through and accrediting the CRGE Facility.

The objectives of the CRGE Facility are as follows:

1. **Financial moblisation and allocation:** The CRGE Facility is the Government's vehicle to mobilise, access and combine domestic and international, public and private sources of finance to support the institutional building and implementation of Ethiopia's CRGE Strategy;
2. **Stakeholder coordination**: The CRGE Facility provides a single engagement point where the Government, development partners, academia, the private sector, civil society and other stakeholders can engage and make decisions about how best to utilise available finance in the pursuit of the CRGE vision and goals; and

3. **Unlock capital at scale**: By blending investment sources and leveraging resources, the CRGE Facility will use climate finance to complement other existing forms of investment to bolster Ethiopia's core climate-compatible development activities, thereby promoting the full integration of CRGE with the GTP.

The following are potential finance sources of funding for the National Adaptation Plan:

- Government budget;
- Bilateral & multilateral partners (World Bank, UNFCCC, Green Climate Fund-GCF, the UNDP, GEF, etc.);
- Private investment;
- Civil Society Organizations; and
- Community contributions

The Ministry of Finance and Economic Cooperation and the Ministry of Environment, Forest & Climate Change are jointly responsible for mobilizing funding, in collaboration with counterparts in the various sectors.

3.3 COMMUNICATION STRATEGY

Successful implementation of the NAP-ETH requires a proactive communications strategy, aimed at promoting ownership of the plan among the public and development partners.

A communications strategy is essential in all cases to improve the reach of information about the NAP-ETH at all levels and to solicit feedback,

communicate issues raised from stakeholders - to ensure transparency, participation and smooth implementation.

The communications strategy for adaptation will primarily target national, regional and local decision-makers, as well as:

1. Federal and Regional administrative structures
2. Local administrative units
3. Civil society and the private sector
4. Communications and media experts
5. Academics
6. Researchers
7. Women groups
8. Youth groups
9. Technical and financial partners
10. Opinion leaders including traditional and religious leaders
11. Local communities across the country

Different channels may be used for communications concerning the NAP-ETH, in particular information and communication technologies (ICT), the structures and facilities of the Ministry responsible for communications and the private media, and traditional channels of communication, such as direct collaboration with stakeholders.

Particular emphasis will be placed on the use of Federal and Regional working languages in order to facilitate the simultaneous dissemination of information on a mass basis reaching the grassroots.

Tailored information should also be communicated to the international community, in particular with a view to mobilizing more funding for implementation of the NAP-ETH.

3.4 IMPLEMENTATION OF THE NATIONAL ADAPTATION PLAN

It is intended that implementation manuals will be developed that will guide implementation of the NAP-ETH. A general strategy for implementation of the NAP-ETH within a framework of five (5) Priorities is set out below:

Strategic priority 1: <u>Mainstreaming Climate Change Adaptation in to development policies, plans and strategies</u>

Climate change adaptation, in a coherent manner, must be **mainstreamed** into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate to ensure reducing vulnerability to the impacts of climate change, by building adaptive capacity and resilience. The adaptation measures need to be prioritized according to their urgency or importance based on set and agreed criteria. The mechanisms have also been introduced by which the adaptation measures will be taken.

Strategic priority 2: Build the long-term capacities of institutional structures involved in NAP-ETH

It has been understood that the implementation capacity of coordinating, implementing and executing entities at all levels of government administration is believed to play a pivotal role in realizing the CRGE

vision and the GTP. However, a wide implementation capacity gap has been observed among CRGE implementing sector offices in relation to organizational, system and human capacity, according to the findings of a nation-wide capacity needs assessment. This would be one of the major constraints encountered in implementing and achieving CRGE strategies and vision. Government of Ethiopia has developed a National Capacity Development Programme to address problem associated with climate change mitigation and adaptation capacity gap by building long lasting foundations in the organizational system and human capacity of institutions. The implementation of NAP-ETH benefits from continuous capacity assessment works and targeted capacity building activities.

Strategic priority 3: Improving the knowledge management system for NAP-ETH

As far as possible, the NAP-ETH program will establish structured systems of knowledge acquisition and development, including careful use of geo-referenced data sets on GIS layers that help link the program/project sites to specific learning outcomes in the form of reports, fact sheets and other knowledge products, such as film, podcasts and other media, to help explain the direction, purpose and impact of the work.

Knowledge briefs will be prepared each year and a set of 'Champions' (community, experts, other non-governmental and private sector) will work with each program/option to capture their experiences and knowledge on an ongoing basis over the five-year period. The program/project will also collect gender-disaggregated data at all levels and will continually strive to improve the depth, range and quality of this

data over the lifetime of the program/project. In years two and five, national learning events will be convened with other like-minded projects to assess progress at a macro-level across climate change adaptation interventions. This will be linked to the production of policy reports with associated briefing papers highlighting key lessons learned, policy pointers for future government action under the NAP-ETH, and good performance experiences across the country.

Strategic priority 4: Establish effective and sustainable funding mechanisms

An estimated expenditure of around USD 6 Billion will be required each year for the next 15-years of NAP-ETH implementation. The projected level of foreign direct investment, grants, and transfers will not be sufficient to fund the required additional investments. Therefore, finance mobilization is identified as one of the major constraints for implementing the NAP-ETH. Low mobilization of domestic financial resources was another implementation challenge encountered. Mobilizing private international capital will play a useful role, but public finance – such as climate finance – can also contribute significantly to close the funding gap. Attracting international capital will not be easy. International competition for scarce capital increases the challenges for least-developed countries in accessing such funding.

Development of a long run strategy that ensure sustainable funding mechanisms will be done. Among other things this will include:

- Undertaking recourse gap assessment
- Identifying major sources of funding

- Diversify source of funding by type and number
- Identifying funding sources according to their reliability
- Enhancing resources mobilizing capacity of institution
- Introducing innovative funding mechanisms

Strategic priority 5: Advancing adaptation research and development in the area of climate adaptation

It has also become increasingly clear that the environmental repercussions and economic impacts of climate change are sizeable, and populations everywhere in the world are beginning to experience adverse consequences of climate change on aspects of their lives and environments, including on their health and wellbeing. Research and development activities will play an important role in improving awareness and management of climate change with a view to successful implementation of the National Adaptation Plan.

Specific objectives, outcomes and indicators have been initially identified for each strategic priority and are provided in Table 7 (following page). These will be reviewed and updated as implementation strategies are developed.

