FEDERAL REPUBLIC OF SOMALIA

MINISTRY OF NATIONAL RESOURCES

NATIONAL ADAPTATION PROGRAMME OF ACTION ON CLIMATE CHANGE **(NAPA)**

APRIL 2013

United Nations
Framework Convention on
Climate Change

Message from the President of Somalia

Somalia is emerging from a long, difficult period of instability towards an era of peace and development. We are now working hard for a Somalia that is at peace with itself and with its neighbors. We no longer wish to see our citizens threatened by devastating impacts brought about by droughts and flash flooding. Pervasive poverty in Somalia is exacerbated by such climatic extremes and leads to widespread famine resulting in the loss of thousands of lives. We must now begin taking action to address the impacts of climate change on Somalia since we know that it contributes to national disasters. We must stabilize and strengthen our vulnerable pastoral and agriculture sectors so that they benefit the entire population of the country and increasingly contribute to our economy instead of being set back each time a drought event occurs. We must protect the very ecosystems that so many of our people depend on each day to survive.

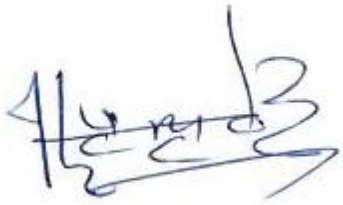
As has been set out in the provisional constitution for Somalia, every person has the right to an environment that is not harmful to their health and well-being, and every person has the right to have a share of the natural resources of the country, whilst being protected from excessive and damaging exploitation of these natural resources. The current impacts of climate change on Somalia are extensive and potential future impacts may well be worse if nothing is done now to help the most vulnerable populations and sectors cope. Climate change is a very real phenomenon with the country facing increasing uncertainty for seasonal and annual rainfall levels, rising surface temperatures, sea level rise and the loss of lives and livelihoods dependent on fragile over exploited ecosystems and natural resources.

The finalization of this National Adaption Programme of Action (NAPA) provides a critical basis for addressing the risks associated with a changing climate in Somalia, as well as delivering on our commitment to the United Nations Framework Convention on Climate Change. The NAPA is a result of a national participatory process that focuses on the addressing the most immediate climate related risks. The programme seeks to build community awareness, increase monitoring and risk forecasting and support the adoption of government policies and strategies to improve climate change resilience among vulnerable groups. This programme will guide our collective action and support a coordinated approach to addressing the multiple challenges of climate change.

On behalf of the Federal Government and the people of Somalia I would like to congratulate all those that participated in consultations and contributed to the preparation of the National Adaption Programme of Action and ensured that this programme truly reflects the position of our nation. Here I would, in particular, like to acknowledge United Nations Development Programme (UNDP), for partnering with the Ministry of National Resources to achieve this important milestone for Somalia. I am pleased to note that

Somalia benefited from the funding from Global Environment Facility (GEF) for the first time and expect that the country will continue to benefit from the technical and financial resources available with the international organizations.

As we look to the future with hope, pride, and optimism, we must be sure to implement this NAPA with collective commitment and dedication. In this way we all work to address the impacts of climate change and ensure a better future for our people and our nation.



H.E. Hassan Sheikh Mohamoud

President of the Federal Government of Somalia

Message from the UN Resident Coordinator/UNDP Resident Representative

Climate change is a global issue affecting all nations. Its impact is felt severely across sub-Saharan Africa due to the high degree of climate variability and weak coping capacities. Climate change knows no boundaries and the solutions demand regional and global coordination and collaboration. The United Nations Framework Convention on Climate Change (UNFCCC) facilitates intergovernmental efforts to reduce greenhouse gas emissions and to adapt to the expected impacts of climate change. It also provides guidance on developing and implementing national climate change strategies and incorporating adaptation actions into national development plans. Somalia became a signatory to the UNFCCC in December 2009. Somalia's goal is to reduce climate change-induced vulnerabilities for the poorest communities, namely the 65% of the population who depend on natural resources through pastoralism and agriculture. These sectors are most affected by decreased production due to unpredictable rainfall patterns, increased temperatures and the loss of lives and livelihoods resulting from natural disasters.

Climate change directly threatens the achievement of the Millennium Development Goals (MDGs) especially those related to eliminating poverty and hunger. Food security - one of the most critical challenges facing Somalia - is compounded by the effects of climate change on agricultural production and the sustainable management of rangelands and other ecosystems. Climate change also has an impact on health, water availability, terrestrial biodiversity, coastal and marine resources, and the livestock sector. The National Adaptation Programme of Action (NAPA) identifies three urgent areas of action and proposes adaptation measures. The participatory formulation process was led by the Ministry of National Resources for Federal Somalia with support from the Puntland and Somaliland authorities, the Least Developed Countries Fund, the United Nations Development Programme and stakeholders from Government and civil society. This critical document complies with the obligations set forth by the UNFCCC and is a planning tool for the Government and development partners in Somalia.

I commend the Government of Somalia for its leadership of the NAPA process and for ensuring strong participation across Somali society. The NAPA document is an important tool that will help the Government and development partners address climate risks and increase the resilience of the economy and livelihoods of the nation. The U.N. will continue to support the Government in its efforts to tackle the adverse effects of climate change and promote sustainable social and economic development.

Mr. Philippe Lazzarini
UN Resident Coordinator
UNDP Resident Representative

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Acronyms

AMISON:	African Union Mission in Somalia
ASAL:	Arid and Semi-Arid Lands
CC:	Climate Change
ESM:	Earth System Models
EWS:	Early Warning System
EC:	European Commission
ENSO:	El Nino/Nina Southern Oscillation
EU:	European Union
FAO:	Food and Agriculture Organization of the United Nations
GCM:	Global Climate Models
GDP:	Gross Domestic Product
GEF:	Global Environment Facility
GFS:	Government of Federal Somalia
GHA:	Greater Horn of Africa
GLOSS:	Global Sea Level Observing System
HDI:	Human Development Index
HADMA:	Humanitarian and Disaster Management Authority
ICPAC:	IGAD Climate Prediction and Applications Centre
IDP:	Internally Displaced Person
IGAD:	Intergovernmental Panel on Authority
ILO:	International Labour Organization
IOD:	Indian Ocean Dipole
IPCC:	Inter-Governmental Panel on Climate Change
ITCZ:	Inter Tropical Convergence Zone
IUCN:	International Union for the Conservation of Nature
LDC:	Least Developed Country
LEG:	LDC Expert Group
MMD:	Multi Model Data
MPI:	Multidimensional Poverty Index
MTO:	Money Transfer Organization
NAPA:	National Adaptation Programme of Action
NBSAP:	National Biodiversity Strategy and Action Plan
NDP:	National Development Plan
NGP:	Non-Governmental Organization
QBO:	Quasi-Biennial Oscillation
RCM:	Regional Climate Model
RH:	Relative Humidity
SST:	Sea Surface Temperatures
SHARE:	Support to Horn of Africa Resilience
SWALIM:	Somalia Water and Land Information Management
UNDP:	United Nations Development Programme
UNEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
UNHCR:	United Nations High Commission for Refugees
WCRP:	World Climate Research Programme
WHO:	World Health Organization

Executive Summary

Somalia has been troubled by internal conflicts for over two decades, which has led to enormous development challenges. In October 2012, a new provisional constitution was adopted and a new parliament inaugurated, ushering in the Federal Government of Somalia, the first permanent central government in the country since the start of the civil war. The new government is acutely aware of the risks that climate change represents to progress on key development indicators and maintaining peace and security and is committed to tackling these challenges. The National Adaptation Programme of Action (NAPA) is a first step toward articulating and implementing a nationwide strategy that addresses the impacts of climate change across Somalia. The overarching vision set out in the NAPA is to make the Somali people more resilient to climate change, recognizing their high vulnerability in an economy that is dominated by a high dependence on natural resources.

Due to its recent history, there is a limited store of scientific knowledge and research specific to Somalia, which might help to characterize the likely impacts of climate change. However, studies on the impacts of climate change for the Horn of Africa in general predict that the region will be facing more extreme and frequent droughts and floods. These climatic disasters are also the main existing hazards in Somalia. Severe droughts interrupted by devastating floods occur frequently and result in large-scale starvation and the death of thousands of people and livestock. It is anticipated that the nation's vulnerability to climate change will be intensified by its extremely high dependency on the natural resource base and low Human Development Indicators.

This National Adaptation Programme of Action (NAPA) has been prepared by the UNDP in close collaboration with the Ministry of National Resources, Government of Federal Somalia. The governments in Puntland and Somaliland were also consulted during the NAPA process. The preparation process has closely followed the guiding principles outlined in the annotated guidelines of the Least Developed Countries (LDC) Expert Group (LEG) established under the United Nations Framework Convention on Climate Change (UNFCCC).

Consultative workshops were organized in Federal Somalia, Puntland and Somaliland respectively. During the three participatory workshops, exposure, sensitivity and adaptive capacity to climate risks were discussed and a list of potential adaptation measures and criteria for selection of priority actions were developed. Participants included representatives from the following groups:

- State Actors;
- Governing Institutions and Authorities;
- Traditional and Religious Elders;
- Pastoralists and Agro-pastoralists;
- Youth;
- Women;
- NGOs;
- Academia; and
- Private Sector

The groups identified droughts, floods, extreme high temperatures and strong winds to be the major climate related hazards that they experience. However, it was emphasized by nearly all groups that floods and droughts represent the most severe climate risks and that these should be the priority in the NAPA. A sectoral approach was taken to understand the vulnerabilities to drought and flood within each sector,

while also focusing on the particular impacts to vulnerable groups. The sectors that were identified and discussed as vulnerable to climate change included:

- Water Resources;
- Agriculture and Food Security;
- Animal Husbandry, Grazing and Rangelands;
- Health;
- Marine and Coastal Resources;
- Biodiversity; and,
- Natural Disasters

Stakeholders also identified greater vulnerability in general for rural populations as compared to urban and generally agreed that pastoralists are more vulnerable than other groups including agricultural farmers. The vulnerabilities of pastoralists were taken into consideration in the sectoral discussions. However, women and youth were identified as particularly vulnerable groups.

The state and non-state actors identified existing strategies and plans to address environmental challenges specifically, and sustainable development in general, to ensure that the NAPA recommendations are complementary to these plans. Some important strategies that were highlighted include the new provisional constitution adopted by the Federal Republic of Somalia, the 'Six Pillar Policy' for Federal Somalia, the 5-year Development Plan for Puntland that is expected to commence in early 2013, and the National Development Plan (NDP 2012-2016) for Somaliland.

Each stakeholder group developed a list of potential adaptation measures to address the identified climate vulnerabilities. For each region, the options that were recommended were consolidated to make three regional lists that consisted of 49, 34 and 22 consolidated recommendations for Federal Somalia, Puntland and Somaliland respectively. The three regional lists were then combined and consolidated to create one national level list of adaptation measures for each sector.

Group-wide decision making with government stakeholders on criteria selection and weighting also took place during the consultations and led to the following four criteria being selected with their relative importance indicated by a percentage weighting. The criteria against which each recommendation was ranked included:

1. Addresses urgent and immediate climate change needs (30%);
2. Contributes to poverty reduction (30%);
3. Linked to government plans and priorities (20%); and
4. Cost-effectiveness (20%)

Each adaptation activity was given a ranking for each of the four criteria and a final list of five prioritized recommendations was developed by the NAPA team. The final step was to consolidate activities into three programmatic areas to ensure a comprehensive and mutually reinforcing approach. The final three selected programs for the NAPA are described below:

Programme Area	Adaptation Activities
Sustainable Land Management	• Development and implementation of national and regional policies for the protection of forests, ecosystems and biodiversity • Development and enforcement of district level land-use plans • Large-scale forestation campaign including the distribution of seedlings to vulnerable communities • Protection of forests through the hiring of community-based rangers • Improved rangeland management and development and enforcement of a system for rotational grazing • Curbing charcoal production by banning exports, developing alternative energy plans, supporting the manufacture and use of fuel-efficient stoves and supporting alternative livelihood options for charcoal producers • Awareness raising on environment, focusing on natural resource management, strengthening ecosystem services and promotion of alternative fuel/energy sources
Water Resources Management	• Development and implementation of national and regional water resource management plans • Construction of medium to large-scale water storage infrastructure (reservoirs) including supply for irrigation, livestock watering points and boreholes. All new water projects to be accompanied by an Environmental Impact Assessment • Construction and rehabilitation of community level infrastructure including berkeds, shallow wells, ponds and other appropriate technologies, ensuring that a mechanism for maintenance of the schemes is in place • Construction of embankments/gabions and check-dams to protect flood-prone areas
Disaster Management	• Strengthen the National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness plans. • Setting up of an emergency relief fund • Construction of food and fodder storage facilities

Taken collectively, these three program areas provide a coherent programme which, if implemented as an integrated programme, would significantly reduce the vulnerability of Somalia's critical development sectors and communities to climate-related risks.

1.0 Introduction and Setting

1.1 Background

Somalia has been marred by conflict and civil unrest for over two decades and until very recently has been absent of a functioning central government since the beginning of the 1990s. Severe droughts and flash flooding events continue to impact the country and contribute to repeated loss of life and livelihoods. Somalia has over one million internally displaced persons and almost one million have fled to the neighboring countries in search of securing access to food, water and shelter (UNHCR, 2012).

Notably, the previous Transitional Federal Government took some of the first important steps to bring Somalia in line with global efforts to address environmental issues through ratifying both the United Nations Framework Convention on Climate Change, and the Convention on Biodiversity in 2009; and also the Kyoto Protocol, the Cartagena Protocol on Biosafety, and the Stockholm Convention on Persistent Organic Pollutants in 2010.

In late 2012 the Somali people witnessed the adoption of a new constitution and the inauguration of parliament which ushered in the new Government of Federal Somalia (GFS) as the first permanent central government in the country since the start of the civil war. Attached to this significant political shift towards stability is the hope that Somalia is emerging from its turbulent past into a promising and prosperous future. Pursuant of peace, reconciliation and stability across all Somalia, the Government is actively engaged in addressing the country's existing development challenges. The new provisional constitution for Somalia states in article 25 on Environment that "*every person has the right to an environment that is not harmful to their health and well-being, and to be protected from pollution and harmful materials; and that every person has the right to have a share of the natural resources of the country, whilst being protected from excessive and damaging exploitation of these natural resources*".

Understanding and addressing climate change and issues of environmental sustainability is an integral component of effective sectoral planning and policy development. The Somalia National Adaptation Programme of Action (NAPA) is one such planning initiative undertaken by the GFS to directly address and respond to the country's current and future climate change impacts. The intention of this NAPA is therefore to identify Somalia's key climate change impacts, its vulnerable sectors and groups, as well as identifying the necessary priority adaptation measures to be implemented through national policy, programmes and actions.

1.2 National Geography

Somalia is Africa's easternmost country, has a land area of 637,540 km^2, and occupies the tip of a region commonly referred to as the Greater Horn of Africa (because of its resemblance on the map to a rhinoceros' horn) that also includes Ethiopia, Eritrea and Djibouti. Bordered by Kenya, Ethiopia and Djibouti to the west, Somalia has the longest coastline in Africa of over 3,025 km, which ranges from the Gulf of Aden in the north to the Indian Ocean in the east and south, with coastlines of around 1,000 km and 2,000 km respectively. The country stretches for almost 1,550 km from north to south between latitudes 120 N and 10S, and 1,095 km from west to east between longitudes 410 and 510 E .

Somalia's terrain consists mainly of arid and semi-arid plateaus, plains, and highlands. It is for the most part a flat country, rising in the southern and central regions to a few hundred meters above sea level near the Ethiopian border. Somalia's Arid and Semi-Arid Lands (ASALs) make up more than 80% of the country's landmass and are characteristically prone to extreme weather conditions including high mean surface temperatures, periods of extended drought, highly erratic rainfall and strong winds (UNDP/ICPAC, 2013).

Map 1: The Federal Republic of Somalia

Distinct geographical regions in the country include: the northern coastal plain of Guban comprised of semi-arid terrain; the northern highlands which are rugged mountain ranges that rise from the Guban region and contains the country's highest peak (2407m); the Ogaden region which descends southwards from the highlands and consists of shallow plateau valleys, wadis and broken mountains which continue until the Mudug plain in central Somalia (Federico and Giovanni, 2000). The northern region of Somalia also contains the Golis Range Mountains, which run parallel to the Gulf of Aden and ends at Cape Gardafui. The southern part of the country hosts the only two permanent rivers (Juba and Shabelle) which support the country's agricultural area; and supplies water to the largest city, Mogadishu, in addition to approximately 40% of the total population - loosely estimated to be about 10 million (World Bank, 2013).

Approximately 50% of Somalia's land area can be considered permanent pasture (UNEP, 2010), while 13% is suitable for cultivation. Much of the country is arid and semi-desert making it relatively unproductive for agriculture, with nomadic pastoralism a prevailing livelihood among rural communities. Vegetation is dry deciduous bushland and thicket, comprised largely of Acacia and Commiphora species. Closed forest cover occupies only about 2.4 % of the country. However, when the Juniperus forests and evergreen tracts in the mountains in the north are included, the total forest coverage amounts to around 14 per cent (90,000 km^2) of the land. The mist forests of the Golis Mountains in the north of the country are important centres of biological diversity and species endemism (UNDP, 2010).

Tropical floodplain forest that once existed along the Shabelle River has been cleared for smallholder agriculture, including sugar and banana plantations. Important native forest exports include frankincense, myrrh, gum Arabic and yicib nuts. In 1985 Somalia was the world's largest source of incense, and produced over 2,000 tones. Despite its harsh physical environment, Somalia is home to some 3,028 species of higher plants, of which 17 are known to be threatened. Somalia is considered a center of floral endemism and of the known species, 700 (17 per cent) are endemic. Overgrazing and charcoal production have had a profound impact on species composition, ground cover and the structure of vegetation (UNDP, 2010).

With the longest coastline in Africa (3025 km) a few well developed reefs exist directly off the Somalia coast. Most prominent is the Bajuni reef, a 125-kilometer long coral reef chain of several small islands, islets and rocks. The southern Somali coast, with that of Kenya and Tanzania, also forms part of the Somali Current Large Marine Ecosystem, encompassing 700 000 km2, and extending 800 km between Dar es Salaam and Ras Hafun. Abundant biomass develops here and the ocean shelf has a wide variety of coral reefs, mangroves, seagrass meadows, beaches and estuaries (UNDP/ICPAC, 2013).

1.3 Historical, Ethnic and Administrative Context

The Cushitic populations of the Somali coast in the Horn of Africa have a long history, and were known by ancient Arabs as the Berberi. By the 7th century A.D., the Berberi mingled with Arab and Persian traders who had settled along the coast. This led to the emergence of a Somali culture bound by common traditions, a single language, the Islamic faith and a clan-based social and political system.