Table 6 – NAP-ETH – Strategic Implementation

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Assumptions and risks
STRATEGIC PRIORITY 1: Mainstreaming climate change adaptation into development policies, strategies and plans				
Incorporate climate change adaptation into National policies strategies and plans	Fully mainstreamed national policies, strategies, programmes and plans	▪ Mainstreamed policies, strategies, programmes and plans	▪ Mainstreaming manuals and check lists ▪ Evaluation reports ▪ Reports from sectors	▪ Collaborative partnership exists between climate change and development institutions. ▪ Each development program has economic and GHG scales
STRATEGIC PRIORITY 2: Building long-term capacities of institutional structures involved in NAP-ETH				
Expand the technical, human and financial resources and operational structures	Integrated program for climate change adaptation capacities	▪ A program for building the capacities and its operational structures is available	▪ Document with details of the capacity-building programme ▪ Reports from sectors ▪ Evaluation reports	▪ Comprehensive capacity development plan exist aimed at creating critical mass of resources

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Assumptions and risks
Build the capacities of institutional structures involved in managing NAP-ETH	Dynamic long-term planning mechanisms that incorporate NAP-ETH have been put in place	▪ Policy documents and development strategies refer to climate change adaptations	▪ Policy documents and development strategies	▪ Enabling institutional framework exist ▪ Sufficient financial and technical resources mobilized
	Problems relating to climate change adaptation are resolved promptly	▪ Satisfaction rate for stakeholders affected by climate change	▪ Evaluation reports	
	Risks relating to variability and climate change are better managed	▪ Anticipation capacities of institutional structures involved in managing climate change adaptation	▪ Evaluation reports	
STRATGEC PRIORITY 3: Improving the knowledge management system for NAP-ETH				
Improve knowledge of climate change adaptation	Climate change adaptation is more widely known and documented	▪ A climate change adaptation database has been created and is functional ▪ Lessons learned on adaptation documented and	▪ Evaluation reports	▪ Multifaceted institutional memories mechanism established ▪ Strong knowledge and portfolios bases established

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Assumptions and risks
		shared among stakeholders		
Ensure that the existing early warning system is functional	The early warning system works effectively	▪ Improve the anticipation and communication capacities of the early warning system	▪ Evaluation reports	▪ High resolution reliable early warning system created ▪ Effective early warning system implementation mechanism exist
Foster a culture of resilience and adaptation to climate change among citizens	Citizens gradually develop a well-informed approach to manage risks and variability and adapt to climate change	▪ % of population with access to climate information for decision-making ▪ Adoption rate for best practices in the field of climate change adaptation	▪ Evaluation reports	▪ Community climate change impact resilience capacity exist ▪ Best practices of climate resilience scaled up
STRATEGIC PRIORITY 4: Implementing effective and sustainable funding mechanisms				
Building capacities and leadership in Ethiopia with a view to mobilizing the funding required for NAP-ETH	More funding is available for NAP-ETH	▪ Increase in funding mobilized	▪ Signed funding agreements	▪ Strong climate change governance mechanism exists ▪ Sufficient financial and material resources mobilized

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Assumptions and risks
Provide sustainable funding sources for NAP-ETH	Ethiopia has stable and sustainable sources of funding for the rehabilitation/recovery of people affected by climate hazards and changes	▪ Amount of funding available ▪ A sustainable funding mechanism is in place	▪ Evaluation reports	▪ Sufficient and consistent budget allocated for implementation of climate change adaptation ▪ Clear guideline and definition exist about climate finance
STRATEGIC PRIORITY 5: Advancing adaptation research and development in the area of climate change adaptation				
Undertake and support research and information analysis related to climate change impacts & adaptation	Vibrant research recommendations Develop a model for the successful implementation of adaptation options	▪ Number of basic research undertaken ▪ New research findings	▪ Assessment and Evaluation Reports	▪ Strong action research capacity established informed by basic and adaptive research

PART IV

PART IV: MONITORING AND EVALUATION OF THE NAP-ETH

4.1 OBJECTIVES AND SIGNIFICANCE OF NAP-ETH MONITORING AND EVALUATION

The main objectives of the NAP-ETH's monitoring and evaluation system are to follow up the implementation of the NAP-ETH so as to ensure its effectiveness. The M&E system provides a tool to follow up progress in achievement of planned target and to take appropriate and timely corrective measures when necessary and manage the development process effectively. It also provides an up-to-date overview of progress at all times, makes activities more effective and efficient in order to achieve anticipated outcomes; and increases the visibility of the NAP-ETH throughout the implementation period.

M&E of adaptation aims to track progress achieved in the implementation of adaptation interventions, and/or the effectiveness of these interventions in reducing vulnerability, improving adaptive capacity, and supporting the overall well being of populations affected by the impacts of climate change.

Monitoring takes place on a continuous basis, which is required for adaptive management in order to track progress and determine whether any adjustments need to be made. For accountability purposes, both monitoring and evaluation may be used: monitoring can help to confirm whether a planned intervention has taken place, evaluation can help to assess its effectiveness. Similarly, both monitoring and evaluation can serve learning purposes.

National M&E of adaptation looks at progress towards adaptation in a country: Which achievements have been made in implementing adaptation-related policies, plans, interventions, and investments? What are the results of those achievements? As interventions on a more local level also contribute to this progress, national M&E of adaptation may also need to take into account information about adaptation that happens at regional levels.

National M&E of adaptation refers to adaptation progress of a country and can take into account information about what is happening at the more local project and community levels, whereas portfolio M&E of adaptation aims to explain how a range of adaptation projects (in one or multiple Region) are contributing to a common set of objectives.

The results of the monitoring and evaluation would be used to improve effectiveness and efficiency of the process, and facilitate incorporation of new assessments and emerging science, as well as highlight lessons learned. The results would also be used to develop reports on the progress and effectiveness of the NAP-ETH process, which could inform the COP through national communications and other reporting channels

4.2 ROLES AND RESPONSIBILITIES IN M&E

Many distinct actors, i.e., National Adaptation Plan, Coordinator, Implementing and Executing Entities, will be involved in National Adaptation Plan (NAPs) M&E. The quarterly and annual reporting path summarized and presented below highlights the many actors and

levels involved and their function in reporting. The detailed roles and responsibilities in monitoring, evaluation and reporting are presented in Table 8.

Table 7 - Roles and responsibilities in monitoring, evaluation and reporting

Actors	**Monitoring, Evaluation and Reporting Responsibilities**
Ethiopian Parliament: (Standing Committee for Natural Resources and Environmental protection)	• Provide high level direction, guideline and support to the implementation of NAP-ETH • Perform biannual performance evaluation of NAP-ETH
Inter-ministerial steering committee	• Facilitate high level decision making related to the implementation of NAP-ETH • Oversee cross-regional and cross-sectoral issues related to the implementation of NAP-ETH
Management committee	• Monitor and evaluate overall NAP-ETH implementation and avoid duplication effort • Oversee financial management performance of IEs
CRGE facility	• MEFCC and MoFEC coordinating the overall implementation and M&E of NAPs • Approves the NAP M&E System • Reviews NAP performance and Portfolio performance on a quarterly basis
NPC	• Commissions spot-checks of projects/programmes,

	as required (for technical or financial reasons) • Commissions reviews or evaluations (independent or non-independent) of projects /programmes
Monitoring and Evaluation Directorate of MEFCC and MoFEC)	• Develops and maintains the NAP M&E System • Provides guidance and support on NAP M&E system requirements (including reporting templates) • Monitors project/programme performance quarterly (progress reports) and annually (performance assessment reports) • Consolidates quarterly and annual reports from IEs reports for submission to, and approval, by MEFCC and MoFEC • Executes spot-checks of projects/programmes, as requested by the MEFCC • Commissions and coordinates joint monitoring missions (with development partners), as required • Commissions independent evaluations, as required • Produces quarterly reports • Produces annual performance assessment reports • Coordinates and hosts annual reflection meeting • Disseminates and posts approved reports to the public
Federal Implementing Entities (FIEs) ** *Line Ministries*	• Ensures compliance of all CRGE financed and non-CRGE financed projects / programmes with the NAP M&E system (including reporting requirements) • Develops and implements M&E plans for all CRGE and None CRGE financed projects / programmes (**M&E plans should be in line with both sectoral

	M&E plans and the CRGE M&E system) • Supports RIEs and EEs (government & non-government) in implementing NAPs M&E plans • Monitors project/programme performance quarterly progress reports and annually performance assessment reports • Consolidates and aggregates project/programme performance data from across RIEs and federal-level EEs and generates quarterly progress and annual performance assessment reports • Leads mid-term review and impact assessment procedures (e.g. develops TORs, oversees review / evaluation, submits final report to MEFCC)
Sector CRGE Units[1]	• Focal points within line ministries coordinate the sector to ensure compliance on M&E responsibilities, including working closely with the planning directorate and across all other directorates.
Regional Implementing Entities (RIEs) ***Regional Sector Bureaus***	• Supervises the monthly and quarterly implementation of programmes / projects at all levels in the region • Prepares quarterly (progress) and annual (assessment) reports and submits to relevant FIEs and BoEFCs & BoFED • Performs quarterly monitoring missions, as required • Facilitates and hosts periodic joint monitoring missions, as required and requested by the CRGE and FIE
Regional Environment, Forest and	• Responsible for bureau-level financial monitoring and reporting

Climate Change Office (BoEFCs) and BoFEDs	• Responsible for bureau-level monitoring and reporting
Executing Entities (including Woreda offices and Zone Departments)	• Executes and monitors CRGE financed projects / programmes, and None CRGE financed Adaptation project /program including the project / programme M&E plan • Generates monthly and quarterly progress reports for submission to the relevant IE (RIEs, although in some cases, EEs may report directly to FIEs)
Woreda Environment, Forest and Climate Change Office (WoEFO) and WoFEDs	• Responsible for woreda-level fiscal monitoring and reporting • Responsible for woreda-level financial monitoring and reporting
Contributors/ Donors	• Participates in monitoring missions in donors supported projects • Negotiates additional monitoring and reporting requirements with MEFCC and MoFEC as part of any Memorandum of Understanding (MoU)

First level

1a. Woreda executing entities (sector office and other Executing Entities) report on quarterly and annual basis to Woreda Inter Office technical committee Coordinators (Woreda Environment,

Forest and Climate Change and Economy & Finance Office) and regional sector bureaus.

1b. Woreda Inter Office technical committee Coordinators (Woreda Environment, Forest and Climate Change and Economy & Finance Office) consolidate quarterly and annual report of sector offices and submit them to Woreda Inter Office committee and Regional Inter Bureau committee technical Team coordinator (Regional Environment, Forest and Climate Change and Economy & Finance Bureau). Woreda Inter Office committees discuss the progress made with regard to NAP-ETH intervention (program/projects), major problems and challenge encountered during implementation and give possible solution that could address problems and challenge as per the level of mandate provided in the operational manual of the NAP-ETH.

1c. Zonal inter office (wherever appropriate) technical committee coodinators coordiante quarterly and annual report os sector offices and submit them to zonal approprate bureau.

Second Level

2a. Where there are Executing Entities working with regional sector bureaus (also called Regional Implementing Entities), they should also consolidate quarterly and annual reports and submit them to regional sector Bureau and Regional Inter Bureau committee technical Team coordinator (Regional Environment Forest and Climate Change and Economy & Finance Bureau).

2b. Regional implementing sector bureaus consolidate quarterly and annual report submit to Regional Inter Bureau committee technical Team coordinator (Regional Environment Forest and Climate Change and Economy & Finance Bureau) and Federal Sector Offices

2c. Regional Inter Bureau committee technical Team consolidates quarterly and annual reports and submits them to Regional Inter Bureau committee and Federal technical team coordinator. Regional Inter Office committee discusses the progress of made regarding major intervention (NAP-ETH program/projects) and challenges encountered during implementation phase of NAP-ETH and gives possible solution that could tackle the challenge at Regional level as per the mandate given by operational manual of NAP-ETH.

Third Level

3a. Federal implementing sector bureaus consolidate quarterly and annual report submit to the Federal technical Team Coordinator (within Ministry of Environment, Forest and Climate Change and Ministry of Finance and Economy Cooperation).

3b. Where Executing Entities operate at the federal level, they report to federal Implementing Entities.

3c. Federal technical Team Coordinator consolidate mid-year and annual report submit to Federal MEFCC and MoFEC for discussion and approval. MEFCC and MoFEC give direction, guidance and support to identified potential problems.

3d. After obtaining endorsement and approval of the MEFCC and MoFEC, the report will be disseminated to contributors,

development partners and interested parties through including the media.

MEFCC and MoFEC coordinate the overall implementation of the NAP-ETH M&E system. The reports prepared by the federal entities involved in the implementation of NAPs serve as a basis for the report prepared by MEFCC and MoFEC.