The Somali people comprise of six major clans. Four of these are predominantly pastoral (Dir, Daarood, Isaaq and Hawiye), and represent about 70% of the population, while the remaining two (Digil and Rahanwayn) are agricultural and comprise about 20% of the population. While 85% of the population is Somali, the balance of 15% comprises people of Bantu and non-Somali origins (IUCN Eastern Africa Regional Office, 2006). The main religion of the country is Sunni Islam.

About 60% of all Somalis are nomadic or semi-nomadic pastoralists and Somalia is home to the greatest national proportion of pastoralists in Africa. Less than 25% of the population are settled farmers, most of who live in the fertile agricultural zone sandwiched between the country’s two main rivers, the Juba and Shabelle, in the south (IUCN Eastern Africa Regional Office, 2006). The remainder of the population is urban based in the main centers of Mogadishu (Federal Capital), Hargeisa, Burco, Berbera, Bosasso, Garowe, Galkaiyo, Kismayu and Baidoa.

Statistic		Value
Population		9,330,872
Population Density		14.87 people/sq. km
Female Population		50.4%
Age Structure	0-14 yrs	44.9%
	15-64 yrs	52.3%
	65 yrs and over	2.7%
Population Growth Rate		1.596%
Birth Rate		43.52 births/1,000
Death Rate		14.96 deaths/1,000
Net Migration Rate		11.62 migrants/1,000
Rural Population		5,851,483 (62.7%)
Urban Population		3,479,388 (37.3%)

Table 1: Demographic Statistical Estimates (World Bank)

Somalia is officially divided into eighteen administrative regions, which in turn are subdivided into districts. On a de facto basis, northern Somalia is divided by the autonomous regions of Puntland (a semi-autonomous state under the national authority of the Federal Government); and Somaliland (a self-declared though internationally un-recognized sovereign state). In central Somalia, Galmudug is a recent regional entity that has emerged just south of Puntland.

1.4 Demographic Characteristics & Human Development Indices

The most recent National Human Development Report indicates that the Human Development Index (HDI) for Somalia is 0.285 out of 1.0. Somalia would rank 165 out of 170 countries in the 2010 Global Human Development Report if internationally comparable data were available. Life expectancy in Somalia is 50 years, up from 47 in 2001. Out of the three key dimensions used to measure a country's development, in Somalia, education is the lowest at 0.118 out of 1, followed by income at 0.253 out of 1 and health slightly higher at 0.486 out of 1 (UNDP, 2012).

The multidimensional poverty index (MPI) identifies multiple deprivations in the form of indicators of health, education and standard living for each person surveyed. The UN findings indicate that about 82% of Somalis of the nomadic population) are poor across multiple dimensions. Somalia's MPI is 0.47 out placing Somalia at 94 out of 104 countries if ranked in the 2010 Global Human Development Report. Somalia's low MPI can mainly attributed to low standards of living (50%), followed by low levels of education and dismally low access to good health (19%). Overall, 73% of Somalis live on under US $2 day (UNDP, 2012). Table 2 provides further statistics on common development indicators.

Indicator		Value
Under-five mortality		180 per 1,000
Life expectancy at birth		51.2 years
Combined gross enrollment in education		16.6%
Maternal mortality ratio		1,200
Population with access to sanitation facilities		23%
Population with access to improved water source		29%
Unemployment (HDR 2012)	Male	61.59 %
	Female	74.29 %

Table 2: HDI Indicators (UNDP, 2012) (World Bank)

1.5 Economy

Despite experiencing civil unrest, Somalia has maintained a healthy informal economy, based largely on livestock, remittance and money transfer companies, and telecommunications. Due to a dearth of formal government statistics, it is difficult to gauge the size or growth of the economy. Unlike the pre-civil war period when most services and the industrial sector were government-run, there has been substantial, albeit unmeasured, private investment in commercial activities. This has been largely financed by the Somali Diaspora and includes trade and marketing, money transfer services, transportation, communications, fishery equipment, airlines, telecommunications, education, health, construction and

hotels. The NAPA looks at both the challenges and opportunities that can be capitalized upon in the economic domain, ensuring that adaptation measures are linked to potential areas of sustainable economic growth.

Economic Indicator		Value
GDP		$5.896 billion (2010)
GDP growth		2.6% (2010)
GDP per capita		$600 (2010)
GDP /sector	Agriculture	71%
	Services	32.5%
	Industry	7.4%
Main Industries		Sugar Refining, Textiles, Livestock, Money Transfer, Communications
Exports		$515.8 million (2010)
Export Goods		Livestock, Bananas, Hides, Fish, Charcoal, Scrap Metal
Gross External Debt		$2.942 billion (2010)
Imports		$1.263 billion (2010)
Import Goods		Manufactured Products, Petroleum Products, Foodstuffs, Construction Materials

Table 3: Basic Economic Statistics (CIA World Factbook, 2013)

1.5.1 Agriculture, Livestock and Natural Resources

Light rainfall makes much of the country suitable only for nomadic herding with about 60% of the population engaged in pastoralism and farming. Pastoralism and livestock keeping is a mainstay of peoples' livelihoods and security, both in terms of daily subsistence and as the main source of export earnings. Livestock contributes about 40% to GDP and more than 50% of export earnings. Agriculture is the second most important economic sector. Somalia's agricultural sector is largely dependent on rain-fed agriculture. This dependency by the majority of farmers on rain-fed agriculture and pastures has made the economy extremely vulnerable to the vagaries of weather. As a result, failure of rains and occurrence of drought during the growing season has regularly contributed to severe food shortages and loss of animals. Southern Somalia's alluvial plains are the country's most fertile soils together with the inter-riverine area of Bay. Other principal exports include fish, charcoal and bananas. The main agricultural products sold in the domestic market include sugar, sorghum and corn as well as gums and resins (IUCN Eastern Africa Regional Office, 2006). Somalia's long coastline also boasts some of the richest fishing grounds in Africa providing self and paid employment via fishing and aquaculture related activities (UNDP/ICPAC, 2013).

1.5.2 Telecommunications and Media

Somalia offers some of the most technologically advanced and competitively priced telecommunications services in the world. Funded by Somali entrepreneurs and backed by expertise from China, Korea and Europe, these nascent telecommunications firms offer affordable mobile phone and internet services that are not available in many other parts of the continent. Customers can conduct money transfers and other banking activities via mobile phones, as well as easily gain wireless internet access. Prominent Somali telecommunications companies include Golis Telecom Group, Hormuud Telecom, Somafone, Nationlink, NEtco Telecome and Somali Telecom Group. It is estimated that there are currently 10 privately owned Somali newspapers, over 15 radio and television stations, and numerous Internet sites offering information to the public.

1.5.3 Financial Services

Private money transfer operators (MTOs) have also come to play a prominent role in Somalia's economy. The MTOs serve as informal banking networks and these remittance firms (hawalas) have become a large industry in Somalia with an estimated 1.6 billion USD annually remitted to the region by Somali Diaspora. The prominent institutions include Dahabshiil, Qaran Express, Mustaqbal, Amal Express, Kaah Express, Hodan Global, Olympic, Amana Express, Iftin Express and Tawakal Express. Most are credentialed members of the Somali Money Transfer Association (SOMTA), an umbrella organization that regulates the country's money transfer sector.

2.0 The Climate

2.1 Rainfall Patterns

Rainfall in Somalia is generally low and erratic. The country has an average annual rainfall of about 250 mm. The northern maritime plains are extremely hot and arid with average annual rainfall less than 250 mm; with approximately 400 mm of rainfall in the south, and 700 mm in the south-west (FAO, 1995). The rainfall received in the central semi-arid parts of the country is as low as 50-100mm/year. A few small areas along the coastal strip of Somalia are classified as sub humid.

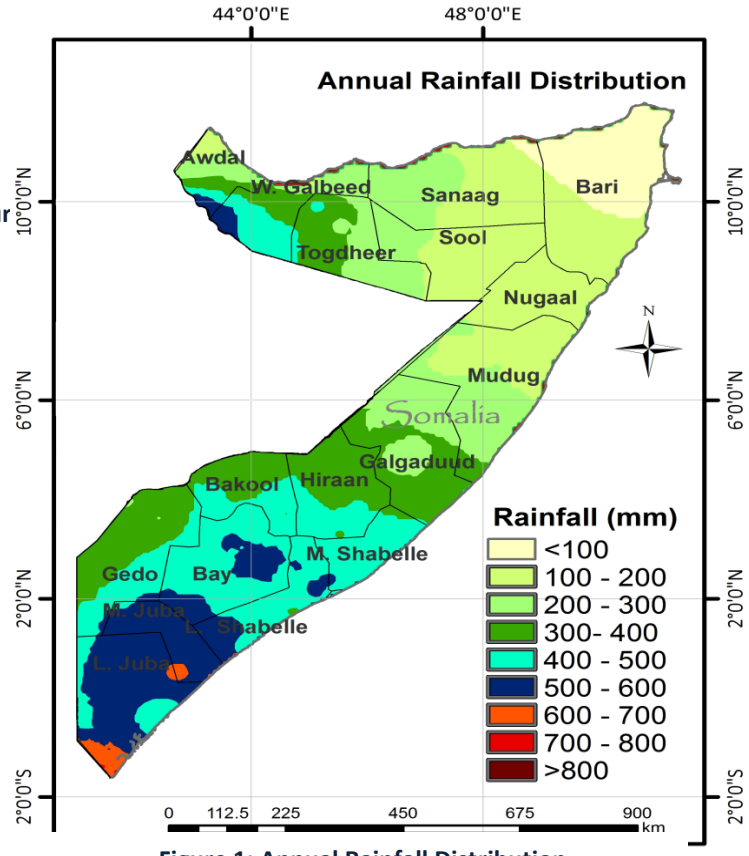

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Figure 1: Annual Rainfall Distribution

The main synoptic scale systems affecting rainfall in Somalia include the Inter-Tropical Convergence Zone (ITCZ), monsoonal winds and ocean currents, jet-streams including the 'Somali Jetstream', easterly waves, tropical cyclones, neighbouring Indian Ocean and Red Sea conditions, as well as teleconnections with various regional and global scale climate systems.

The large-scale systems include the Quasi-biennial Oscillation (QBO), El-Niño/Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), and intra-seasonal waves. An additional factor affecting rainfall is the country's location on the leeward side of the Kenyan and Ethiopian highlands resulting in high regional rainfall concentrations occurring just outside of Somalia but responsible for providing much of the river flow entering Somalia via the Juba and Shabelle (UNDP/ICPAC, 2013).

2.2 Seasonal Rainfall Patterns

Rainfall in Somalia has great spatial and temporal variability. Seasonal rainfall is dominated by the north and south movement of the Inter-Tropical Convergence Zone (ITCZ), delineated into four seasons:-

Jiilaal dry season is from December to March. The north-east monsoon is in dominance and conditions are generally dry and hot. The northern parts of the country experience some cool and dry air during this season while the central and southern parts experience very hot conditions.

Gu rainy season is from April to June. Relatively wet and hot conditions prevail, with Gu considered as the major rainy season in the country. The southern regions receive more rains than the north. Occasionally the *Gu* season extends into June or July because of the Haggai rains, which are produced by the onset of moist onshore winds.

Xagga dry season is from July to September. The South-west monsoon dominates, bringing relatively cool conditions, with showers along the coast but dry inland.

Deyr rainy season is from October to November. At this time, the low pressure system (which sucks in moisture) known as the Arabian ridge intensifies over the Equator, and the central part of the country receives moisture inflow from the Indian Ocean while the northern part of the country is under the influence of dry air from the Arabian Peninsula with less precipitation The rainfall received at this time is less than that of the *Gu* rainy season.

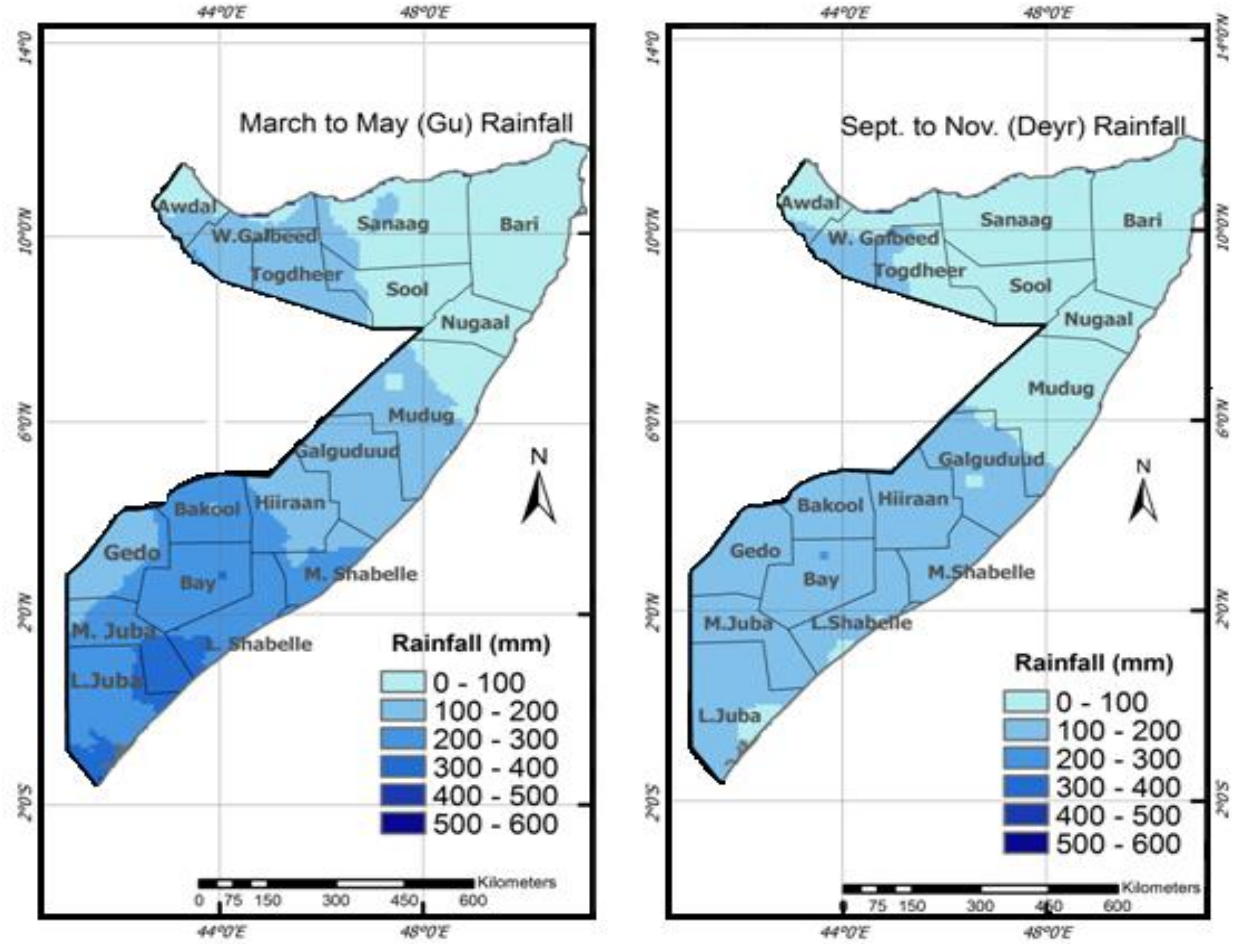


Figure 2: Rainfall during *Gu* and *Deyr* Rainy Seasons

Analysis of long term annual mean rainfall (1963 to 1990) for the country, delineates four climatic zones, namely: the desert zone in the north-east; the arid zone in the central area of the country; and the semi-arid and humid zones in the south and parts of north-west. These zones have been derived using an eco-climate classification method through analysing the mean annual rainfall of selected weather stations across the country.

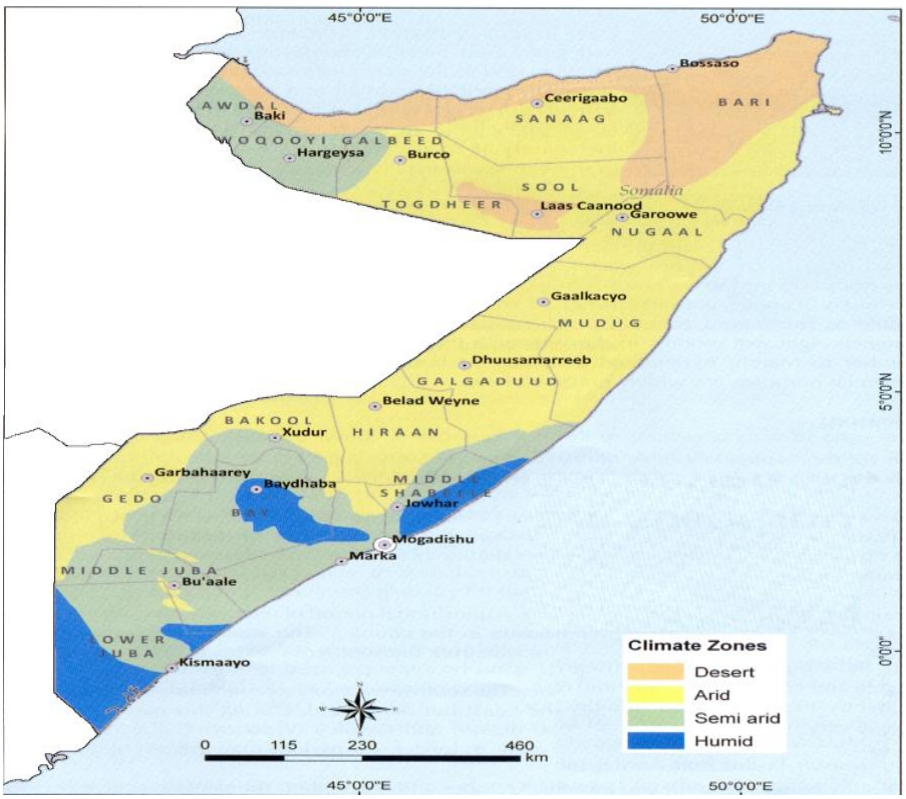


Figure 3: Climate Zones Delineated by Rainfall

2.3 Relative Humidity

Relative humidity (RH) moisture sources in Somalia originate from surface evapotranspiration processes in the neighbouring Indian Ocean and Red Sea, in addition to some localized inland water and wind transport systems in the south of the country close to the riverine systems. Very few measurements of atmospheric humidity have been recorded in Somalia. The earliest records were made from the 1940s to the late 1950s. The spatial distribution of the atmospheric humidity from this data divides the country into three distinctive zones, namely the Southern, Western and Northern areas. Temporal and spatial changes in humidly patterns are a key factor in influencing cloudiness, humidity and rainfall at the local level in Somalia (UNDP/ICPAC, 2013).