M&E reports generate data to measure output and results against the NAP-ETH's performance indicators. MEFCC and MoFEC prepare quarterly and annual implementation assessment reports based on the information available from desk reviews (CRGE Directorate/Unit of Sectoral line Ministries) and field assessments.

Inter-ministerial steering committee holds regular annual meeting to review the annual progress report. The committee discusses the status of major NAP-ETH initiatives (program/projects) and challenges encountered during implementation, and recommends possible solution to address challenge and facilitate the learning and sharing of emerging good practices. Due emphasis will be given to experiences and emerging best practices so as to generate a timely 'learning and information sharing' culture among implementing bodies.

Federal implementing agencies prepare and submit quarterly, and annual progress or implementation assessment reports to MEFCC and MoFEC. The reports include detailed information from the local level of government – woredas, kebeles and city government/administration. The report is prepared to monitor progress on a quarterly and annual basis.

Joint Monitoring Mission site visits

The team of experts from MEFCC (M&E Directorate) and Federal Line Ministries (CRGE Directorate/Unit) will conduct visits to project sites quarterly and annually based on the agreed schedule in the project document and annual work plan to assess first hand project progress. Other Sectoral Implementing entities at regional and woreda level will also join these visits. A Field Visit Report will be prepared by the MEFCC and MoFEC or other implementing entities and will be circulated to MEFCC no less than 15 days after the visit to the project area.

Links to Other M&E Systems

The NAP-ETH M&E operates in the context of other M&E systems and links to them. Some examples of those other systems, explaining their relevance to NAP-ETH M&E are highlighted and presented in Table 9.

Table 8 - M&E systems in Ethiopia that relate to the NAP M&E system

Example	Description and Link to NAP-ETH M&E
Growth and Transformation Plan (GTP II)	The CRGE has been mainstreamed in Ethiopia's five-year development plan GTPII (2015/2016 to 2019/2020) so as to ensure the realization of the vision of CRGE middle-income status by 2025 in a climate-resilient green economy. A national M&E system is in place to track implementation of Ethiopia's five-year development plan, GTPII (2015/2016 to 2019/2020) including the CRGE goal and output. To this end a policy Matrix has been developed aimed at tracking progress of the implementation of National GTP II and Sectoral GTP II against performance indicators cited in the policy matrix. GTPII monitoring and reporting systems would track national results from implementation of the CRGE Strategy (including from both Facility-financed and non-Facility financed actions) based on the indicators stated in the policy Matrix. *GTPII and NAP-ETH M&E systems adopt a common set of indicators to track the implementation of CRGE output outlined in the policy matrix. In this regard GTP II M&E system has been aligned with NAP-ETH M&E system.*
Sectoral CRGE	The NAP-ETH M&E system outlines national, high-level results for sectors. Sector-specific

M&E systems	M&E systems should detail outputs and activities but must also demonstrate alignment with these national-level NAP-ETH M&E results.
CRGE Facility M&E System	The Facility M&E system would track impact and outcome of Facility-financed CRGE projects/program (adaptation and mitigation). CRGE Facility M&E would track result of the implementation of similar project/program with that of non-Facility financed program/projects. In this regard the NAP-ETH M&E adopts a common set of indicators with CRGE Facility M&E and is aligned with CRGE Facility M&E particular indicators in relation to adaptation projects and program outputs, outcomes and impacts.
M&E systems of existing and relevant sectoral and cross-sectoral programs	The M&E systems of a range of programs (PSNP, SML, etc.) will track data that is relevant for understanding impacts and outcomes of adaptation, and the performance of adaptation initiatives. Links would be made between the M&E systems of relevant long term programs, and the NAP-ETH M&E system will adapt indicators from these long term programs

4.3 RESOURCES AND CAPACITIES REQUIRED FOR MONITORING AND EVALUATION

Intensive capacity building activities will be carried out during the first five-year implementation period of the NAP-ETH in sector line ministries (CRGE Directorate/Unit), regions, city government/administrations, woreda and kebeles that are responsible for the implementation of NAP-ETHs, so as to ensure timely and accurate information flow and feedback for the M&E system of the NAP-ETH.

Implementation agencies at federal, regional, and local levels need to have adequate human resources and equipped with sufficient M&E capacity so as to ensure the M&E system operates effective during the plan period. MEFCC and MoFEC will work in close collaboration with Implementation agencies at federal, regional, and local levels to facilitate access to technical assistances for M&E capacity development to realize the effective operation of the M&E system.

The M&E section in the MEFCC will have technical and professional capacity responsible for processing the data collected from Ministries and institutions involved in the implementation of climate change adaptation programs/project.

Approximately 5% of the cost of each operational program/project under the National Adaptation Plan (NAP-ETH) should be allocated specifically for this purpose in order to build funding capacities.

4.4 MONITORING AND EVALUATION METHODOLOGY

The methodology applied in monitoring and evaluation of the NAP-ETH will be based on the issues indicated in Table 7 and in Annex 2, which presents the Logical Framework Analysis (LFA) for implementation of the NAP-ETH.

The data generated by sectoral line ministries, CRGE facility, National Plan commission and others Regional Bureaus will be used as an input to the M&E system. Data from census, surveys and administrative (sectoral line ministries) sources will also be used to generate report by MEFCC.

According to the information obtained from the evaluation reports, policy documents, development strategies, project activity reports, training reports and study or research reports, as well as information generated by the Central Statistics Agency (CSA), and the National Planning Commission (NPC) have been identified as major sources of data for monitoring and evaluation of the NAP-ETH.

The method of data collection employed in monitoring and evaluation of the NAP-ETH will include activity reports, meeting reports, survey, ad-hoc studies, and stakeholder consultation.

MEFCC and MoFEC will be responsible for processing and compiling the data collected from ministries and institutions (CRGE Section) involved in the implementation of climate change adaptations. The ministries and institutions (CRGE Section) and other national institutions (CSA, NPC, NMA, etc.) will be

responsible for generating and providing data for MEFCC and MoFEC.

4.5 REVISION AND UPDATING PROCESS

Reviews should be carried out as necessary so as to incorporate progress made, new adaptation challenges, social and environmental developments, new policies and national and international government undertakings.

Reviews may be carried out in two ways:

- A regular review carried out every five (5) years, e.g., to increase the effectiveness of the NAP-ETH;
- Ad-hoc reviews, triggered by factors such as adaptation outcomes, the effectiveness of adaptation measures, variations observed compared to initial climate projections, changes in the vulnerability of development sectors, etc.