The analysis of RH data reveals that the mean daily relative humidity pattern is opposite to that of the temperature pattern (Muchiri 2007), with high humidity corresponding to low temperatures. Observations of available data reveal that RH in the southern areas of Somalia, (i.e. the area covering the southern and central coastline and lower reaches of the Juba and Shabelle Rivers) is high, ranging from 70-80% on average (Polishchouk, 1988).

The western zone of Somalia, which encompasses the south west and west-central parts of the country, (from Gedo, upper Bakool, Hiraan and Galgadud regions), are areas located along the lee of the Ethiopian-Kenyan mountain range, which is a zone of divergence (Polishchouck, 1988). Oceanic air, a significant influence of atmospheric humidity in Somalia, seldom reaches these mountainous regions (ICPAC, 2013).

In the northern inland areas, RH is comparatively low (<45%) apart from the northern coastline that has higher values (65-70%). Humidity in this northern zone experiences a greater RH range than the south and western zones, changing from 40% in the afternoon to 85% at night. The permanent strong, dry wind from the Arabian Peninsula influences atmospheric moisture over these regions, in particular a very strong and dry wind occurs during June to September, named *kharif*, and contains an air mass of very low moisture.

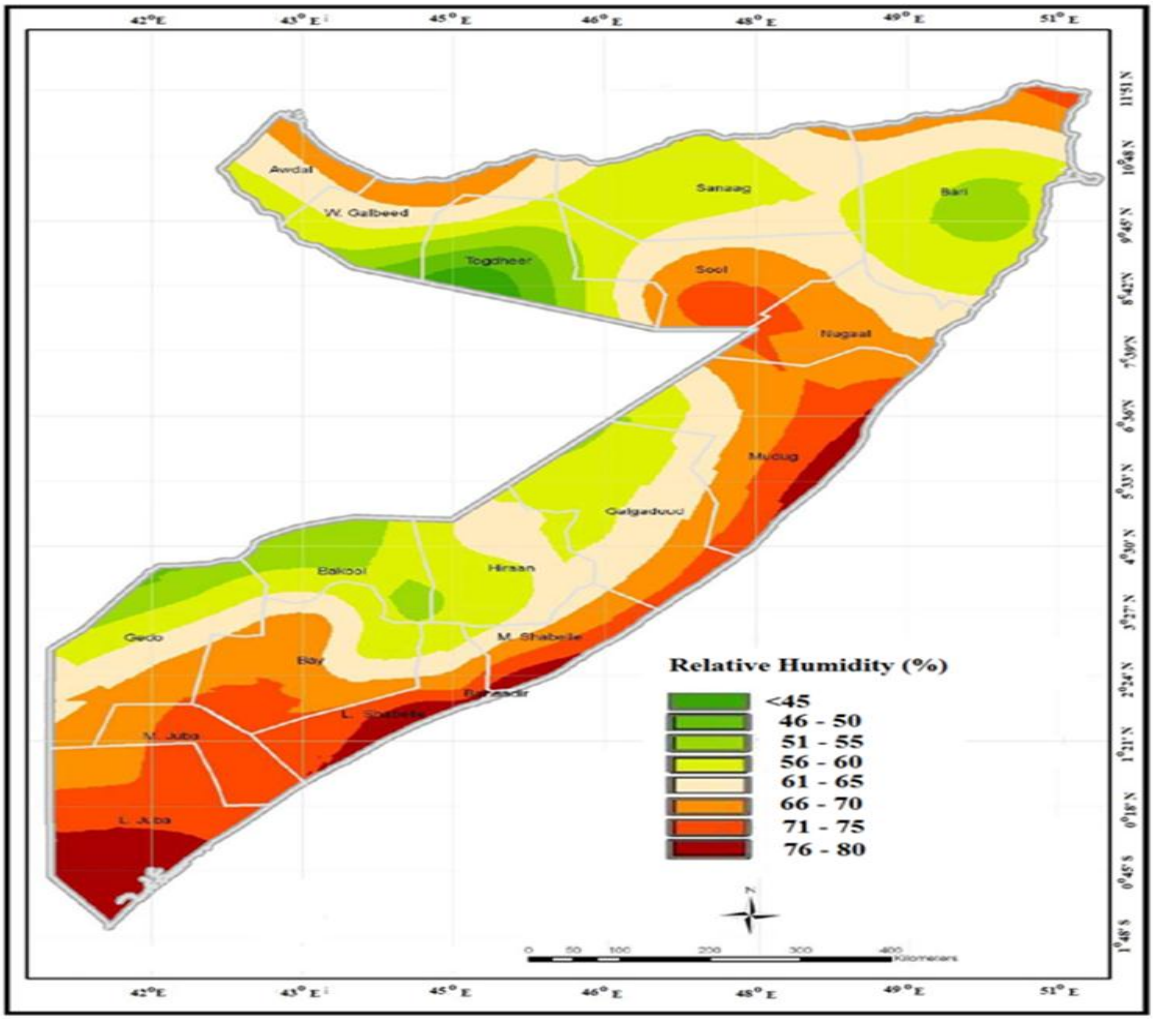


Figure 4: Relative Humidity

2.4 Solar Radiation

In Somalia the seasonal variation in solar radiation influences the seasonal migration of the ITCZ, which moves over the Greater Horn of Africa region for about 4-5 weeks each year (Ogallo 1983). The geographical position and climatic conditions of Somalia are extremely favourable for solar energy harnessing. Somalia is bestowed with high and stable solar radiation across the entire country.

Until recently (2009/2010) no direct solar radiation measurements have been taken in Somalia (FAO 2011). However sunshine data was collected during the pre-war era and was used to estimate radiation values. It is estimated that most places in Somalia receive about 20MJ/m2/day of insolation and about 3000 hours/year of sunshine (Saunier 1978). The solar radiation is high and constant throughput the year due to Somalia's position relative to the equator. The fact that the time of maximum radiation coincides with the time of maximum cloudiness also contributes to the minimal variation of solar radiation (UNDP/ICPAC, 2013).

Solar radiation is highest during the months of March to May in the north; February and March in central Somalia and January to April in the south. Solar radiation ranges from 286 W/m2 in the southern parts of the country to 330 W/m2 in the northern parts. The average daily solar energy received on the horizontal surface is about 5-7 kWh/m2. The daily average total solar radiation in some parts of the country, calculated from the relative sunshine duration applying FAO procedures (FAO 2011), indicate one of the highest in the world.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Northern	245	305	320	322	325	296	265	303	271	269	262	249	**286**
Central	296	348	303	284	263	261	320	301	278	258	280	274	**289**
Southern	497	520	469	404	277	232	199	260	283	250	259	297	**329**

Table 4: Solar Radiation (W/m2) over Somalia for a period of one year

2.5 El Niño Southern Oscillations

The El Niño Southern Oscillation[1] (ENSO) has influence on the variability of Somalia's climate. Inter-annual rainfall variations in the southern region of Somalia are tightly linked to the ENSO, with more rain and flooding during El Niño and droughts in La Niña years, both having severe impacts on human habitation and food security. Observation of the rainfall Atlas of southern Somalia (FAO, 1971-1990) indicates peak October/November/December rainfall during strong ENSO years (1972, 1977, and 1982) and drought events during La Niña years (1971, 1974, 1975, 1984 and 1988). These are clearly observable in large peaks and troughs during September/October/November/December seasons.

2.6 The Somali Jet / Eastern Africa Low Level Jet stream

The Somali Jet is a narrow south-westerly surface wind with a 2-day average speed greater than 12 m s-1 (Ardanuy 1979, Krishnamurti et al 1976). The importance of the Somali Jet arises from the fact that its path around 9º N coincides with a zone of coastal upwelling on the coast of Somalia and has an inter-annual relationship with El Niño/La Niña and therefore Somalia rainfall patterns (Halpern and Woiceshyn 1999). As the strong winds drive away the surface coastal waters towards the east, extremely cold water from the depths of the sea rise upwards to preserve the continuity of mass (UNDP/ICPAC, 2013).

[1] El Niño is defined by prolonged differences in the Pacific Ocean Sea surface temperatures when compared with the average value. The accepted definition is a warming or cooling of at least 0.5 °C averaged over the east-central tropical Pacific Ocean. Typically, this anomaly happens at irregular intervals of 3–7 years and lasts nine months to two years.

2.7 The Somali Current

The Somali Current is an ocean boundary current that runs along the coast of Somalia and Oman in the Western Indian Ocean and is analogous to the Gulf Stream in the Atlantic Ocean (McCreary et al 1996). This current is heavily influenced by the monsoons and is the only major upwelling system that occurs on a western boundary of the Indian Ocean. The water that is upwelled by the current merges with another upwelling system, creating one of the most productive ecosystems in the ocean (Mann and Lazier 2006).

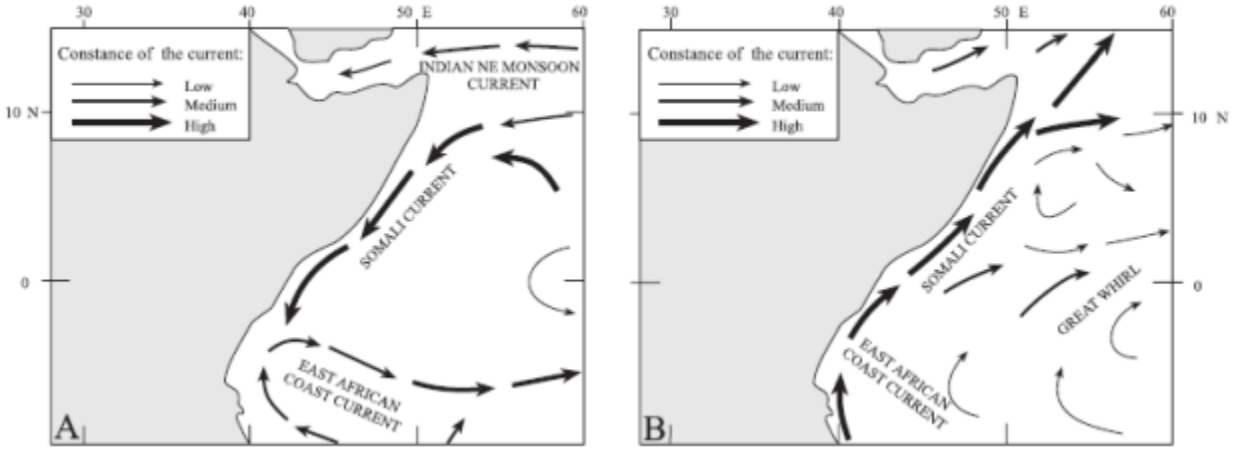


Figure 5: The Somali Current

Its peculiar feature is a reversal in direction with the onset of the summer monsoon. In winter, the current moves from the north to the south running southwards from the coast of Arabia to the east African coastline; but with the advent of the summer monsoon it reverses its direction and flows from the south to the north. This suggests a relationship with the reversal of monsoon winds, but usually the oceans respond very slowly to changes in atmospheric circulation and oceanographers have wondered why the Somali Current reverses its direction and reaches its maximum speed nearly a month earlier than the onset of south-westerly monsoon winds.

Has the Climate Changed Already?

A number of preliminary studies, including analysis of data from the FAO Somalia Water and Land Information Monitoring (SWALIM) programme, coupled with data from neighboring countries in the GHA region, can be used to provide an indication of possible changes in climate in the country. In addition, global models are also used to extrapolate information to Somalia level and regional models have then been used to downscale climate predictions. IPCC global models indicate that extreme weather events associated with El-Niño have been both increasing in frequency and intensity in the past 20 years (IPCC, 2007). This has had an impact on Somalia's climate patterns with estimated increases in mean rainfall indexes, and increased incidences of extreme weather events (UNDP/ICPAC, 2013).

Acknowledging that some gaps exist for baseline climate data in Somalia (mainly between 1990 and 2002 during the period of prolonged civil war), the following section describes the current variability and projected climate change using historical data sets (1960 -1990), and some more recent data sets from SWALIM (2002-2012), along with scientific analysis of the data undertaken as part of this NAPA by the

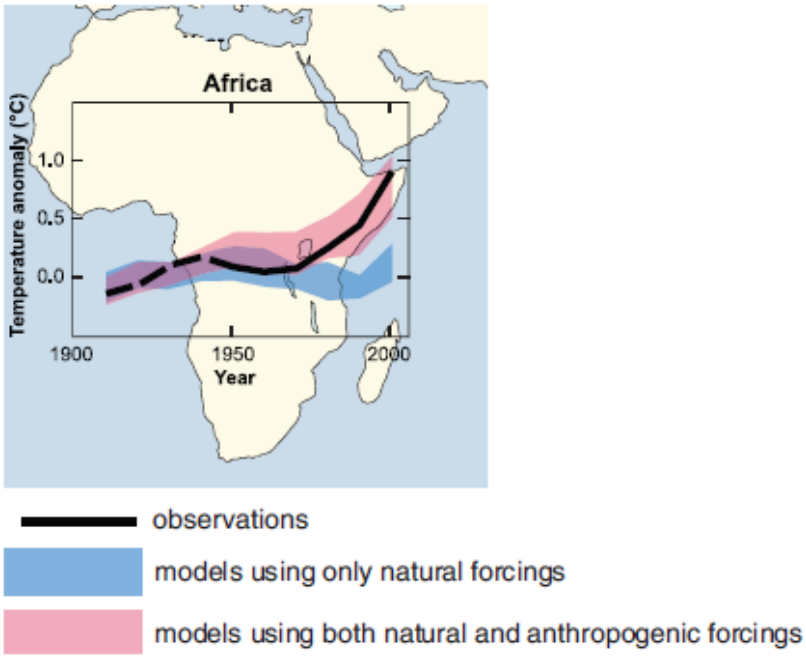
Inter-governmental Climate Predictions and Assessments Center (ICPAC). This analysis by ICPAC is also a first output of analysis of a number of global and regional models to infer climate changes in Somalia, and precedes the development and analysis of a more detailed model for Somalia.

3.0 Framework for an Adaptation Programme

3.1 The Current Climate Variability and Projected Climate Change

3.1.1 Current Climate Variability -Temperature

The fourth IPCC assessment report (IPCC, 2007) shows changes in extreme temperatures across the Greater Horn of Africa (GHA) region have been observed over the last 50 years. An analysis of global data from 1901-2005 shows temperatures have increased 1.0°C in a century. Figure 7 show the difference in anthropogenic and natural forcing's on mean surface temperature increases since 1950.



Inter-annual analysis of national data for Somalia shows that mean air temperatures remain high throughout the year with the hottest months in the south, March and April, being only a few degrees warmer than the coolest months, July and August. At Afgoye, near Mogadishu, mean daily temperatures for the period 1953-1976 were 25.2°C to 28.8°C with an annual mean of 27°C. Diurnal temperature fluctuations are high and can range from 20°C to 35°C.

Figure 6: Temperature Change (IPCC, 2007, Summary for Policymakers Report)

In the southern parts of the country, temperature is highest inland, with Luuq in Gedo region near the border with Ethiopia and Kenya having the highest mean temperature of over 30°C. Temperatures along the southern coast are lower than those inland, due to the influence of cold ocean currents.

The relative thermal uniformity prevailing in the south is distorted by the effects of altitude in the north, where temperature decreases with altitude giving a larger mean daily lapse rate of about 6°C per 1000m. It must however be noted that the lapse rate varies with seasonal changes throughout the year, being larger in the dry season than in the wet season. Isotherms are more or less widely spaced in the south where the surface is more homogeneous, unlike in the north where they are relatively closer to each other, with varied surface (UNDP/ICPAC, 2013).

3.1.2 Current Climate Variability - Rainfall

The amount of rainfall received across Somalia varies dramatically from year to year, from drought periods that persist for several years to erratic periods of intense downpours and flooding. The prominent observation from analysis of weather station rainfall data, across all regions and seasons in Somalia, is a high inter-annual and inter-seasonal variation (See Figure 8). Rainfall is shown to vary between the range of 57mm and 660mm at one weather station in central Somalia during a 20 year observation period (UNDP/ICPAC, 2013).

The temporal patterns of high rainfall variability over Somalia can be directly associated with extreme events such as floods and droughts impacting the country (UNDP/ICPAC, 2013). Schreck and Semazzi (2004) concluded that Somalia's high rainfall variability is correlated with perturbations in the global Sea Surface Temperatures (SSTs), especially over the equatorial Pacific and Indian Ocean basins. The occurrences of most of these events are during periods when the Indian and Pacific Ocean experiences anomalous sea temperatures and circulation anomalies during El Niño/La Niña, together with IOD events (Lasco and Boer 2006). These include the recent droughts of 2000, 2004, 2008 and 2010-2011; and floods of 1997/1998 (ICPAC, 2013).

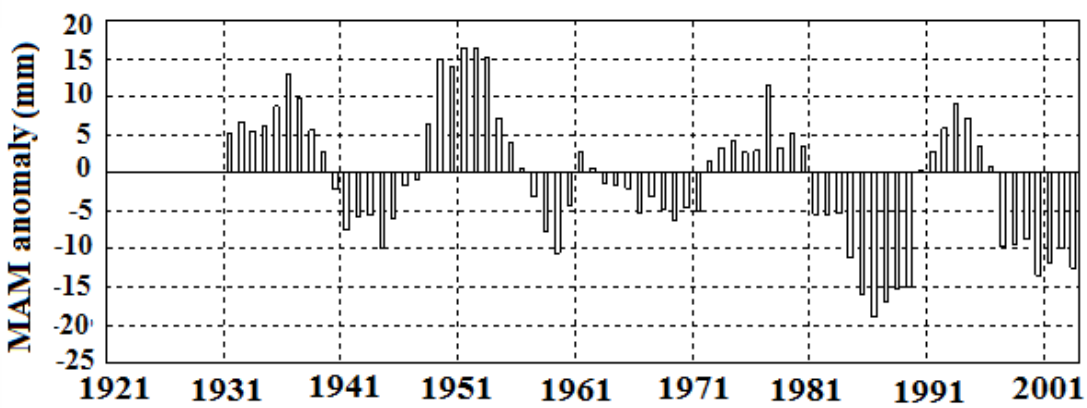


Figure 7: Decadal Rainfall Variability

Since 1960s, Somalia has experienced at least one major climate extreme event in each decade (Balint et al 2011). Major floods that have been experienced since 1960 include; 1961, 1977, 1981, 1997-98, 2005, 2006 and 2009. While major drought events were experienced in 1969, 1976, 1984, 1987, 1999, 2001, 2004, and 2010. In the past decade (2001 to 2010) the country has been alternating from drought to floods within the years (FAO SWALIM, 2012). The observed pattern (IPCC 2007, 2012) shows increasing variability in rainfall for Somalia suggesting an increase in the frequency and severity of future droughts and flash flood events.