A review must be carried out every five years in order to maximize the gains for sustainable development in Ethiopia, regardless of the changes made in relation to implementation of the NAP. The NAP-ETH should therefore be integrated into a continuous process of development planning related to the Growth and Transformation Plan (GTP) at the national level, which requires ongoing collaboration between the relevant stakeholders.

All stakeholders that will be involved in the implementation of the NAP-ETH have to be involved in the review of the plan. A participatory approach will therefore be employed in the review.

4.6 EXTERNAL EVALUATION

Mid-term and final evaluations must be carried out during the five-year implementation cycle of the NAP-ETH. A mid-term evaluation will be carried out at the end of the first half of the five-year cycle. It will focus on the effectiveness and efficiency of the first five-year implementation cycle of the NAP. A final evaluation will be carried out at the end of the five-year implementation cycle of the NAP-ETH so as draw lessons learned during the first five years of implementation. It will therefore be specifically aimed at the systematic and objective evaluation of progress made towards the anticipated outcomes of the NAP-ETH.

1. Projects will undergo an independent mid-term evaluation at the mid-point of project implementation. The mid-term evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; it will highlight issues requiring decisions and actions; and it will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term.

2. Projects will also undergo final evaluations. An evaluation of project outcomes achieved at the end of the five-year cycle will take place at the end of the first five-year project implementation cycle and according to the plan indicated in the project document. Project final evaluations can be used as a basis for decisions aimed

at improving outcomes during the second five-year implementation cycle of the NAP. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation should also provide recommendations for follow-up activities and requires a management or high-level response.

3. An independent final evaluation of the NAP-ETH will take place and be completed two months prior to the Inter ministerial Committee meeting. The final evaluation will look at impacts and sustainability of results, including the contribution to capacity development and the achievement the NAP-ETH objectives, impacts and it goal.

Templates for Progress Reports, which will be used for regular reviews of progress made in relation to the National Adaptation Plan, and monitoring of outputs and impacts are shown in Annex 3.

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ANNEXES

Annex 1: Risks and Vulnerable sectors within each Region with their existing coping mechanisms

Region	Risks/ Hazards	Vulnerable sectors and Impacts					Existing Coping Mechanisms
		Agriculture/ Pastoral	Livestock	Health	Forest	Water & Energy	
Afar	Drought, Flood, Livestock disease, conflict and Human disease	Loss of cereal production in limited agro pastoral zones, increased price of cereals	Livestock death, decreased livestock production and productivity, loss of income,	Malnutrition, death, increased water borne diseases, decrease of productive humanpower	Deforestation and degradation	Degradation of water quality, decreased hydroelectric power, Decreased amount of water for Irrigation, Destruction of physical structures and roads	Migration of House hold heads with their livestock; resource sharing; food borrowing; eating wild fruits; selling more livestock; etc.

Amhara	Flood, drought, human and livestock diseases	Decreased food production, loss of cultivable land, livelihood distribution due to migration	Decreased livestock production and productivity, loss of draught oxen power, loss of grazing land	Malaria, Malnutrition, Increased communicable diseases, decrease of productive human power	Deforestation, degradation	Lack potable water, decreased hydroelectric power, Decreased amount of water for Irrigation, Destruction of physical structures and roads	Sell more livestock than usual; consumption of crops rather than sell; seek alternative jobs; wild food eating; reduce expenditure on non-essential items; seasonal labor migration; etc.
Benishan gul Gumz	Flood, Drought, Human and animal diseases, wild fire, Crop pest, Migration and conflict	Crop damage, decreased soil fertility, loss of productive manpower and Price shock	Trypanosomiasis, decreased livestock production and productivity, loss of drought oxen power, loss of income	Malaria, Loss of Productive manpower, malnutrition, Effects as a result of heat waves, Death	Deforestation, degradation, wild fire	Degradation of water quality, increased canal sedimentation, degradation of indigenous forest	Eating wild fruit and tubers; borrowing money; migration; seeking additional jobs; community

							supporting culture;
Dire Dawa	Flood, Drought, Conflict, Human and livestock disease,	Loss of cereal production	Death, loss of draught oxen power, increased zoonotic diseases	Loss of productive man power, Death, Increased communicable disease due to lack of potable water, Malnutrition	Deforestation, degradation	Distraction on Irrigation physical structure	Sell more livestock than usual; consumption of crops rather than sell; seek alternative jobs; reduce expenditure on non-essential items; seasonal labor migration; etc.

Gambella	Flood, Erratic Rainfall, Wild fire, Human and Livestock disease and Crop Pest, conflict	Loss of Cereal Production, loss of industrial crops, loss of income, loss of cultivable land	Death, Increased communicable diseases, loss of livestock production and productivity, decreased fish production, loss of pasture	Malaria outbreak, shortage of potable water, death	Destruction of indigenous forests, increased soil erosion, land degradation	Increased volume of rivers,	Eating wild fruit; consumption of cereals rather than selling; migration; seek alternative jobs; sell more livestock than usual; sell of non-productive assets; sending children for work to urban areas; sell charcoal and fire wood; etc.

Oromia	Flood, drought, human and livestock diseases, Conflict	Decreased food production, loss of cultivable land, livelihood distribution due to migration	Decreased livestock production and productivity, loss of drought oxen power, loss of grazing land	Malaria, Malnutrition, Increased communicable diseases, decrease of Productive human power	Deforestation, degradation, wild fire	Lack potable water, decreased hydroelectric power, Decreased amount of water for Irrigation, Destruction of physical structures and roads	Migration; elders conflict resolution mechanisms; support drought oxen power; give milk cows for neighbors; seed support; sell more livestock than usual; increase working hours; sending children for work; sell of non-productive assets; limit portion size of meals; rely on less preferred and cheap foods; etc.

SNNPR	Flood, Crop Pest, Drought	Loss of Cereals production, loss of income	Loss of pasture and water, decreased livestock production and productivity, loss of draught oxen power	Increased communicable disease, decrease of productive human power, malaria, death	Deforestation, degradation	Lack potable water, decreased hydroelectric power; Decreased amount of water for Irrigation; Destruction of physical structures and roads	Eating wild fruit; consumption of cereals rather than selling; migration; seek alternative jobs; sell more livestock than usual; sell of non-productive assets; sending children for work to urban areas; sell charcoal and fire wood, gum and incense; etc.