3.1.3 Projected Climate Variability - Temperature

The IPCC Global Climate Models (GCMs) and the new generation of the Earth System Models (ESMs) from the Fifth Phase of Coupled Model Inter-comparison Project (CMIP5) and Regional Climate Models (RCMs) have been used in this assessment study to determine projected future climate scenarios for Somalia. Since GCMs are low in resolution and cannot provide satisfactory future climate scenarios over Somalia, the high resolution RCMs have been used to downscale the GCMs for impact and vulnerability assessment (Boko et al., 2007).The differences in temperature between the years 1980 to 1999 and the years 2080 to 2099 have been averaged over the east Africa region.

Over the region and in all seasons the median temperature is expected to increase between 3.2°C and 4.3°C (Table 5).

Table 5: Temperature projections for East Africa Region in the MMD for A1B scenario (IPCC, 2007)

Region	Season	Temperature Response (°C) Min	25	50	75	Max	T yrs
EAF	DJF	2.0	2.6	3.1	3.4	4.2	10
	MAM	1.7	2.7	3.2	3.5	4.5	10
12S,22E	JJA	1.6	2.7	3.4	3.6	4.7	10
to	SON	1.9	2.6	3.1	3.6	4.3	10
18N,52E	Annual	1.8	2.5	3.2	3.4	4.3	10

Regional temperature observations and projections (Figure 9) show that mean temperature anomalies (1901-195) for the Greater Horn of Africa region (black line) are highly correlated with simulated (red envelope) temperatures (1906-2005) when incorporating known forcing's. This provides a useful degree of certainty in the projected temperature increase (orange envelope) for the period 2001 to 2100 (using global MMD models under the 'medium case' A1B scenario).

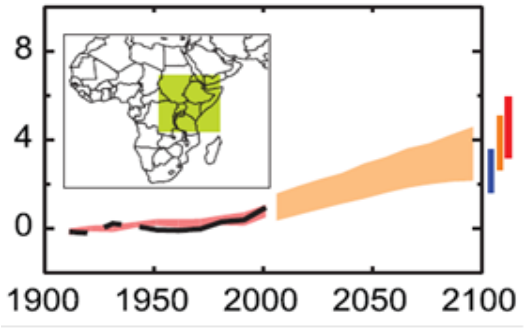


Figure 8: Projected Temperature anomalies by MMD models (Hulme et al 2001)

The coloured bars at the end of the orange envelope represent the different temperature projections reached by 2100, calculated under three climate emissions scenarios: i) B1 scenario (blue-low), the A1B scenario (orange-medium) and the A2 scenario (red-high). The modelled projections show that in the best case scenario (blue), temperatures in will increase 3.1°C and in the worst case scenario (red), temperatures will increase 4.3°C across the GHA region (represented by the green square on the map).

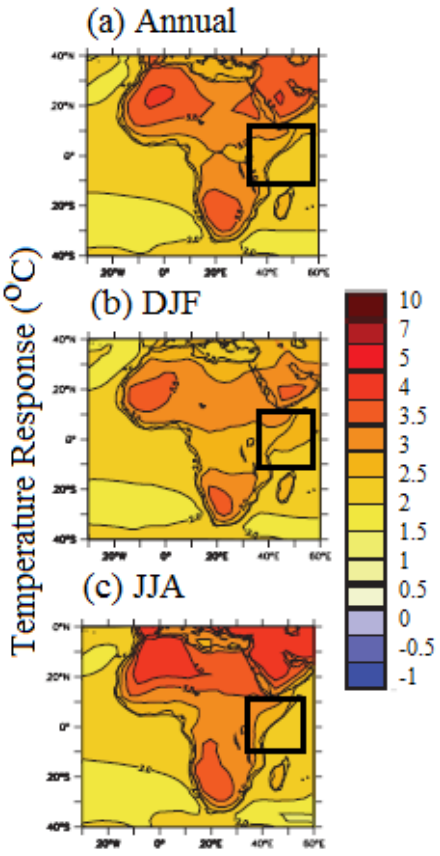


Figure 9: Temperature changes over Africa from the MMD-A1B simulations for (a) Annual mean (b) DJF and (c) JJA temperature change between 1980 to 1999 and 2080 to 2099, averaged over 21 models. (Source: IPCC 2007).

Observations of the Regional mean temperature projections taken from 21 models (Figure 10) shows that Somalia will experience a 3°C temperature increase in northern regions of the country, and a 2.5°C increase in central and southern areas of the country. Seasonal projections show that the largest temperature increases in northern Somalia will occur in June July and August (JJA), while the largest temperature increases in southern Somalia occur in December, January and February (DJF).

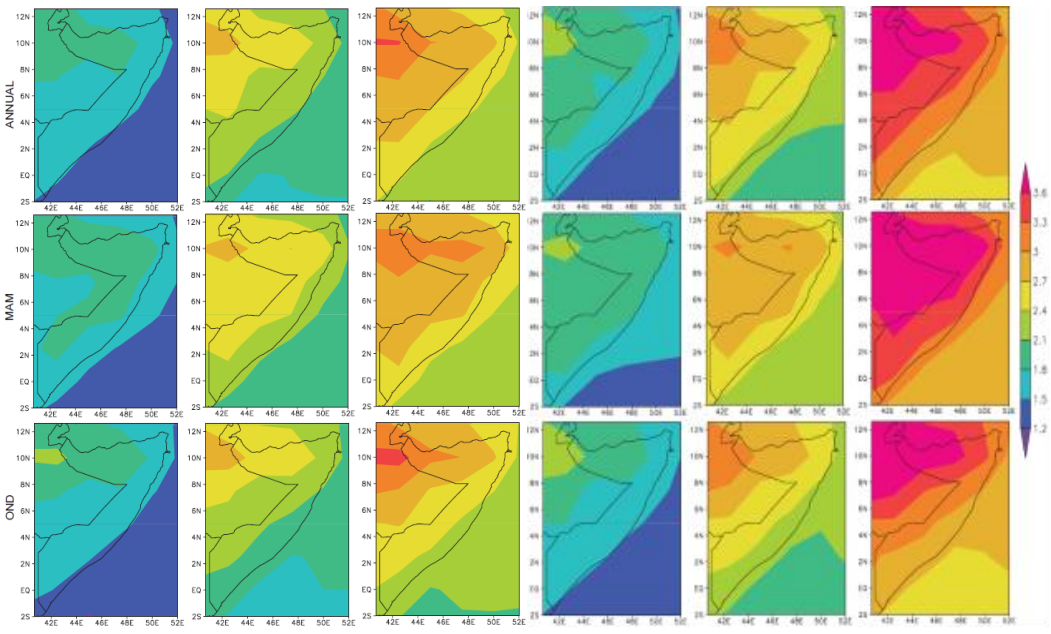
The new generation of the Earth System Models (ESMs) from the CMIP5 has also been used to analyze projected changes in seasonal and annual mean climate over Somalia based on IPCC firth assessment report. These Regional projections are analyzed in 30 year time slices centered on 2030, 2050 and 2080, and are calculated relative to the reference period 1981-2000.

The most recent global projections show that Somalia is expected to experience a steady future increase in temperature, rising to 3.2°C by 2080 (WCRP, 2012).

Period average	Mean projected changes (°C) for Somalia		
	2030	2050	2080
Annual	**+0.8**	**+2.5**	**+3.2**
December to February (DJF)	+0.7	+2.4	+3.2
March to May (MAM)	+0.8	+2.5	+3.5
June to August (JJA)	+0.7	+2.8	+3.8
September to November (SON)	+0.9	+2.1	+3.1

Table 6: Mean estimate of projected temperature for Somalia using RCM

The recent CMIP5 regional models also project a uniform increase between northern, central and southern regions of Somalia, and between seasons (Figure 11), with temperatures expected to increase at a steady rate of 0.3-0.5°C per decade until 2050 (WCRP, 2012).



(a) RCP4.5 **(b) RCP8.5**

Figure 10: Projected temperature anomalies first, second and third columns for 2030, 2050 and 2080 respectively under (a) rcp4.5 and (b) rcp8.5 scenarios. Top, middle and bottom panels are annual, MAM and OND respectively. Anomalies are taken on a base period of 1981-2000.

In summary, both Global and Regional models show that mean temperatures are expected to increase in Somalia between 3°C and 4°C by 2080.

3.1.4 Projected Climate Variability – Rainfall

Albeit with differences in magnitude, the ensemble of projected rainfall response from global climate models for the east Africa region shows an expected gradual increase in precipitation anomalies over Somalia under both best and worst case emissions scenarios.

Period average	Projected changes			Rainfall intensity projections
	2030	2050	2080	
Annual	**+1%**	**+3%**	**+4%**	**+2-3%**
MAM	+1%	+2%	+3%	+1-2%
OND	+3%	2%	1%	+2-3%

Table 7: Projected mean annual rainfall

Mean annual rainfall in Somalia is expected to increase in relation to the 1981-2000 reference period, by 1%, 3% and 4% by 2030, 2050 and 2080, respectively. However the global models also indicate seasonal changes[2] to be expected with less precipitation for central and southern Somalia during MAM season by 2080 as indicated in figure 13 (second panel). In summary, a gradual increase in total rainfall is expected in Somalia though with increasing seasonal variability. Extreme rainfall events can be expected to increase across the different monthly periods (ICPAC, 2013).

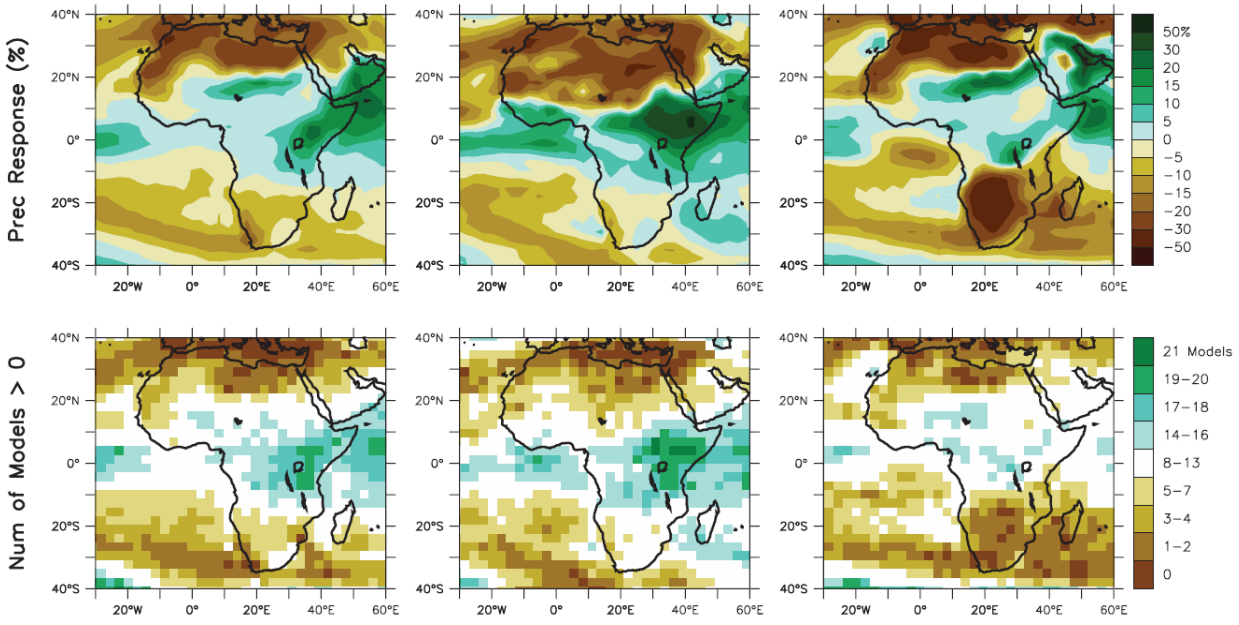
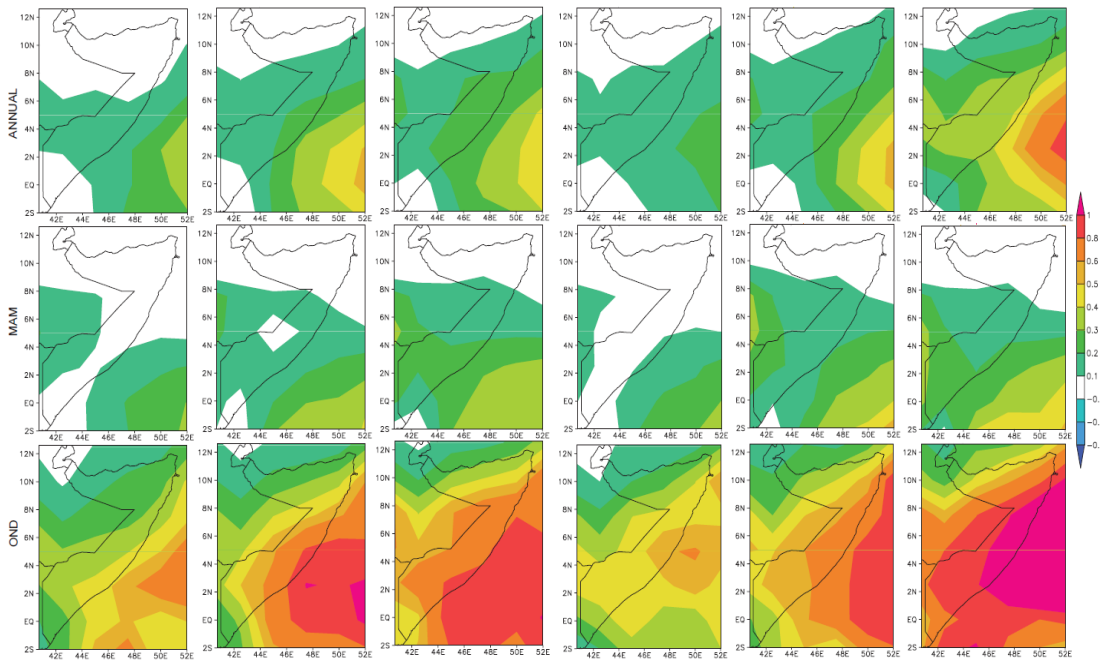


Figure11: Fractional precipitation changes over Africa from the MMD-A1B simulations (a) annual, (b) DJF and (c) JJA averaged over 21 models together with the number of models out of 21 that project increases in precipitation.

[2] These projections are in agreement with the IPCC 2007 report, based on the changes between 1980 and 1999. Given limited information on observed rainfall trends in Somalia, the disparities in seasonal distribution may be attributed to the low resolution of current models.



(a) rcp4.5 (b) rcp8.5

Figure 12: Projected precipitation anomalies first, second and third columns for 2030, 2050 and 2070 respectively under (a) rcp4.5 and (b) rcp8.5 scenarios. Top, middle and bottom panels are annual, MAM and OND respectively. Anomalies are taken on a base period of 1981-2000.

3.1.5 Sea Surface Temperatures and Sea Level Rise

The sea surface temperature over the coast of Somalia bounded by 2^0S to 13^0N and 52^0E to 55^0E depicts a gradual rising trend in temperature of 0.4^oC over a 26 year period (1981-2007).

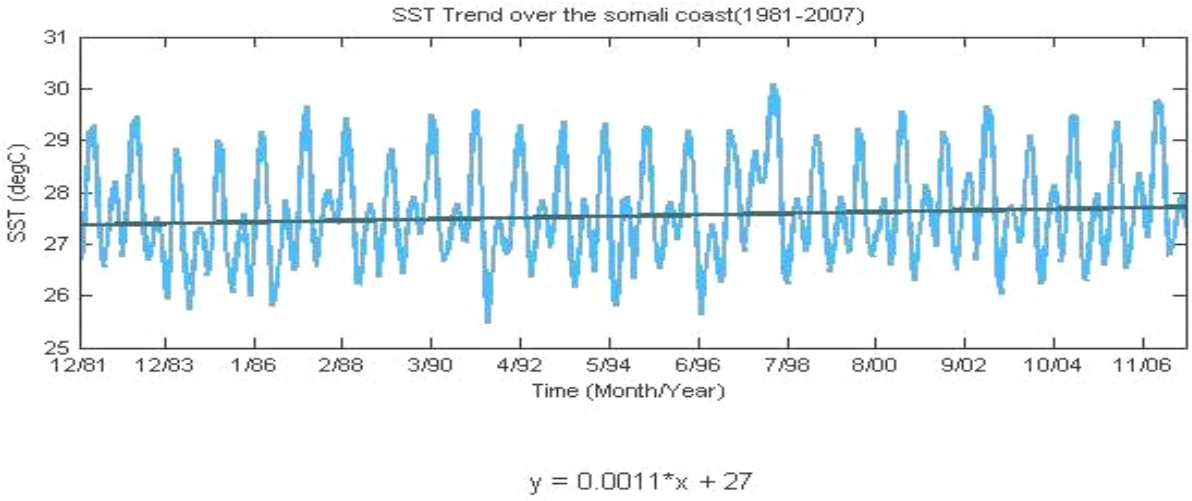


Figure13: Sea Surface Temperatures

There is currently no available tide gauge data along the Somalia coast that can be used to support the expected sea level rise. A 15-year (1995-2010) record on observations of monthly mean sea level from a tide gauge in Lamu, Kenya within the East African coast, part of the Global Sea Level Observing System

(GLOSS) network, indicates a rising trend of about 1.3 mm per year, which is aligned to the global trend (ICPAC, 2013; IPPC 2007).