Somali	Drought, Flood, Human and livestock and crop disease, conflict, soil erosion by wind, Price shock	Decreased crop production, Increased cereal price, Crop pests and disease	Death, Loss of livestock production and productivity, Price shock, Loss of pasture and water which results in migration, loss of income	Malnutrition, Increased water borne diseases, decrease of productive human power	Deforestation, land degradation, Soil erosion by wind	Shortage of potable water, increased flood occurrences in some zones	Migration of House hold heads with their livestock; elders conflict resolution mechanisms; resource sharing; food borrowing; eating wild fruits; selling more livestock; etc.
Tigray	Flood, hill storm, drought, Diseases, Conflict	Loss of cereal production, Increased cereal prices, Crop pests and disease	Livestock diseases, Loss of livestock production and productivity	Malaria, Increased communicable diseases, malnutrition, productive human power decrease, death	Deforestation, land degradation	Destruction of dams, loss	Sell more livestock than usual; consumption of crops rather than sell; seek alternative jobs; wild food eating; reduce expenditure

							on non-essential items; seasonal labor migration; etc.

Annex 2: LFA for implementation of NAP-ETH

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
Goal: Vulnerability to the impacts of climate change reduced by building adaptive capacity and resilience						
1	Food security enhanced through improved agricultural productivity in a climate-smart[8] manner	▪ Climate change adaptation proactively mainstreamed in the agriculture sector, including programs and projects and in regional agricultural strategies and plans ▪ Agricultural productivity increased ▪ Agricultural diversity enhanced ▪ Climate-smart	▪ % Increase in yield per hectare (tons) ▪ % Increase in agro bio-diversity index values ▪ % of targeted population (women/men) adopting one or more climate-smart agricultural practices ▪ % of targeted population (women/men) that are food secure	▪ Agriculture program/project performance reports ▪ PSNP reports ▪ Agriculture sector reviews/evaluations	▪ Ministry of Agriculture and Natural Resources ▪ Agricultural Transformation Agency ▪ Academic and Research Institutions ▪ Central Statistics Agency	▪ Relevant climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning and

[7] Some assumptions cut across all adaptation options, these assumptions include: existence of critical mass of experts and sufficient resources; existence efficient fund management and budget administration; functioning policies, strategies, plans and guidelines; strong public engagement and participatory management systems; cooperation and integration between all implementing entities;

[8] In this document, references to climate-smart approaches are understood to emphasize those approaches that support adaptation and resilience building. Climate change mitigation may be a co-benefit of these practices.

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
		agricultural practices adopted, particularly by small-scale farmers ▪ Increased food security for vulnerable households				climate-smart decision-making in agriculture ▪ Focus of innovation in the area of climate smart agriculture is primarily on methods and techniques related to adaptation by small scale farmers
2	Access to potable water improved	▪ Investments in water infrastructure take likely climate change impacts into account ▪ Stability of access to potable water improved especially in periods of	▪ # of people (women/men) receiving potable water from new or rehabilitated systems and sources ▪ % of targeted population (women/men) with year-	▪ Human health index reports ▪ Water program/ project performance reports ▪ Water sector	▪ Ministry of Water Irrigation and Electricity ▪ Ministry of Health ▪ Municipalities ▪ Ethiopia Water	▪ Community participation and cooperation between all stakeholders exist ▪ Relevant

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
		high climate stress and during periods of increased demand	round access to safe drinking water	reviews/evaluations	Technology Institute ▪ Central Statistics Agency ▪ National Planning Commission	climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning in the water sector

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
3	Sustainable natural resources management strengthened through safeguarding landscapes and watersheds	▪ Sustainable natural resource management (SNRM) prioritized in vulnerable landscapes ▪ SNRM planning takes type and extent of expected climate change impacts into account ▪ Resilience of rangelands and watersheds increased	▪ # of SNRM plans integrating adaptation developed for vulnerable landscapes ▪ # of hectares of vulnerable landscapes where SNRM plans integrating adaptation are implemented	▪ Agriculture and NRM program/project performance reports ▪ PSNP reports ▪ Natural resource sector reviews/evaluations	▪ Ministry of Livestock and Fisheries ▪ Ministry of Agriculture and Natural Resources ▪ Central Statistics Agency ▪ Ethiopian Agriculture Research Institute ▪ Ethiopian Environment and Forestry Research Institute ▪ National Planning Commission	▪ Valuation of ecosystem services instituted ▪ Relevant climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning in the natural resource sector

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
4	Soil water harvesting and water retention mechanisms improved	▪ Increased use of durable rainwater harvesting methods at households and community levels ▪ Increased implementation of soil and water conservation (SWC) measures ▪ Negative effects of rainfall variability on agriculture and natural resources reduced	▪ # of households/communities harvesting rainwater ▪ # of hectares of land where SWC measures have been implemented ▪ % of target population (women/men) better able to manage rainfall variability	▪ PSNP reports ▪ Natural resource sector program/project performance reports ▪ Natural resource sector reviews/evaluations	▪ Ministry of Agriculture and Natural Resources ▪ Central Statistics Agency ▪ Ethiopian Agriculture Research Institute ▪ Ethiopian Environment and Forestry Research Institute ▪ National Planning Commission	▪ Relevant and adoptable technologies are readily available, suitable for use and accessible to vulnerable households
5	Human health systems improved through the implementation of changes based on integrated health and	▪ Environment and health surveillance protocols and systems enhanced to take account of climate change information affecting health factors ▪ Increased awareness	▪ % of target population covered by environment and health surveillance systems integrating climate change ▪ % of health workers aware of climate change impacts	▪ Health index reports ▪ Health project/program performance reports ▪ Health sector reviews/evaluations	▪ Ministry of Health ▪ Institute of Public Health ▪ Universities, and Research Centers	▪ Integrated human health infrastructure and institutional framework exist ▪ Relevant climate

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
	environmental surveillance protocol	of health impacts of climate change				information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning in the health sector
6	Ecosystem resilience improved through conserving biodiversity	▪ Increased awareness of climate change impacts on ecosystems ▪ Conservation planning takes climate change into account ▪ Ecosystem resilience maintained/increased	▪ % of conservation practitioners aware of climate change impacts on ecosystems ▪ # of conservation plans addressing climate impacts on ecosystems ▪ # of hectares conserved in ways that build	▪ Environment and biodiversity conservation project/program performance reports	▪ Ministry of Agriculture and Natural Resources ▪ Central Statistics Agency ▪ Ethiopian Agriculture Research Institute	▪ Capacity to analyze ecosystem resilience is available

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
			ecosystem resilience		▪ Ethiopian Environment and Forestry Research Institute ▪ National Planning Commission ▪ Ethiopian Biodiversity Institute	

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
7	Sustainable forest management enhanced	▪ Increased awareness of climate change impacts on forests ▪ Forest management and governance systems integrate climate change adaptation ▪ Afforestation and reforestation enhanced ▪ Natural forests conserved ▪ Reduced impacts of climate change on forests	▪ % of forestry practitioners aware of climate change impacts on forests ▪ # of hectares of land afforested/ reforested ▪ # of hectares of natural forests conserved ▪ # of measures implemented to reduce climate change impacts on forests	▪ Forestry sector reviews/evaluations ▪ Forestry project and program performance reports	▪ Ministry of Environment Forestry and Climate Change ▪ Ethiopian Environment and Forestry Research Institute ▪ Central Statistics Agency	▪ Functioning land use plan enforced ▪ Relevant climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning in the forest sector
8	Social protection and livelihood options of the vulnerable people built	▪ Social groups that are particularly vulnerable to climate change identified and drivers of vulnerability assessed	▪ % of targeted vulnerable people (women/men) benefiting from livelihood diversification ▪ % of vulnerable people	▪ Vulnerability assessment reports ▪ PSNP reports	▪ Ministry of Agriculture and Natural Resources ▪ Central Statistics	▪ Functioning social protection mechanism is institutionalized

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
		▪ Livelihood options of vulnerable people diversified	(women/men) with access to social protection mechanisms when affected by climate shocks		Agency ▪ Ethiopian Agriculture Research Institute ▪ Ethiopian Environment and Forestry Research Institute ▪ National Planning Commission ▪ Ethiopian Biodiversity Institute	
9	Alternative and renewable power generation and management enhanced	▪ Access to alternative and renewable power increased ▪ Stability of energy systems increased	▪ % of target population (women/men) with stable access to alternative and renewable energy ▪ # of energy system designs that take climate change into account	▪ Energy sector reviews/evaluations	▪ Ministry of Environment, Forestry and Climate Change ▪ Central Statistics Agency ▪ Ministry of Water, Irrigation and Electricity ▪ Ethiopian Electric and Power	▪ Effective alternative and renewable energy management systems exist ▪ Relevant climate information (observations, forecasts, longer-term

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
					Corporation ▪ Ministry of Mining and Natural Gas ▪ Universities ▪ Research institutions	projections) is available at the appropriate scale and in useful formats to support adaptation planning in the energy sector
10	Resilience of the urban system increased	▪ Increased awareness of climate change impacts in urban environments ▪ Urban land use plans integrate climate change adaptation ▪ Urban agriculture developed	▪ % of urban planners aware of climate change impacts in urban environments ▪ # of urban areas where land use plans integrating adaptation are implemented ▪ # of hectares of urban agriculture developed	▪ Climate change resilience reports ▪ Economic development reports ▪ Urban sector performance reports	▪ Ministry of Urban and Development ▪ Municipalities ▪ Central Statistics Agency ▪ Research Institutions ▪ Universities ▪ Central Statistics Agency	▪ Relevant climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning in the urban sector
11	Sustainable transport system	▪ Adaptive transport infrastructure created	▪ % of transport infrastructure designs	▪ Transport sector performance report	▪ Ministry of Transport	▪ Capacity of mobilizing

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
	built	▪ Sustainable transport infrastructure design system developed with consideration of climate change impacts ▪ Climate-vulnerable transportation infrastructure is suitably enhanced	that take climate change impacts into account ▪ # of kilometers of climate-vulnerable transportation infrastructure reconstructed ▪ #/type of adaptive infrastructure systems constructed	▪ National transport performance report	▪ Central Statistics Agency ▪ Research institutions ▪ Universities	huge resources exist ▪ Relevant climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support adaptation planning in the transport sector
12	Adaptive industry system developed	▪ Vulnerable industries take climate change adaptation considerations into account in management and planning ▪ Efficient and environmentally sound production systems	▪ # of industries adopting climate change adaptation strategies/considerations ▪ % cost and energy savings due to efficiency measures ▪ # of hectares protected from environmental	▪ Industry sector performance report ▪ National industry development reports	▪ Ministry of Industry ▪ Central Statistics Agency ▪ Research Institutions ▪ Universities	▪ Environmental impact assessment and strategic impact assessment enforced

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
		developed ▪ Socially responsible industries promoted	impact ▪ # of people benefitting from socially responsible industries			
13	Endogenous adaptation practices mainstreamed	▪ Climate-resilient livelihood practices promoted ▪ Local climate knowledge and scientific knowledge integrated ▪ Effective endogenous adaptation practices scaled up	▪ % of targeted population (women/men) adopting one or more climate-resilient livelihood practices ▪ # of dialogues/planning processes where local and scientific climate knowledge are integrated ▪ # of community watershed/rangeland plans integrating endogenous adaptation practices	▪ National and regional performance report ▪ Climate change activities implementation report	▪ Ministry of Environment Forestry and Climate Change ▪ Ministry of Agriculture and Natural Resources ▪ Ministry of Livestock and Fisheries ▪ Ministry of Labor and Social Affairs ▪ Central Statistics Agency	Relevant climate information (observations, forecasts, longer-term projections) is available at the appropriate scale and in useful formats to support dialogue and integration with local knowledge
14	Efficient value chain and marketing system developed	▪ Climate risks to value chains assessed ▪ Livestock and crop value chains enhanced	▪ # of value chain climate risks assessments completed ▪ % of value chain actors	▪ National economic performance report ▪ Agricultural development report	▪ Ministry of Environment Forestry and Climate Change	▪ Efficient crop and livestock marketing systems exist

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
		▪ Reduced climate impacts on value chains	(women/men) actively managing climate risks		▪ Ministry of Agriculture and Natural Resources ▪ Ministry of Livestock and Fisheries ▪ Ministry of Labor and Social Affairs ▪ Central Statistics Agency	
15	Drought and crop insurance mechanisms strengthened	▪ Farmers and herders insured against climate risks ▪ Insurance agencies capacitated to provide drought and crop insurance	▪ # of insurance companies offering drought and crop insurance ▪ % of target population (women/men) with insurance	▪ DRMC performance report ▪ National and regional performance reports ▪ Insurance reports	▪ Ministry of Environment Forestry and Climate Change ▪ Ministry of Agriculture and Natural Resources ▪ Ministry of Livestock and Fisheries ▪ Ministry of Labor and Social Affairs ▪ Central Statistics	▪ Enabling financial mechanisms exist to accommodate drought and crop insurance