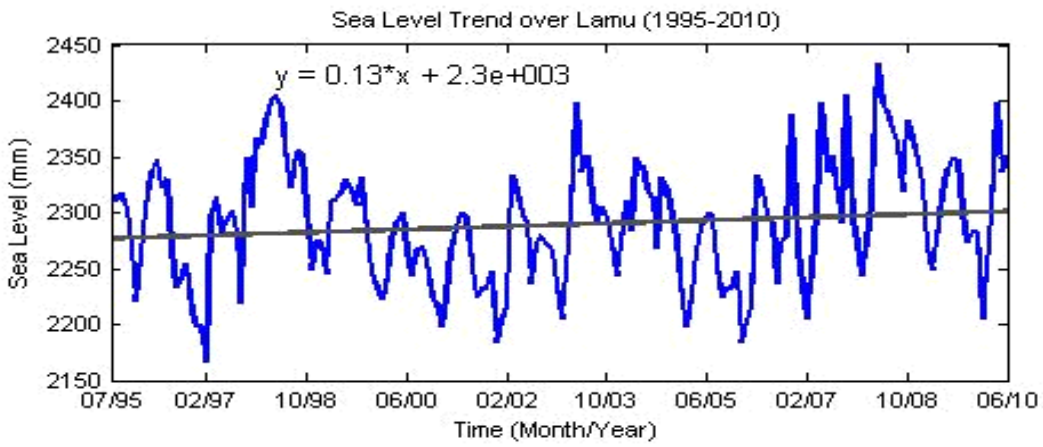


Figure 141: Plot of mean monthly Sea Level (mm) at the Lamu Tide Gauge

(Source of data: Kenya Marine and Fisheries Research Institute)

The Mombasa tide gauge, about 500km away from Lamu, with a 25-year (1986-2010) record of observations also indicates the same rising trend (Figure 16) even though there are data gaps in this record. It is important to note that data from both Mombasa and Lamu, which lie within the East African coast and about 500km apart, show an increasing trend in sea level. From this observation, the Somalia coast, which is a few kilometers away from Lamu and along the same East African coast, is very likely to exhibit the same trend. This is supported by the fact that the ocean dynamics of the two Kenya stations are closely intertwined (ICPAC, 2013).

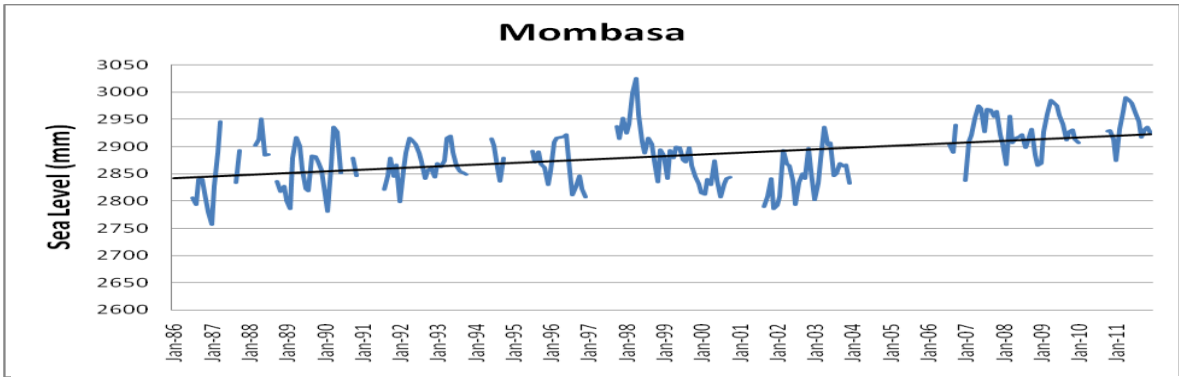


Figure15: Plot of mean monthly Sea Level (mm) at the Mombasa Tide Gauge
(Source of data: Kenya Marine and Fisheries Research Institute)

Somalia can expect a mean sea-level rise of about 50cm by the end of 2099 along the Indian Ocean coastline (IPCC, 2007; Lennon, 1994).

3.2 Vulnerability of Key Sectors

3.2.1 Community Perceptions on Climate Variability

Discussions with communities in the three regions of Federal Somalia, Puntland and Somaliland were held on their perceptions and experiences of climate variability. Most of the information regarding changes in climate conditions was obtained from discussions with traditional leaders, religious elders, pastoralists and agro-pastoralists. Responses were near identical across the three regions. The main points raised were as follows:

Temperature

- Temperature has notably increased over the past 3-4 decades;
- In the past, migration was observed from the populace in Djibouti to Somaliland to escape the extreme heat in Djibouti. However, this has ceased now that Somaliland also experiences the same high temperatures regularly;
- New species of grasses and vegetation have appeared in the areas experiencing warmer temperatures;
- In 2008-2009 extreme drops in temperature were experienced in some highland areas of Puntland. In the Boroma region the water stored in ponds and containers became frozen.

Drought

- Drought is defined by the community as a missed rainy season and is said to occur either throughout the region or to rotate in the different regions. There are many years where some parts of the country receive rainfall while others do not. These microclimates lead to nomadic behavior of the population.
- The frequency of drought has increased in the past 3-4 decades
- The amount of rainfall received during the *Gu* season has decreased, but the time of onset is roughly the same
- Rain is more erratic during both rainy seasons, with frequent intra-seasonal dry spells
- Seasonal changes are becoming harder to predict each year. Rainy seasons are now sporadic and increasingly unpredictable

Dust storms and winds

- Dust storms have become more common and occur right before heavy flooding. They occur every year, but very severe ones occur every 4-5 years.
- Coastal areas have seasonal winds lasting 9 days. These are now arriving much more frequently and at unpredictable times of the year. (Somaliland)

Floods

- Less flooding has been observed by communities in both Federal Somalia and Somaliland as compared to 30 years ago

3.2.2 Community Identified Climate Impacts

The major climate hazards in Somalia are droughts and extreme flooding events. In addition, there are other climate-related phenomena such as dust storms, heat waves and cyclonic winds whose occurrences, though less frequent, still pose serious threat to local livelihoods and future climate change is expected to see all of these hazards intensify. Extensive consultations with key stakeholders were held to identify the

impacts of climate hazards. The tables below present the general impacts of each hazard that all the consulted communities identified.

HAZARD	IMPACTS
DROUGHT	▪ Loss of life ▪ Loss of livestock ▪ Loss of livelihoods ▪ Increased poverty ▪ Decreased GDP due to low agricultural and livestock productivity ▪ Shortage of agricultural inputs ▪ Food insecurity and malnutrition, particularly amongst women and children ▪ Increased local food prices ▪ Rural-urban migration in search of work ▪ Internal displacement and overpopulation of IDP camps ▪ Insecurity for women to rape and gender-based violence in IDP camps and during migrations ▪ Lack of clean drinking water ▪ Outbreak of diseases due to poor sanitation and clean drinking water ▪ Overburden on existing health facilities ▪ Conflict between settled farmers and livestock herders over competing resource uses ▪ Conflicts between nomadic groups on rights to access diminishing pasturelands ▪ Drying up of shallow wells ▪ Depleted groundwater resources ▪ Increased water prices in the private sector ▪ Deforestation due to livelihood shift to charcoal production from agro-pastoralism ▪ Bushfires ▪ Wildlife Migration ▪ Desertification ▪ Water pollution becomes more concentrated ▪ Salt-water intrusion in coastal areas ▪ Rising unemployment rates due to weakness/sickness amongst workforce ▪ Theft and looting ▪ Drug-use ▪ Family disintegration ▪ Psychological illnesses ▪ School-dropout rate increases
STRONG WINDS	• Increases soil erosion due to loose topsoil being swept away with winds • Shallow wells are buried under dirt, sediment and other debris • Loss of life, usually due to heavy or sharp objects being flung at them due to the winds, especially GI sheets that are used as roofing for houses and are not properly secured • Destruction of the environment • Destruction of crops and agricultural land • Disruption in transportation services • Disruption in telecommunications and electricity due to falling phone and power lines ▪ Spread of pollution and plastic waste

EXTREME FLOODING EVENTS	▪ Loss of life ▪ Food insecurity and malnutrition ▪ Deforestation and desertification ▪ Outbreak of animal diseases as 'berkads' get contaminated ▪ Outbreak of human diseases, particularly diarrhea, malaria, cholera and tuberculosis ▪ Sewage overflows in urban areas ▪ Food shortages due to destruction of standing crops and stored stocks - famine ▪ Water-logging of soil leading to decreased productivity of agricultural land ▪ Damage to houses, canals, roads and markets ▪ Disruption in government services that are affected by flooding such as health posts ▪ Topsoil erosion leading to gully formation ▪ Unemployment due to shut-down of industries and vendors ▪ Lack of access to remote populations to provide relief and regular development work ▪ Loss of seed supplies ▪ Formation of gulley's ▪ Shallow wells are buried under debris and silt ▪ Transportation services are disrupted ▪ Local government officials hampered by floods in carrying out their duties
HIGH TEMPERATURE	• High evaporation rates leading to less availability of water and drying up of shallow wells • Crops dry up, resulting in failed harvests • Pharmaceuticals exposed to heat are destroyed • Changes in wildlife activity • Declining water quality due to less water and more concentration of pollutants • Outbreaks of skin diseases and tropical diseases such as malaria • Reduced trade with nearby cities, especially Bossaso where temperatures are extreme • Increased pest invasions

Table 8: Community Identified Climate Impacts

3.2.3 Sectoral Vulnerabilities

In the discussions with government and the different consulted groups, the participants suggested that the NAPA should focus on flooding and droughts only, as these are the two immediate and severe hazards that the people of Somalia need to adapt to. Thus, the sector vulnerabilities presented below cover droughts and floods as the main hazards in each sector.

SECTOR	HAZARD	VULNERABILITIES
Water Resources	**Drought**	• Declining water found in shallow wells (very common) and in ground resources (from boreholes access) leading to high mortality rates in humans and animals • Limited water infiltration to the soil due to the steep terrain, shallow and thin soils and sparse vegetation, increasing risk factor with climate change. • Increased price of water • Lack of clean water for drinking • Increases in conflict over water • Increasing demand for borehole water as shallow wells dry up first

SECTOR	HAZARD	VULNERABILITIES
	Flooding	• Increased contamination and pollution by runoff from human settlements, industry and roads impacting on aquatic biodiversity. • Destruction of water infrastructure • Sewage systems can also be damaged, and may also contaminate the domestic water supply. • No capture and storage of floodwater
Agriculture and Food Security	**Drought**	• Increased demand for agricultural inputs and not enough supply • Increased frequency of water shortages for agriculture as well as rising demand through increased evapotranspiration (due to higher temperatures) • Seeds are eaten to supplement diet and seeds are lost for next season planting • Local food prices go up • Increased pressure on remaining resources • All government efforts directed at saving lives and away from development • Reduced availability of irrigation waters • River water and shallow well water salinity increases
	Flooding	• Destruction of standing crops • Loss of stored food • Soil borne diseases that affect crops • Waterlogging of soil leading to low productivity • Increase insects and pests • Loss of agricultural land • Damage to fruit trees • Loss of top soil and nutrients • Gully formation leading to reduced productivity of agricultural land
Animal Husbandry and Rangeland	**Drought**	• Loss of animals leading to food insecurity, loss of livelihoods and low export earnings for the economy • Reduced livestock productivity; reduced fertility and reproduction leading to decreased income, and to increased price of products. • Scarcity of pastureland • Conflict over water and rangeland for livestock • Charcoal production increases due to need for alternate livelihood strategies • Sand dunes enter rangeland areas and affect vegetation
	Flooding	• Degradation of rangelands due to erosion
Marine and Coastal Resources	**Drought**	• Increasing coastal sand dunes cover land areas • Less plankton production • Increased salinity in coastal groundwater due to salt-water intrusion • Coral reef destruction (due to higher SST temperatures)
	Flooding	• Flow of wastewater (contaminated) into the sea • Destruction of mangroves
Health	**Drought**	• Increase of mortality of humans and animals • Shortage of food leading to malnutrition, especially amongst of youth and

SECTOR	HAZARD	VULNERABILITIES
		mothers • Increasing psychological disorders due to stress • Increased incidence of pneumonia, asthma and other lung and nasal diseases. • Increased incidence of heat stroke, sunburn, dehydration, heat exhaustion and sunstroke.
	Flooding	• Increase of water borne diseases • Destruction of health service facilities • Overburden on existing health facilities • Disease epidemics
Biodiversity (forests, freshwater aquatic, marine and invasive alien species)	**Drought**	• Deforestation and cutting down of trees and other vegetation for charcoal • Wildlife hunting increases • Soil erosion due to deforestation • Bush fires • Wildlife migration • Reduction in biodiversity • Increases numbers of some species including pests, weeds & pathogens (due to higher temperatures)
	Flooding	• Soil erosion and loss of nutrients • Wildlife migration • Direct damage by floods and increased sedimentation reducing aquatic reproduction, productivity, habitat area and causing local extinctions. • Temporary or permanent increases in surface and ground water leading to increased aquatic productivity, including fish.

Table 9: Sectoral Vulnerabilities

3.2.4 Vulnerable Groups

Although the majority of the population of Somalia is vulnerable to climate change, consultations with stakeholders identified women and youth as particularly vulnerable and is described in more detail below. Most stakeholders identified greater vulnerability for rural populations as compared to urban populations. It was also generally agreed that pastoralists are highly vulnerable compared to other groups including agricultural farmers, since they are so dependent upon rain-fed rangeland grazing for their livestock and tend to have very few fixed assets. The vulnerabilities that pastoralists face are taken into consideration in the sectoral vulnerabilities, as most of the participants in the meetings focused on the pastoralists given their understanding that a large portion of the country's population is engaged in this livelihood.

Another group that participants identified as especially vulnerable during consultation were internally displaced peoples (IDPs), given that they are often forced to move as either a direct result of a climatic hazard, such as drought, or to flee conflict. In either case, migration is commonplace and places pressure on natural resources surrounding IDP settlements and on the outskirts of urban areas. Participants noted that IDPs are frequently in fear of returning to their own district, or simply no longer have the means to do so having used up or sold all assets, and consequently become even more susceptible to climate risks.

Women and youth are found to be highly vulnerable to climate change, and the way that this vulnerability is expressed is different from the other stakeholders that were interviewed. The following two sections describe this in more detail.

Women

Women in rural areas are identified as one of the most vulnerable groups in Somalia. The sexual division of labor, unequal access to both material and non-material resources and women's diminished participation in decision-making in both political and private domains generally result in increased vulnerability of women to the impacts of climate change. For example, women are found to be the ones who must find solutions to feed their families in crisis situations. Some of the roles that women play in Somalia and the impact of droughts and floods are listed below. Most of the impacts of droughts and floods are the same, and are thus grouped together.

- Women are responsible for fetching drinking water if it is within 5-8 kilometers. If it is farther away, men take over the responsibility. Droughts either lead to women having to walk much farther, or the transfer of this responsibility to men.
- Women suffer the most from food insecurity due to drought/floods as they often feed their children before themselves leading to malnutrition.
- Lactating mothers suffer significantly due to lack of protein intake when livestock are lost due to drought/flood.
- The impact of drought/flood is greater on rural women in nomadic regions given that their livelihoods are generally dependent upon livestock and other natural resources.
- During migration to urban areas or IDP camps, women face physical insecurity during movement and within the IDP camps.
- Infections are often passed on from children to their mothers, particularly during drought when women are weak due to lack of food.
- When women relocate to urban areas, they have a particularly hard time in adapting to the lifestyle as they have had very limited exposure outside the rural setting.
- In some cases, young girls go into prostitution as a means of income for survival.
- Rural women make small amounts of money from selling milk, and they make decisions on how to use that small income. This income is lost when livestock is lost to drought/flood.
- Due to deaths from continuing conflict and disasters, women head many households. These women are held responsible in the clan-system for their family and often have to pay the price, such as livestock to another clan, for the actions of their households. However, since they are women-headed they do not receive the same money when it is paid out to their own clan.
- Clan-based systems are used to cope with most issues surrounding natural resources and natural disasters. The clan elders meet when there is a problem, but also have regular meetings. Women do not participate in these meetings, and are only involved in making logistical arrangements such as food and accommodation. However, some women are indirectly involved by advising their husbands on topics that are discussed in the meetings.

Youth

Somalia has 73 percent of its population below the age of 30, the highest in the country's history. Many young people are trapped in an environment of violence, fear, unemployment and poverty (UNDP, 2012). This both erodes their hopes for human development and makes them more likely to become part of conflict. Experiences from Somalia and elsewhere show that when large numbers of young people are jobless and have few opportunities for positive engagement, they become a ready pool of recruits for extremists. This is particularly concerning for Somalia where Al Shabaab still poses a real threat to the

stability of the country, particularly in the South. Climate change often leads to increased conflicts and would thus have a particularly severe impact on youth. Some other impacts as identified through consultations with youth groups are presented below:

- Children and youth suffer from malnutrition due to lack of calcium intake when livestock is lost to drought/flood and crops are destroyed due to drought/flood
- Although very few schools are available and education is very limited in Somalia, the children who are enrolled in schools often drop out during times of crisis
- Youth unemployment goes up due to the damage to the economy from droughts and floods
- Unemployed youth are drawn into crime, drugs and other delinquent behavior
- Youth lose hope and vision in life, leading to depression and other psychological disorders
- Marriages are often delayed during droughts and floods, affecting youth
- During migration to urban areas, children often become beggars or street-children
- Youth are often orphaned due to death of parents during drought/flood
- Youth are forced to work in urban areas and drop-out of schools during droughts/floods

3.2.5 Adaptive Capacities and Coping Mechanisms

In order to assess vulnerability, it is important to analyze the ability of people to cope with climate hazards. Not only does this help in understanding vulnerability, it will be an important input into designing adaptation activities that capitalize on existing strengths within communities and institutions.

Livestock

- Early warning of livestock disease outbreak is the key to prevent severity of impact. Herders share information through word of mouth, mobile phones or during clan meetings. Livestock owners used to report the outbreak of livestock disease to the government, but this is no longer practiced.
- When there is no conflict people [used to] use veterinary services provided by the government and private sector. However, the quality of private sector services is often of poor quality with untrained veterinarians and sale of poor quality medicines.
- Herders also self-prescribe medicines based on experience without any veterinary examination.
- Associations of veterinary doctors and livestock exist in the region. This includes BANELPA (Banidu Professional Livestock Association), a local organization.
- Clan support and family support is provided if possible to help each other restock lost animals during times of drought/flood.
- Migration from rural to urban areas takes place as a coping mechanism.
- BANELPA 'Banidu professional livestock association – local organization (acts also as veterinary forum) is being accessed.
- FAO and other International Organizations are also accessed for a range of support services in the livestock sector.

Human Health

- Islamic teaching says people should not move far during outbreaks of disease to prevent it from being spread and this message is spread through religious leaders to prevent widespread outbreaks.
- People go to key organizations such as SCRS and WHO to obtain information on human health outbreaks.
- Information on health issues and epidemics is received through local media.
- People purchase clean water during water-borne disease epidemics.
- Some people boil water during disease outbreaks.

- In rural areas people go to traditional healers (who they trust more than medical practitioners) though success is recognized as non-existent.
- Key organizations working on these issues include: OSPAD, WAANO, SCAC.
- Telecommunications also play a role in sending messages to remote areas and a large segment of the population. Many NGOs and government departments use the telecoms to send messages regarding health messages. However, it is not used for communicating climate hazards or early warnings about droughts, but has the potential to be used for this purpose.

Water

- A small number of villages capture and store rainwater, but this is not done systematically but by digging ditches adhoc and lining them with plastic sheets.
- Small catchment area management takes place, i.e., constructing canals to channel water into farm land.
- Government had invested in the past on water reservoirs that were lined with concrete at the community level. However, most of these are no longer functional.
- Community protects flood prone areas though embankments (using sacks of mud).
- Construction of Gabions using stones and wire meshed to prevent flooding of farms and houses takes place is some flood plain areas. An initiative by ILO was mentioned in this regard in Somaliland.
- Water is taken to drought areas via tankers by the private sector and NGOs
- Business community provides support to drought-affected rural areas (voluntary services by the private sector).
- Community self-help exists through fundraising to assist most affected households due to droughts and floods.
- Help is received from relatives that live in urban areas and have not been affected by drought.
- Donations and remittances from Somali Diaspora are a major source of resilience for communities.
- Government role is largely missing throughout all of federal Somalia when addressing issues related to lack of water availability.
- People move into alternative livelihood choices including trading of '*khat*' or small businesses.
- Religious leaders provide community awareness on droughts.

Agriculture and Food Security

- Some food storage used to take place underground but this practice is not well known and food storage is uncommon now – very low capacity and knowledge of any traditional and modern methods. The western region of Somaliland is engaged in agriculture and there is a practice of storing food for a year whereas, the eastern part of the country is more vulnerable as they are nomadic and do not practice storing food.
- Seeds are provided by Ministry of Agriculture in Somaliland, but no drought-resistant breeds have been introduced according to the agro-pastoralists that were interviewed.

Disasters

- In urban areas, when there is a sudden death in a family or other such disaster, the women of the community come together and hold a ceremony that includes a small feast. During these events charity is collected and given to the affected family.
- In urban areas there is a traditional savings system referred to as '*haagba*', whereby women contribute monthly to a revolving fund. Most Somali women get involved in a '*haagba'* with a particular purpose in mind. If they do not, they often do not take the money when it is their turn and wait until there is a strong need and get a larger disbursement. Common uses of the funds is for

sending children to university, buying land, and buying gold but it is also often used to cope with the impacts of natural disasters.

- Clan-based systems are used to cope with most issues surrounding natural resources and natural disasters. Families move into town to seek out fellow clan members and request help (including financial support) during times of droughts.
- In addition to clan-systems is cooperation within neighborhoods or small settlements, where various clans may reside. This is done on an ad-hoc basis to assist people when they suffer hardship such as a death in the family or loss of livestock.
- The religious leaders and institutions are considered to be the trust worthiest in terms of collection and distribution of charity. For this reason, even government officials rely heavily on them for matters related to relief distribution and charity.
- The religious leaders collect contributions from people in their communities. In one case, this was led by the Minister of Religious Affairs in Somaliland and was particularly successful.
- The religious and traditional leaders are engaged in preaching and outreach to people, particularly regarding the need for community work and cooperation and for wealthy citizens to give back.
- District Officers (Mayors) are approached by communities for help during disasters.
- HADMA – Humanitarian and Disaster Management Authority (Government) are usually engaged
- Women's Associations are involved in helping with financial matters (savings, investments, and donations), human rights and natural disasters.
- Youth Associations are present in each region (funded by members and outside contributions) and these assist people to cope with disasters.

3.3 Relation of NAPA to Somalia's Development Goals

It is important to note that the NAPA consultation process was carried out in the three regions of Federal Somalia, Puntland and Somaliland given the political and administrative disintegration of these three regions. However, given that climate change and environmental issues in general occur over agro-ecological zones and not political boundaries, it is imperative that a unified and holistic plan be developed for the country as a whole, with the needs and priorities of each of the regions taken into consideration.

Although each of the three regions has their own development goals, many of them are similar and overlapping. The plans and policies of each of the regions will be taken into consideration when selecting and designing adaptation measures. The broad absence of (or very weak) governance structures and systems has allowed civil society and the private sector to take on many of the roles of government, particularly in Federal Somalia. Thus, linking the NAPA to existing policies and plans may be limited in nature. However, a number of international NGOs and donor agencies are engaged in policy development, capacity building of government institutions and environmental programming. It is vital that the NAPA is linked with these efforts.

Federal Somalia

Given that the new Federal Government has just come into power, there are not many programs, plans or policies that have been approved at the time of preparing this NAPA, although their development is underway. The newly formed government of Federal Somalia may revisit existing development plans and policies during 2013 to enact responsibilities under the new Ministries.

Multilateral Environmental Agreements

The previous Transitional Federal Government did bring Somalia back into global efforts to address environmental issues. This includes: a) United Nations Framework Convention on Climate Change

(December 2009); b) United Nations Convention on Biodiversity (December 2009); c) Kyoto Protocol (October 2010); d) Cartagena Protocol on Biosafety (October 2010); and, e) Stockholm Convention on Persistent Organic Pollutants (July 2010). The intrinsic nature surrounding issues of climate change, desertification and biodiversity that are all relevant in Somalia means that potential synergies exist between the selected climate change adaptation activities identified in this NAPA, and the conventions to which Somalia is a signatory. The final list of adaptation activities satisfy multiple objectives as required by NAPA and the conventions in that they aim to decelerate land degradation and desertification through reinstatement of the natural resource base; increase biodiversity through strengthening ecosystem and ecosystem services (including forest ecosystems); and ameliorate climate change.

Constitution and Six Pillar Policy

A new provisional constitution has been drafted and adopted by the Government of Federal Somalia (GFS) within which, Article 25 on Environment states that, "*every person has the right to an environment that is not harmful to their health and well-being, and to be protected from pollution and harmful materials; and that every person has the right to have a share of the natural resources of the country, whilst being protected from excessive and damaging exploitation of these natural resources*". In addition, in October 2012, the new President of Somalia released a document entitled the 'Six Pillar Policy' briefly outlining the intentions of how Somalia will be improved under the new government – essentially a set of government objectives that are useful for consideration during NAPA preparation. The document conveys three specific intentions related to the environment, which are as follows:

- Enact laws that preserve and protect the environment;
- Incorporate environmental education in the formal and informal education systems in the country;
- Rectify the environmental damage of the past such as deforestation and cleaning of Somali seas.

After the 2010/11 drought that affected the Horn of Africa and considering the high cost of financing emergency operations through 2011 and 2012 in the Horn, many donors including EU, have moved their focus of attention toward preparedness and resilience. The UNDP has developed a comprehensive national charcoal reduction programme. FAO will be supporting the country's National Biodiversity Strategy and Action Plan (NBSAP), which is expected to start this year. The EU has launched the SHARE Initiative - Support to Horn of Africa Resilience, and the UNEP is planning to undertake the Initial National Communications for Somalia.

Puntland

Puntland region is expected to commence its new 5-year development plan early 2013. The previous 5-year plan was approved in 2007 for the period of 2007-2011 wherein which environmental protection is a major development goal. The policy states it long-term goal to '*Conserve nature and protect the environment for the present and future generations; encourage sustainable environmental and natural resource management for equitable growth and development, poverty reduction, and enhanced livelihoods*.' The first priority is indicated to be the establishment of an environmental institution that will be responsible for the environment. Major areas for intervention were Soil and Water Conservation; Water Resource Development: Land Rights and Rangeland Management; Reduced Deforestation; and Marine Conservation. The development plan had also placed 'Disaster Management for Livelihoods and Security' as a top priority.

Puntland also has a Youth Policy which has the strategic objectives of enhancing environmental knowledge and awareness among young Puntlanders and encouraging the active involvement and leadership by young people in environmental initiatives.

CARE is working in Puntland to strengthen livelihoods through improvements in natural resources. The European Commission (EC), one of the largest contributors on development aid in Somalia, is currently planning projects intended to develop rangeland areas and natural resources as a means of strengthening livelihood opportunities in the Puntland region.

Somaliland

During consultations, the Somaliland government officials emphasized the importance of the National Development Plan (NDP) and the need for the NAPA recommendations to be closely aligned with the goals of the NDP 2012-2016. Somaliland's National Development Plan (NDP) provides a medium term framework for achieving the country's long-term development aspirations as embodied in Somaliland Vision 2030, and the Millennium Development Goals. The plan is built on five main pillars: Economic, Infrastructure, Governance, Social and Environment. Sectoral plans are listed in the policy that will be referred to when selecting and designing the recommendations. Under the Environment Pillar of the plan, the following activities are planned for:

- Substitution of charcoal as the main source of energy with coal, gas, solar and wind
- Enforcement of ban on charcoal exports
- Improvement of rangeland utilization and environmental conservation
- Empowerment of rural communities to look after their environment
- Registration of land and adoption of appropriate land tenure systems,
- Conservation of soil and water
- Reforestation
- Preservation of biological diversity
- Rehabilitation of degraded areas
- Managing new settlements in line with rural and urban land use and environmental protection
- Development of strategies for disaster preparedness and management
- Formulation of appropriate environmental policies
- Building the institutional capacity of Ministry of Environment and Rural Development.

The government of Somaliland established the Policy of Disaster Risk Management in 2008. This policy aims at addressing the increasing incidences and emergency of both slow and rapid on-set disasters, which result into serious human disaster and suffering, destruction of property and infrastructure, disruption of the environment and overall welfare of the society. The policy has four main areas for intervention which include: 1) Preparedness, Prevention and Mitigation; 2) Food Reserve; 3) The Disaster Fund; and 4) Strategic Stockpiles.

3.4 NAPA Vision

The overarching goal of the NAPA is to make the Somali people more resilient to climate change, recognizing their high vulnerability in an economy that is dominated by subsistence agriculture and livestock rearing and undermined by the heterogeneity of clan-based conflicts.

The Somalia NAPA recognizes and addresses the fact that climate change will have wide-ranging impacts within and across multiple sectors and that the knowledge and capacity to respond is lacking.

Development support to Somalia has to ensure that all projects and programmes address climate change issues. The NAPA, as the first of the national level planning documents on climate change adaptation, is an excellent starting point for such integration. Additionally Somalia is a member of IGAD, which should form a strong basis for improved regional co-operation to address issues relating to shared ecosystems and natural resources. This will ultimately provide a functioning means of strengthening regional cooperation. IGADs Climate Prediction Centre (ICPAC) has already been active in supporting the NAPA preparation process through assessing climate data modeled projections.

The completion of the NAPA will enable Somalia to access international funding for climate change projects though the Global Environment Facility. The projects that are determined under the NAPA preparation will be widely communicated and seek to compliment and be integrated into the national and regional (provincial) development plans and policies as they themselves are developed. Given the broad scope and scale of likely NAPA projects, such national level integration is likely to be easily achievable bringing financial support and awareness of climate change impacts into the government through the cross-sectoral implementation of adaptation projects.

3.5 NAPA Objectives

The NAPA is the first national-level document that identifies urgent and immediate climate change adaptation needs of the most vulnerable groups through Somalia. It provides the starting point from which climate change adaptation can be mainstreamed into development plans as a key strategy for attaining sustainable development and poverty reduction (MDG, 2010). The main objectives of the NAPA preparation and implementation are to:

- Develop a NAPA for Somalia following a participatory process to address the most immediate climate related risks.
- To develop and implement immediate and urgent project based activities to adapt to climate change and climate variability
- Build the community awareness on climate change
- Increase monitoring and risk forecasting capacities
- Support the adoption of government policies and strategies to improve resilience to climate risks among vulnerable population groups (including women and children) and economic sectors

3.6 Limitations and Potential Barriers to Implementation

Political Disintegration/Lack of Coordination: Political divisions, particularly the existence of the three distinct regions of Federal Somalia, Puntland and Somaliland make the implementation of national programs challenging. The NAPA is one of the first national level plans to be formulated, and it will be important to develop strategies for cooperation amongst the three regions. Implementation arrangements will most likely be different for the three regions. A lack of strong coordination mechanisms (both at the federal and regional levels) currently exists in order to maximize climate change adaptation gains from the ongoing and planned national initiatives, action plans, policies, programmes and projects.

Conflict: The African Union Mission in Somalia (AMISOM) peacekeeping force remains active in Somalia in its battle against the Islamic clan based insurgent and terrorist group known as *Al Shabaab*. In the last 24 months AMISOM have made many areas in the South and Central regions of Somalia accessible to the international community, allowing peace building and development activities to take place.

Climate Data Limitations: The prolonged civil war in Somalia saw the collapse of the climate monitoring network, hence, little postwar data is available, with mainly pre-war data for the period 1963 to 1990.This

leaves a gap of years with no data, making accurate scientific analysis of climate change in Somalia difficult. Currently, the country lacks the capacity to forecast potential threats of large-scale disasters and has little preparedness to respond and cope with such disastrous events. Furthermore, this lack of data also means that there is not enough information to develop detailed spatial mapping to allow for adequate planning for risk reduction.

Human and Financial Capacity Limitations: As a country that has been plagued by two decades of conflict and is still trying to secure all of its regions, Somalia, is restrained by human and financial capacity, hence its ability to respond and cope with natural disasters and long-term environmental change is very limited. There is concern that inadequate funding both at the national and international levels may limit the level of implementation of all measures identified in the Somalia NAPA.

Policy gaps: Somalia lacks both macro policies as well as regional and/or micro policies for the various socio-economic sectors. Where regional/macro policies are in place, they suffer from important gaps that inhibit effective action toward sustainable development. There is also a lack of regulatory mechanisms for existing legislation and sectoral policy. There is a lack of approved laws and regulations that are directly linked with climate change including environmental land and maritime laws, regulations and codes of conduct.

Infrastructure: Very poor transportation infrastructure may raise the cost of activities significantly, particularly for the most vulnerable areas.

3.7 Identification of Key Adaptation Needs

The identification of key adaptation needs is a crucial element in the overall NAPA process. Such identification enables the establishment of priority adaptation activities against the key vulnerabilities in each sector. This section summarizes how Somalia's immediate adaptation priorities were derived.

3.7.1 The Identification Process

Comprehensive lists of adaption needs/options for each key sector were identified in a series of consultations that were carried out in the three regions of Federal Somalia, Puntland and Somaliland. Participants included Traditional Leaders, Religious Elders, Pastoralists, Agro-pastoralists, Women, Youth, NGOs, Academics, Private Sector, Government Ministries and Departments and Local Government representatives.

Adaptation options were defined in a participatory process whereby groups were formed to first discuss the impacts of the main climate hazards of droughts and floods and then to brainstorm and reach consensus on measures for each sector that respond to these impacts. For each region, the options that were recommended by each stakeholder group were consolidated to make 3 regional lists [Annex 1]. The three regional lists were then combined and consolidated to create one national level list of adaptation measures for each sector.

Consolidated list of selected adaptation measures for Somalia

Sector	Proposed Adaptation Measures
Water	1. Improve access to water supply through provision of piped water supply to urban areas and IDP camps. 2. Improve the quantity of water available through rehabilitation of dams, 'berkeds', boreholes and the construction of new dams, reservoirs, water diversions, livestock watering points and irrigation infrastructure. The selection of sites for these boreholes should take into account livestock concentration in the area and should be accompanied by an Environmental Impact Assessment. 3. Improve water capture and natural storage through improved land management 4. Establish a regulatory framework for water management along with local level management structures and capacities for water resource management. 5. Improve water quality through water treatment plants that should be constructed alongside large-scale water storage projects, low-cost water treatment at the community level and legislation for water pollution control 6. Construction of river embankments, check dams and retaining walls to protect flood-prone areas
Agriculture and Food Security	1. Government support to increase local production and prioritize it over exports through incentives such as small grants, provision of agricultural inputs, strong institutional support and guidance relating to finances, assets and technology and improved extension services. 2. Watershed management through construction of water diversions from streams to farms for irrigation, establishment of boreholes for supply of water for irrigation and support for community-level water capture and storage for agricultural lands. 3. Sustainable land management and reforestation to reduce soil erosion 4. Establishment of an agricultural research institute that employs Somali experts who are familiar with the local context and that focus on the study of hydrology and soils 5. Establishment of an agricultural credit system for farmers along with agricultural cooperatives and associations 6. Diversification of food production appropriate to the natural ecosystem and introduction of high-value drought resistant crops and agro-forestry 7. Improve food security through the construction and maintenance of food storage facilities and seed banks and raising awareness amongst communities, particularly pastoralists on the importance of stockpiling food. 8. Enhance farm-based livelihoods through the improvement of farm-to-market roads, creation of small agro-industries, training in the marketing of farm products and development of markets for agricultural produce 9. Integrated Pest Management to protect crops and reduce risk/increase incentive to farmers

Animal Husbandry, Livestock and Rangelands	1. Land management with emphasis on preventing deforestation, planting new trees, establishing regulations for rotational grazing and protection and supervision of grazing areas. This program should be administered by Ministry of Environment, District Officials and Traditional Elders and Leaders of the communities 2. Provision of veterinary services by the government, ensuring access to remote rural areas and establishing diagnostic labs 3. Support pastoralists in becoming agro-pastoralists or livestock farmers, whereby their livelihoods are diversified. This should include support for the cultivation of fodder crops. 4. Control the export of female livestock due to the negative impacts on the sector 5. Cultivation of drought resistant fodder crops 6. Enhance livestock-based livelihoods through support to small-scale industries (hides, tanning, milk) and training in marketing of animal products (cheeses and yogurt) 7. Provide funding and mechanism for research into animal health 8. Establishment of livestock associations and cooperatives and support to local NGOs working in the sector
Health	1. Improve health status through establishment and/or upgrading of health facilities, particularly for maternal and child health and to address diseases related to malnutrition. Health posts and mobile health teams in rural areas should also be established to ensure access to remote and nomadic populations. 2. Expand community-level nutrition programs 3. Establish early-warning systems for drought and food insecurity 4. Monitoring and treatment of drinking water quality 5. Training of public health workers, particularly those that reside/work in remote areas 6. Launch a public health awareness campaign, targeting rural areas 7. Establish a waste management system 8. Carry out regular vaccination campaigns 9. Develop and enforce regulations on pharmaceutical industries for quality assurance and safety 10. Establish well-equipped referral hospitals in major towns and regions 11. Re-training of doctors and nurses that are in the system to deal with climate related health problems
Coastal and Marine Resources	1. Immediate ceasing of illegal fishing and dumping of all wastes at sea through development and implementation of a legal framework, policy, and the establishment of a coastguard 2. Research into diseases caused by toxic wastes that are known to have been dumped off the Somali coast 3. Awareness raising on the importance of marine resources, protection of coastal resources and pollution prevention. 4. Develop the fishing sector through government support in coastal cold-storage and modern fish processing 5. Prevent the construction of housing and other infrastructure near the coast 6. Mangrove plantation and awareness raising on protection of coastal resources 7. Relocation of vulnerable coastal communities and provide necessary tools and skills for alternate livelihoods 8. Research on biodiversity in coastal waters with the objective to improve fisheries and establish a framework for fishing that takes into account fish populations and sustainable fishing

Biodiversity (forests, freshwater aquatic, marine and invasive alien species)	1. Protection of forests through charcoal reduction by developing alternative energy plan, encouraging the use of fuel-efficient cooking stoves, supporting alternative livelihoods and banning exports of charcoal. 2. Large-scale tree-planting program which includes the panting of high-value productive trees 3. Construction of check-dams to reduce flooding and destruction of trees 4. Protection of forests through legal frameworks and enforcement by the employment of rangers 5. Widespread awareness campaign on the impacts resulting from the destruction of forests and other natural resources 6. Protection of biodiversity and wildlife through policy measures, particularly focusing on endangered species 7. Establish a research center that studies flora and fauna to understand the advantages and disadvantages of certain species and their impacts on land and water resources, and to further examine sustainable forestry, agriculture and fire management
Natural Disasters	1. Establishment of a National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness plans. 2. Enhanced coordination and information-sharing between relevant ministries and stakeholders 3. Community mobilization and development to enhance ownership by communities of local development problems as they related to climate events so that they become more active participants in developing solutions. This should also include a national level community-based disaster management program. 4. Installation of agro-meteorological stations 5. Utilize local knowledge on forecasting, weather information and agriculture to inform planning and initiatives 6. Create a fund for disasters to be administered by the Ministry of Interior and Local Government

Table 10: Consolidated list of adaptation measures for Somalia

3.7.2 Criteria for Ranking at Country Level

In each of the three regions, group-wide decision with government stakeholders on criteria selection and weighting took place during the consultations. The State-actor groups were provided with a list of different criteria that are generally recommended for use in the NAPA process and they were carefully explained. All of the groups were in agreement that the four UNFCCC recommended criteria were sufficient. However, when discussing weighting the importance of the four criteria, there was a slight variation between Puntland and Somaliland.