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
					Agency	
16	Early warning systems improved	▪ Early warning prediction and communication systems improved ▪ Vulnerable people have access to early warnings for climate hazards ▪ Communication mechanisms created between early warning and implementing agencies	▪ % of target population (women/men) with access to early warning systems ▪ # of agencies with better preparedness for climate hazards	▪ DRMC performance report ▪ National and regional performance report	▪ Ministry of Environment Forestry and Climate Change ▪ Ministry of Agriculture and Natural Resources ▪ Ministry of Urban Development and Housing ▪ Ministry of Labor and Social Affairs ▪ Disaster Risk Management Commission ▪ National Meteorology Agency	▪ Strong collaboration and integration exist between data providers and implementers ▪ Communication systems enable wide dissemination of early warnings
17	Adaptation technologies developed	▪ Technology needs assessed for vulnerable sectors/groups ▪ Relevant adaptation technologies developed	▪ # of people (women/men) benefitting from adaptation technologies	▪ Technology assessment and adoption reports	▪ Ministry of Environment Forestry and Climate Change ▪ Ministry of	▪ Integration mechanisms between local and imported technologies

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
		and adopted			Agriculture and Natural Resources ▪ Ministry of Urban Development and Housing Ministry of Labor and Social Affairs ▪ Disaster Risk Management Commission ▪ National Metrology Agency ▪ Ministry of Health ▪ National Planning Commission ▪ Central Statistics Agency ▪ Ministry of Labor and Social Affair	exist
18	Adaptation research and development	▪ Information and knowledge needs for adaptation assessed and	▪ # of research products produced that address climate change	▪ Annual research reports	▪ Ministry of Environment Forestry and	▪ Sufficient research funds

No.	Specific objectives	Expected Results	Indicators	Means of verification	Entity responsible for data collection	Assumptions[7] and risks
	reinforced	relevant research strategies developed ▪ Increased support for and/or availability of adaptation-focused research and/or research that considers climate change impacts ▪ Demonstrated uptake of research results related to climate change adaptation	adaptation/consider climate change impacts ▪ Documented cases of research informing climate-adaptive policies and practices		Climate Change ▪ Ministry of Agriculture and Natural Resources ▪ Ministry of Urban Development and Housing Ministry of Labor and Social Affairs ▪ Disaster Risk Management Commission ▪ National Metrology Agency ▪ Ministry of Health ▪ National Planning Commission ▪ Central Statistics Agency	available ▪ Collaborative partnerships exist between research, academic, training and implementing institutions

Annex 3: Template that will be used for regular reviews National Adaptation Plan

Planned activities	**Implemented activities**	**Implementation rate %**	**Activities not implemented**	**Explanation of discrepancies**
Strategic priority 1				
Activity 1:				
Activity 2:				
Activity 3:				
Strategic priority 2				
Activity 1:				
Activity 2:				

Activity 3:				
Strategic priority 3				
Activity 1:				
Activity 2:				
Activity 3:				
Strategic priority 4				
Activity 1:				
Activity 2:				
Activity 3:				
Strategic priority 5				

Activity 1:				
Activity 2:				
Activity 3:				
Activity 3:				
Strategic priority 6				
Activity 1:				
Activity 2:				
Activity 3:				
Strategic priority 7				
Activity 1:				

Activity 2:				
Activity 3:				

Annex 3.1.National Adaptation Plan Outcome Monitoring

Planned activities	**Implemented activities**	**Implementation rate %**	**Activities not implemented**	**Explanation of discrepancies**
Strategic priority 1				
Outcome 1:				
Outcome 2:				
Outcome 3:				
Strategic priority 2				
Outcome 1:				
Outcome 2:				

Outcome 3:				
Strategic priority 3				
Outcome 1:				
Outcome 2:				
Outcome 3:				
Strategic priority 4				
Outcome 1:				
Outcome 2:				
Outcome 3:				
Strategic priority 5				

Outcome 1:				
Outcome 2:				
Outcome 3:				
Strategic priority 6				
Outcome 1:				
Outcome 2:				
Outcome 3:				
Strategic priority 7				
Outcome 1:				
Outcome 2:				

Outcome 3:				

Annex 3.2. National Adaptation Plan impact monitoring

Planned activities	**Implemented activities**	**Implementation rate %**	**Activities not implemented**	**Explanation of discrepancies**
Strategic priority 1				
Specific objective 1:				
Specific objective 2:				
Specific objective 3:				
Strategic priority 2				
Specific objective 1:				
Specific objective 2:				

Specific objective 3:				
Strategic priority 3				
Specific objective 1:				
Specific objective 2:				
Specific objective 3:				
Strategic priority 4				
Specific objective 1:				
Specific objective 2:				
Specific objective 3:				
Strategic priority 5				

Specific objective 1:				
Specific objective 2:				
Specific objective 3:				

Annex 3.3: Summary of Prioritized Adaptation Options from All Regions
This is just the start in prioritization Process – not final result!!! Just indications!!

Region	Prioritized Adaptation Options	
SNNPR	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO4	Improving soil and water harvesting and water retention mechanisms
	AO8	Building social protection and livelihood options of vulnerable people
Amhara	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO3	Strengthening sustainable natural resource management through safeguarding landscapes and watersheds
	AO7	Enhancing sustainable forest management
	AO8	Building social protection and livelihood options of vulnerable people
TIgray	AO3	Strengthening sustainable natural resource management through safeguarding landscapes and watersheds
	AO7	Enhancing sustainable forest management
	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO8	Building social protection and livelihood options of vulnerable people
Oromia	AO3	Strengthening sustainable natural resource management through safeguarding landscapes and watersheds

	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO2	Improving access to potable water
Dire Dawa and Harar	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO3	Strengthening sustainable natural resource management through safeguarding landscapes and watersheds
	AO10	Increasing resilience of urban systems
Somali	AO3	Strengthening sustainable natural resource management through safeguarding landscapes and watersheds
	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO16	Improving early warning systems
	AO10	Increasing resilience of urban systems
Benishangul-Gumuz and Gambela	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO17	Developing and using adaptation technologies
	AO2	Improving access to potable water
Afar	AO1	Enhancing food security by improving agricultural productivity in a climate-smart manner
	AO4	Improving soil and water harvesting and water retention mechanisms
	AO2	Improving access to potable water