However, the major conclusion was that two of the criteria were more important than the others. Taking both discussions into consideration, the following criteria were used for ranking adaptation measures.

Criteria	Weight (%)
1. Addresses urgent and immediate climate change needs	30
2. Contributes to poverty reduction	30

3. Cost-effectiveness	20
4. Linked to government plans and priorities	20

Table 11: Weighted Prioritization Criteria

3.7.3 Ranking of Adaptation Measures

The ranking exercises were undertaken by the GFS NAPA team in collaboration with the technical experts who carried out the NAPA consultative workshops. Ranking is based on knowledge of the Somalia climate change context, review of government policies, review of existing work on vulnerabilities and the feedback and discussions carried out during the stakeholder consultations. The 58 consolidated activities were given scores against each of the four criteria and the appropriate weightings were applied, and can be seen in Annex 2. The scores for each of the four criteria as follows:

	Ranking				
Criteria	**1**	**2**	**3**	**4**	**5**
Addresses urgent and immediate CC needs	Does not address an urgent CC need	Addresses non-urgent CC needs	Addresses some urgent and some less urgent CC needs	Addresses some urgent CC needs	Addresses the most urgent CC needs
Contributes to poverty reduction	Does not contribute to poverty reduction	Indirectly contributes to poverty reduction	Directly contributes to poverty reduction for a small population	Directly contributes to poverty reduction for a large population	Key intervention for poverty reduction for the majority of Somalia
Linked to government plans and priorities	Does not align with government plans	Indirectly linked to government plans	Aligned with government plans that are not yet implemented	Aligned with existing government programs and policies	A key priority of the government
Cost-effectiveness	Cost-prohibitive	High cost with incremental benefits	Medium cost with medium benefits	Medium cost with large benefits	Low cost with large benefits

Table 12: Description of scores for each criterion

After applying the appropriate score to each criteria and applying the formula with the correct weights, the following list of top 5 measures were selected, regardless of sector:

1. Land management with emphasis on preventing deforestation, planting new trees, improving rangelands and ecological zones, establishing regulations for rotational grazing and protection and supervision of grazing areas.
2. Increase the quantity of water available through rehabilitation of dams, 'berkeds', boreholes and the construction of new dams, reservoirs, water diversions, livestock watering points and irrigation infrastructure. The selection of sites for these boreholes should take into account livestock concentration in the area and should be accompanied by an Environmental Impact Assessment.

3. Strengthen the National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness plans.
4. Protection of forests through charcoal reduction by developing alternative energy plan, encouraging the use of fuel-efficient cooking stoves, supporting alternative livelihoods and banning exports of charcoal.
5. Construction of river embankments, check dams and retaining walls to protect flood-prone areas

3.7.4 Priority Adaptation Activities

Using the ranked activities above, three projects that take a programmatic, and cross- sectoral approach were developed through consolidation. Activities that were not ranked in the top 5 but which fit well into the three programmatic areas are also added to ensure that the programs are comprehensive and target the vulnerabilities identified during the consultations.

	Program Area	Activities
1	**Sustainable Land Management**	• Development of a national regional policies for the protection of forests, ecosystems and biodiversity • Protection of forests through the hiring of community-based rangers • Awareness raising on environment, focusing on ecosystem and their services and promotion of alternative fuel/energy sources • Development and enforcement of land-use plans for each district • Improve rangeland management and develop and enforce a system for rotational grazing • Large-scale afforestation campaign including the distribution of seedlings to vulnerable communities • Curbing charcoal production by banning exports, developing alternative energy plan, supporting the manufacture and use of fuel-efficient stoves and supporting alternative livelihood options for charcoal producers
2	**Watershed Management and Development**	• Construction of medium to large-scale infrastructure including dams, diversions for irrigation, livestock watering points and boreholes. All new projects to be accompanied by an Environmental Impact Assessment • Construction and rehabilitation of community level infrastructure including berkeds, shallow wells, ponds and other appropriate technologies, ensuring that a mechanism for maintenance of the schemes is in place • Construction of embankments/gabions and check-dams to protect flood-prone areas
3	**Disaster Management**	• Strengthen the National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness plans. • Setting up of an emergency relief fund • Construction of storage facilities for food and fodder, including stockpiles of emergency relief items.

Table 13: Selected Programmes for Adaptation

3.8 NAPA Implementation

This NAPA, which aims to reduce the vulnerability of Somalia to the consequences of climate change in the sectors described above, will be implemented through three crosscutting strategic approaches:

- Capacity development and institutional strengthening for stakeholders in matters related to adaptation to climate change and climate variability
- The demonstration of new ideas and techniques through field based interventions, that improve the resilience of the population and ecosystems
- Information, education and communication campaigns for stakeholders on the risks due to climate change and climate variability

This crosscutting approach has allowed the very large number of project ideas that emerged from the district and local consultations to be rationalized without losing the main priorities emerging from these consultations. It is clearly intended that each sectoral programme area emerging from the NAPA process will include these three types of activities.

3.9 Outcome Recommendations for Somalia NAPA

The purpose of NAPA is to address the country's urgent and immediate adaptation needs. In preparing the NAPA for Somalia it was evident from the extensive consultations that have taken place with many different groups in society, and across government sectors, that the Somali people are already significantly impacted by climatic variability. The social and economic impacts that drought and flash flooding events, among others, are having on the country appear far reaching and have already resulted in significant loss of lives and livelihoods, and economic losses, and serve only to exacerbate issues of migration, conflict and access to natural resources. By addressing climate change and helping people to adapt to climate variability the priority programme areas identified in this NAPA are intended to help provide the base from which all other development and peace building endeavors can contribute and build upon. As a cross cutting issue affecting all sectors and all people in Somalia, the Federal Government of Somalia recognizes the importance in programme activities that are national in their scope and scale, and importantly, are used as a tool to mitigate conflict and build peace throughout the country. Notably, adaptation activities that are approached at an ecosystem based level have the advantage of not being constrained by political or administrative boundaries.

Government authorities, regional and international institutions will be required to deliver coordinated and comprehensive support towards implementing NAPA activities for the benefit of all Somalis. Strengthening technical, institutional and human resource capacity is an integral component of all of the selected priority adaptation activities and should be comprehensively addressed at the national, regional, district and community levels. In view of this the following three programme areas outline the rationale and recommended outcome activities for the priority NAPA adaptation measures for Somalia.

Programme Area 1: Sustainable Land Management to Build Resilient Rural Livelihoods and Enable National Food Security

Rationale:

Around 65% of the Somali population are rural and engaged in pastoralism, agro-pastoralism, subsistence agriculture, and charcoal production, as livelihood options. All of these livelihoods are heavily reliant on - and severely deplete in the case of charcoal - the natural resource base and provision of ecosystem services. The sustainability of ecosystems to support pastoralist and agricultural livelihoods, are under threat from a combination of loss of vegetation and grazing land, deforestation due to charcoal production, loss of soil fertility, poor cultivation practices of productive land, insufficient dry season water supply, lack of alternative livelihoods, lack of alternative energy sources others than charcoal, physical access constraints, conflict over natural resources , land tenure disputes, underinvestment in supporting activities such as effective grazing management and livestock production systems, and a lack of agricultural extension services.

The NAPA consultations underlined the vulnerability of Somalia's traditional rural livelihoods systems to increasing climatic variability, particularly pastoralist activities across all of the country and agriculture activities in the south of the country. Concerns were raised over increases in the occurrence and severity of natural disasters, including extended drought events and flash flooding. Too little water is captured and stored during the wet season for use in the dry season.

With existing pastoralist and farming systems and methods already under threat from poor land management, it was universally felt that existing climatic variability combined with longer term impacts of climate change would inevitably undermine the entire sector and result in increased rural to urban migration, increased conflict over natural resources and the continued loss of lives and livelihoods. For these reasons the need for comprehensive measures to reduce vulnerabilities of pastoralists to climatic variability while simultaneously increasing investment into sustainable agriculture and farming practices - both clearly linked by the provision of a strong natural resource base and ecosystem services with a sustainable land management approach- was ranked 1 in the list of NAPA priorities.

Recommendations:

Policy and Planning

- Engage climate vulnerable pastoralists and farmers and other key stakeholders (i.e. clan elders) in the formulation of local and district development plans.
- Introduce integrated rangeland management, reforestation, agro-forestry and waters resources management planning principles to district and community stakeholders.
- Strengthen national and sub national capacity to engage with community and integrate climate risk analysis into community level development planning processes.

Physical Investment and Demonstration

- Rehabilitation and reinstatement of degraded ecosystems, in particular rangelands and forests, to provide sustainable grazing areas and fuel wood sources, and ecological protection to agricultural areas
- Demonstrate, through localized interventions, sustainable land management measures (reduce erosion, increase soil fertility, reduce crop losses, reduce burning) to increase resilience to climate risks.
- Demonstrate models to diversify rural household income, including agro-forestry based livelihoods models, rangeland and wildlife protection schemes, and investment into production of sustainable household energy tools.

Awareness and Information Sharing

- Community based (with a focus on pastoralists and farmers) education and awareness measures on climate risks, rangeland management and food production.
- Provision of seasonal early warning system (easily accessible and understandable) and forecasting for pastoral livelihood security and farmers food security.

Programme Area 2: ***Integrated Water Resources Management to Ensure Water Access is provided to Vulnerable Populations and Sectors***

Rationale:

As set out in section 2 of the Somalia NAPA document, climate change could result in a slight increase in the amount of rain received each year. However, the variability of rainfall patterns is also set to increase from an existing very high variable range. Because of this high variability in rainfall patterns, it is not clear how seasonal rainfall (both wet and dry seasons alike) will change. El Nino events, which results in delayed onset of rainfall and less rainfall at certain times of the year, may also become more frequent and severe in effect. This may have far reaching implications on the incidents of drought, floods and water quality within the context of a sector, which in Somalia, remains largely under-developed. Progressive climate change is also likely to affect the yield of ground water and shallow water reservoirs, from year to year. In coastal areas sea level rise is likely to increasingly affect groundwater through coastal erosion, surface inundation and seawater intrusion into coastal aquifers.

In relation to water resources management and protection, the NAPA consultations revealed a number of specific concerns, notably the inability to capture and contain rainfall - particularly intense rainfall events that lead to flash flooding creating damage to land, gullying, soil erosion and loss of soil fertility, existing water supply schemes and damage to infrastructure. This trend is combined with frequent and persistent water scarcity events across the whole of the country resulting from delays in rainfall onset and an extension in the dry season, sometimes lasting for many months. Consequently, the need for the protection of water resources through integrated and strategic approaches was ranked second in the list of NAPA priorities.

Priority adaptation measures that emerged from the consultation included the need for protection of critical water resources through the construction of medium to large-scale water storage infrastructure (e.g. reservoirs) including diversions for irrigation, livestock watering points and boreholes. Also community level infrastructure including berkeds, shallow wells, and ponds were prioritized. Water resources protection, harvesting and storage is needed during extreme events to reduce vulnerability during dry season water shortages.

Recommendations:

Policy and Planning

- National and regional water resources management policies and plans.
- Climate risk and vulnerability assessments with a specific focus on drought prone areas.
- Groundwater and surface water resource data collection and monitoring

Institutional Development

- Establishment of a government-led participatory mechanism for water sector coordination based on IWRM principles, with a specific focus on supporting the livestock and agricultural sectors.
- Capacity development in climate induced impacts on water resources for policy makers and planners at national and district level

Physical Investment and Demonstration

- Construction of water capture and storage reservoirs and equitable distribution systems appropriate to the needs of the population and economic sectors.
- Construction and rehabilitation of community level infrastructure including berkeds, shallow wells, ponds and other appropriate technologies, ensuring that a mechanism for maintenance of the schemes is in place
- Construction of embankments/gabions and check-dams to protect flood-prone areas
- Physical protection of critical water resources (rivers, springs, wells, groundwater) to ensure provision of safe water supply during climate change extreme events.

Project Profile 3: ***Reducing Risks among Vulnerable Populations from Natural Disasters***

Rationale:

The NAPA process has highlighted significant concerns that natural disasters (in particular severe drought events and flash flooding) already constitute a development risk that are becoming more frequent, widespread and intense across the country, with the potential to cause significant further loss of livelihoods and lives. Some 14 major drought events have been recorded in the last 50 years adversely affecting over 6 million people. Specific issues raised during consultations include the potential for increases in injury and death as a result of drought, increase in incidence of conflict over diminishing natural resources such as water and grazing land, significant migration and displacement of people, and loss of primary assets such as livestock.

To address the risks faced by vulnerable populations during natural disasters, a climate risk management approach needs to be put in place that focuses not just on recovery and response measures, but also at prevention measures though improved management of natural resources such as water, forests, grazing pasture and land. Specific measures are required to development and implement an early warning system and put in place a combination of planning engineering and design measures to reduce risk. This broader 'preventative' as well as responsive DRR approach will require strengthening national disaster management authority so that is also able to coordinate and direct cross-sectotal ministries and institutions to deliver joint planning activities. This approach both reinforces and adds value to the project outputs of NAPA project profiles 1 and 2 for Somalia.

Recommendations:

Policy and Planning

- Strengthen the National Disaster Risk Management Authority with a preventive as well as responsive remit
- Integrate the National Disaster Risk Management Policy principles into key GFS sectoral policies with a specific focus on climate risks
- Awareness raising for senior officials and policy makers in key sectors for linkages between disaster risk management and climate related risks
- Develop government strategies in responding to drought and flash flood events

Climate Risk Planning and Management

- Data collection and analysis on incidence of key climate related disaster events (droughts, floods, dusts storms, strong winds).
- Institutional establishment of national early warning system with a focus on climate related risks in areas of high vulnerability.
- Community level mapping of high vulnerability areas to risks of drought and flooding, dusts storms and strong winds, and integration into local disaster risk management plans and responses.

Investment and Demonstration

- Identification, field demonstration and appraisal of targeted climate risk reduction measures including, inter alia: improved land and water management practices; livelihoods protection; improved settlement construction and physical infrastructure.
- Training programme for national, district, and community level professionals to support strengthened planning competencies for climate risk reduction.

Institutional Development

- Promote National Disaster Management Authority (NDMA)-led coordination and information sharing and disaster risk management and climate risk reduction with key ministries and at a district level, including early warning response.
- Build capacity at district level to enable building of community level awareness, disaster preparedness and response capacity.
- Establish relations with regional institutions to promote information exchange and joint action at national and district levels in Somalia.

4.0 NAPA Formulation Process

The NAPA formulation process was based on the annotated guidelines for the preparation of NAPA (UNFCCC, 2002) and adjusted according to the context. The steps taken included:

- Build the NAPA team and the multi-disciplinary team
- Synthesize available information including past assessments, strategies, and consultations,
- Carry out participatory, rapid assessment of vulnerability and potential increases in climate hazards and risks and identify potential adaptation activities with ranking criteria for prioritization
- GFS-NAPA team to carry out ranking exercise communicate findings for validation
- Develop project profiles and submit NAPA to UNFCCC

4.1 Guiding Principles

Multidisciplinary Approach: The involvement of a number of sectors of the Government and various other stakeholders ensured the participation and ownership of the entire NAPA process including the vulnerability and adaptation assessment process, as well as the selection, prioritization and ranking of the projects and adaptation activities.

Participatory Approach: The three regional consultations with various representations from the government, including informal government authorities and governors, civil society organizations, private sector and academia encouraged and provided opportunity for all levels to voice their local knowledge and to promote a mutual learning process between grassroots communities, NGOs, tiers of government and the national NAPA team with regard to climate change.

Complementary Approach: The information used to develop the NAPA is based on available national priorities, programmes and policies of Somalia. The process compliments both national and international documents such as the National Development Plans for Somaliland and Puntland, and the 6-pillar policy of the newly formed Federal Government as well as work of NGOs taking place across the country.

Sustainable Development: The mainstreaming of the NAPA into national priorities, programmes and policies that support sustainable development goals has been considered in the process.

Gender Equality: Throughout the Somalia NAPA process, the active participation of women, youth and representatives of communities and marginalized groups was pursued.

Country Driven Approach: This was achieved through three regional consultations and the establishment of a multidisciplinary integrated team (Working Groups) from across government and civil society, thereby encouraging a wide stakeholder view and participation.

Cost Effectiveness: The development of project profiles took into account ongoing government programmes and the need to integrate climate risk issues into these programmes in order to ensure promotion of sustainable development principles leading to not only more immediate cost effectiveness but also securing longer term development benefits.

Conflict Prevention and Peace building: The adaptation activities and the final programmatic areas of focus for the NAPA are intended to mitigate conflict, particularly over natural resources such as water and grazing land. Project design will focus on reinstating and maintaining healthy functioning and

appropriately governed ecosystems and ecological zones, as opposed to political and administrative boundaries, to help build peace and avoid conflict over natural resources.

4.2 The NAPA Team and Multidisciplinary Climate Change Working Groups

A NAPA Project Management Team (PMT) was established. At the start of NAPA preparation, during the period of the Transitional Federal Government, the PMT was under the Directorship of the Ministry of Fisheries and Environment. Following the inauguration of the newly elected Federal Government of Somalia in late 2012, the PMT for NAPA fell under the new government structure and new NAPA focal points were established to lead the NAPA process under the Ministry of National Resources. The NAPA Political Focal Point is the Minister of National Resources and the NAPA Operational Focal Point is the special advisor to the Minister. The Ministry of National Resources oversees four key sectoral areas including: agriculture and livestock; fisheries and marine resources; water; and environment and wildlife. UNDP provided technical advice to the PMT and on the ground logistical and operational support to the NAPA focal points and climate change working groups. This support included a NAPA technical advisor, a vulnerability assessor, in addition to several national field officers.

Multidisciplinary climate change working groups (CCWG) were also established at a national level for Federal Somalia and at a regional level for Puntland and Somalialnd. The regional CCWGs were chaired and co-chaired by the Ministry of Planning and Ministry of Environment respectively and comprised of key stakeholders across government, and a range of non-state actors from civil society, academia and NGOS. The CCWGs were the modality for the identification and review of regional and local level information relevant to the environment. CCWGs in Somalialnd and Puntland assisted in coordinating, planning, and organizing stakeholder consultations at the regional level; while the Federal Government of Somalia (FGS) CCWG, under the directorship of the NAPA political and operational focal points, coordinated consultations in the capital Mogadishu and guided national level activities and decisions throughout the NAPA preparation.

4.3 Process of Consultation

The approach used for the three regional consultations drew from a number of existing approaches including the UNDP's Adaptation Policy Framework (APF), Care International's Climate Vulnerability and Capacity Analysis (CVCA), IUCN's Framework for Social Adaptation to Climate Change, CIDA's Community Vulnerability and Adaptation Assessment and Action and the NAPA guidance notes issued by the UNFCCC.

The UNFCCC definition of vulnerability as a function of exposure, sensitivity and adaptive capacity was used to frame the analysis, and the tools developed for understanding these three aspects draw from vulnerability-based, hazards-based and livelihood-based methods of analysis. The three aspects were explored and analyzed using a sectoral perspective as well as stakeholder perspective. The sectors include: a) Water Resources; b) Agriculture and Food Security; c) Animal Husbandry, Grazing and Rangelands; d) Health; e) Marine and Coastal Resources; f) Infrastructure; h) Forests; and, i) Natural Disasters. The groups consulted included: a) State Actors; b) Traditional and Religious Elders; c) Agro-pastoralists; d) Youth; e) Women; f) NGOs; g) Academics; h) Informal Governing Institutions and Authorities; and, i) Private Sector. The list of participants from each consultation is provided in Annex 3.

Consultative workshops were held in Federal Somalia, Puntland and Somaliland respectively. The table below summarized the schedule and stakeholders that were consulted.

Location	Date	Time	Stakeholder Group	No of Participants

Mogadishu, Federal Somalia, United Nations Common Compound (UNCC)	11.12.2012	08:00 – 11:30	Traditional Leaders, Religious Elders, Women, Youth, NGOs, Academics and Private Sector	30
		13:30 – 15:00		
	12.12.2012	08:00 – 14:00	Ministries, Governing Institutions and State Authorities	20
Garowe, Puntland, PUNSAA Office	17.12.2012	08:00 – 10:30	Traditional Elders and Religious Leaders	12
		11:00 – 13:30	Pastoralists and Agro-Pastoralists	12
	18.12.2012	08:00 – 10:30	Women and Youth	12
		11:00 – 13:30	NGOs, Academia, Private Sector	14
	19.12.2012	08:00 – 13:00	Governing Institutions including local government representatives	18
Hargeisa, Somaliland, Maansoor Hotel	07.01.13	08:00 – 10:30	Religious Leaders and Traditional Elders	16
		11:00 – 13:00	Pastoralists and Agro-Pastoralists	8
	08.01.13	08:00 – 10:30	Women	15
		11:00 – 13:00	NGOs	4
	09.01.13	08:00 – 13:00	Ministries, Governing Institutions, Regional Governors	34

Table 14: Details of the Consultation Meetings

Focus Group Discussions, Historical Timelines, Seasonal Timelines, Group Work and Presentations were the tools used to carry out the consultations. Deviations from the planned methodology were minor and included:

- Consultation in Mogadishu had to be carried out in two days rather than three due to constraints in arranging meetings and security considerations
- Youth groups, private sector and academia in Somaliland were invited but did not attend the meetings

The main activities that were carried out with each group are summarized in the table below:

Stakeholder Group	Activity	Objective
Religious Elders and Traditional Leaders	Historical Mapping	To understand past hazards, changes in their nature, intensity and behavior.
	Hazard Impact Assessment	To understand the impacts of hazards on communities, women and youth.
	Focus Group Discussion	To understand coping strategies employed to mitigate or manage risks
	Group Work and Presentations	To generate a list of projects that are need responsive and appropriate

Pastoralists and Agro-pastoralists	Seasonal Timeline	To identify periods of stress, hazards, diseases, hunger, debt, vulnerability, etc. and changes in seasonal patterns over the past decades
	Hazard Impact Assessment	To determine the climate hazards that have the most serious impact on important livelihoods resources and list their impacts
	Focus Group Discussion	To understand coping strategies employed to mitigate or manage risks
	Group Work and Presentations	To generate a list of projects that are need responsive and appropriate
Women and Youth Groups	Discussion	To identify periods of stress, hazards, diseases, hunger, debt, vulnerability that particularly affect women and youth and to understand the role of women and youth in the management of natural resources
	Hazard Impact Assessment	To determine the hazards that have the most serious impact on women and youth
	Focus Group Discussion	To understand coping strategies employed to mitigate or manage risks and the perceptions in terms of trust and responsiveness of government, or other forms of governance.
	Group Work and Presentations	To generate a list of projects that are need responsive and appropriate
NGOs, Academia and Private Sector	Discussion	To understand the work of NGOs and potential linkages to climate change adaptation work
	Discussion	To understand the role of educational institutes in climate change adaptation/environmental awareness
	Discussion	To gain insights on how private sector is affected by climate change
	Group Work	To develop a list of adaptation options
Government	Hazard Impact Assessment	To understand how the work of each government department is affected and the sectoral vulnerabilities to climate change
	Discussion	To discuss existing or planned for policies and programs and to find synergies between these and the NAPA
	Group work	To generate a list of adaptation options
	Discussion	To develop criteria, with weighting for prioritizing adaptation activities

Table 15: Activities carried out for the Vulnerability and Needs Assessment

4.4 Process of Validation

Communication and validation of the findings of the NAPA was undertaken at a validation workshop organized by the Government of Federal Somalia - Ministry of National Resources in Mogadishu on 18th March 2013, with state and non-state actors and international agencies in attendance. At this meeting the GFS communicated their three selected priority adaptation areas. The Minister of National Resources delivered an opening statement for the meeting congratulating all participants on the consultative and country-led process that has been undertaken for the NAPA preparation and committing the full support of his Ministry towards implementing the priority three NAPA areas. The government also delivered a detailed presentation on the findings of the NAPA and chaired a discussion and comment session that followed. The list of participants that attended the NAPA validation meeting is found in Annex 4 (Table 22).

NAPA National Validation Meeting: (left) H.E. Abdirisak Omar Mohamed, Minister of National Resources; (center) Mr. David Clapp, Country Director UNDP Somalia; and (right) Mr. Burham Elmi Hersi, Deputy Minister of Environment, Puntland Region.

4.5 Monitoring and Evaluation

At the initial stage of the project, the project monitoring and evaluation system, composed of the following components was developed:

a) Monitoring plan, with defined benchmarks, indicators and targets, based on results and resources framework developed by the PM/coordinator in consultation with relevant UNDP programme staff;
b) Risk, issues and quality logs created by the PM and relevant program officer;
c) Quarterly project planning (with detailed activities and budget) and reporting conducted by the PMU;
d) Quarterly project reporting and monitoring, conducted by the PMU and the Project Board (also to include risk and issues monitoring and development of lessons learned reports);
e) Annual project planning (with general activities and budget) and reporting conducted by the PMU;
f) Annual project review conducted by the Executive Board on the basis of monitoring reports and products prepared by the project

All main reports are compiled by the PMU and endorsed by the Project Board. Regular financial reports were submitted to UNDP according to the UNDP financial rules and regulations.

4.6 The Government Endorsement Process

The NAPA team conducted a final workshop with the Federal Government of Somalia, Ministry of Environment, in order to allow final comments to be incorporated following the NAPA validation meeting. The final NAPA document will be submitted to the Minister of National Resources who is the Political Focal Point for the NAPA for approval prior to submission to UNFCCC.

4.7 Implementation Strategy

In line with the annotated guidelines for the preparation of the NAPA, as well as a country driven approach towards the implementation of the proposed project profiles, it is envisaged that following endorsement of the document by the Minister of National Resources, the Federal Government of Somalia will begin to prepare project profiles for submission to the LDCF and other donors. The Ministry for National Resources will take the lead on coordinating identification of key activities for funding from each available source of funds. At this point the potential consolidation of different related priorities will be considered. Specifically the following steps will be taken:

- Launch the NAPA and its priorities nationally through an outreach programme to be supported under the UNDP implemented NAPA project.
- Hold follow up discussions with potential international development partners including Norway, Sweden, Japan, UN system, Global Environment Facility, EU and the Multilateral Development Banks on funding and implementation opportunities.
- For each of the project areas, develop more detailed project proposals once a suitable source of funding has been identified, based on the priority profiles presented in the NAPA document. These project proposals will establish the specific technical and geographical scope and content in each area, necessary institutional and management arrangements, monitoring and evaluation requirements, and key partnerships to ensure successful achievement of project outcomes.
- Ensure that each project proposal is grounded in an understanding of community based concerns and will deliver visible impacts at this level. Strengthening sub-national level planning capacity to address climate risks will also need to be a visible component in each case.
- Strengthen the existing climate change working group to provide continuing oversight for NAPA implementation linked to national plans and priorities.
- Continue to use the NAPA document, process and structure as the country's principle framework for adaptation needs to climate-related risks over the medium term.

Annexes

Annex 1: References and Information

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Annex 2: Region-wide Adaptation Measures

Table 16: Adaptation Options for Federal Somalia

Sector	Adaptation Needs
Water	1. Improve access to water supply through provision of piped water supply to urban areas and support to communities for shallow wells in rural areas. 2. Improve the quantity of water available through rehabilitation of dams, 'berkeds', boreholes and the construction of new dams and reservoirs 3. Improve water capture and natural storage through improved land management 4. Establish local level management structures and capacities for water resource management. 5. Improve water quality through water treatment plants that should be constructed alongside large-scale water storage projects, low-cost water treatment at the community level and legislation for water pollution control 6. Construction of watering points for livestock 7. Construction of river embankments and retaining walls to protect flood-prone areas along the Juba and Shabelle
Agriculture and Food Security	8. Government support to increase local production and prioritize it over exports through incentives such as small grants, provision of agricultural inputs, strong institutional support and guidance relating to finances, assets and technology and improved extension services. 9. Sustainable land management and reforestation to reduce soil erosion 10. Establishment of an agricultural research institute that employs Somali experts who are familiar with the local context. 11. Establishment of an agricultural credit system for farmers 12. Establishment of agricultural cooperatives and associations 13. Diversification of food production appropriate to the natural ecosystem 14. Improve food security through the construction and maintenance of food storage facilities and seed banks 15. Enhance farm-based livelihoods through the improvement of farm-to-market roads, creation of small agro-industries and development of markets for agricultural produce 16. Integrated Pest Management to protect crops and reduce risk/increase incentive to farmers
Animal Husbandry, Livestock and Rangelands	17. Land management with emphasis on reforestation, establishing regulations for rotational grazing and protection and supervision of grazing areas 18. Provision of veterinary services by the government, ensuring access to remote rural areas and establishing diagnostic labs 19. Support pastoralists in becoming agro-pastoralists, whereby their livelihoods are diversified and are not over-reliant on livestock 20. Control the export of female livestock due to the negative impacts on the sector 21. Cultivation of drought resistant fodder crops 22. Enhance livestock-based livelihoods through support to small-scale industries (hides, tanning, milk) and training in

	marketing of animal products (cheeses and yogurt) 23. Provide funding and mechanism for research into animal health 24. Establishment of livestock associations and cooperatives
Health	25. Improve health status through establishment and/or upgrading of health facilities, particularly for maternal and child health and to address diseases related to malnutrition 26. Expand community-level nutrition programs 27. Establish early-warning systems for drought and food insecurity 28. Monitoring and treatment of drinking water quality 29. Training of public health workers, particularly those that reside/work in remote areas 30. Launch a public health awareness campaign, targeting rural areas 31. Establish a waste management system 32. Carry out regular vaccination campaigns 33. Develop and enforce regulations on pharmaceutical industries for quality assurance and safety
Coastal and Marine Resources	34. Immediate ceasing of illegal fishing and dumping of all wastes at sea through development and implementation of a legal framework, policy, and the establishment of a coastguard 35. Research into diseases caused by toxic wastes that are known to have been dumped off the Somali coast 36. Develop the fishing sector through government support in coastal cold-storage and modern fish processing 37. Prevent the construction of housing and other infrastructure near the coast 38. Mangrove plantation and awareness raising on protection of coastal resources 39. Relocation of vulnerable coastal communities and provide necessary tools and skills for alternate livelihoods
Biodiversity (forests, freshwater aquatic, marine and invasive alien species)	40. Protection of forests through charcoal reduction by developing alternative energy plan, encouraging the use of fuel-efficient cooking stoves, supporting alternative livelihoods and banning exports of charcoal. 41. Large-scale tree-planting program which includes the panting of high-value productive trees 42. Protection of forests through legal frameworks and enforcement by the employment of rangers 43. Widespread awareness campaign on the impacts resulting from the destruction of forests and other natural resources 44. Protection of biodiversity and wildlife through policy measures 45. Establish a research center that studies flora and fauna to understand the advantages and disadvantages of certain species and their impacts on land and water resources, and to further examine sustainable forestry, agriculture and fire management
Natural Disasters	46. Establishment of a National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness plans. 47. Enhanced coordination and information-sharing between relevant ministries and stakeholders 48. Community mobilization and development to enhance ownership by communities of local development problems as they related to climate events so that they become more active participants in developing solutions. This should also include a national level community-based disaster management program. 49. Installation of agro-meteorological stations

Table 17: Adaptation Options for Puntland

Sector	Adaptation Needs
Water	1. Improve access to water supply through provision of piped water supply to urban areas and IDP camps. 2. Improve the quantity of water available through rehabilitation of dams, 'berkeds', boreholes and the construction of new large-scale dams and reservoirs after doing a thorough assessment to determine the most appropriate location, and small community based water reservoirs 3. Construction of check-dams to reduce erosion and gullying in the channel, prevent flooding and increase soil fertility through infiltration. 4. Construction of canals and water diversion structure for irrigation purposes
Agriculture and Food Security	5. Government support to farmers by designating lands for farming, provision of farm inputs, machinery, technology, small grants, training and support to women given their large role in agriculture 6. Support for community-level water capture and storage for agricultural lands 7. Establishment of an agricultural research institute that employs Somali experts who are familiar with the local context and that focus on the study of hydrology and soils 8. Improve food security through the construction and maintenance of food storage facilities and seed banks
Animal Husbandry, Livestock and Rangelands Sector	9. Land management with emphasis on preventing deforestation, planting new trees, establishing regulations for rotational grazing and protection and supervision of grazing areas. This program should be administered by Ministry of Environment, District Officials and Traditional Elders and Leaders of the communities 10. Encourage pastoralists to shift to livestock farming to reduce their vulnerability, including the cultivation of fodder crops 11. Provision of veterinary services by the government, ensuring access to remote rural areas and ensuring availability of drugs 12. Establishment of livestock associations, cooperatives and support to local NGOs working in this sector
Health	13. Improve health status through establishment and/or upgrading of health facilities, particularly for maternal and child health and to address diseases related to malnutrition 14. Re-training of doctors and nurses that are in the system to deal with climate related health problems 15. Develop a health preparedness plan for disasters 16. Provision of safe water and sanitation 17. Launch a public health awareness campaign, targeting rural areas and using media 18. Develop and enforce regulations on pharmaceutical industries for quality assurance and safety
Coastal and Marine Resources	19. Immediate ceasing of illegal fishing through introduction of permitting for fishing, development and implementation of a legal framework, policy, and the establishment of a coastguard and separate government institution for coastal resource management

	20. Develop the fishing sector through government support in coastal cold-storage and modern fish processing 21. Awareness raising on the importance of marine resources, protection of coastal resources and pollution prevention. 22. Relocation of vulnerable coastal communities and provide necessary tools and skills for alternate livelihoods
Biodiversity (forests, freshwater aquatic, marine and invasive alien species)	23. Protection of forests (particularly Almadow forest) through charcoal reduction by developing alternative energy plan, encouraging the use of fuel-efficient cooking stoves, supporting alternative livelihoods and banning exports of charcoal. 24. Construction of check-dams to reduce flooding and destruction of trees 25. Soil erosion control through large-scale tree-planting program which includes the panting of high-value productive trees 26. Protection of forests through legal frameworks and enforcement by the employment of rangers 27. Widespread awareness campaign on the impacts resulting from the destruction of forests and other natural resources 28. Conservation of rare and indigenous species that are under threat of extinction 29. Establish a research center that studies flora and fauna to understand the advantages and disadvantages of certain species and their impacts on land and water resources, and to further examine sustainable forestry, agriculture and fire management
Natural Disasters	30. Establishment of a National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness plans. 31. Utilize local knowledge on forecasting, weather information and agriculture to inform planning and initiatives 32. Enhanced coordination and information-sharing between relevant ministries and stakeholders 33. Community mobilization and awareness on disaster risk management 34. Create a fund for disasters to be administered by the Ministry of Interior and Local Government

Table 18: Adaptation Options for Somaliland

Sector	Adaptation Needs
Water	1. Increase water availability through rainwater harvesting using large dams, and some small dams in areas with higher reliability of rainfall only. The capacity of large dams should be enough to provide 8 months supply of water to Somaliland. The dams should also be accompanied by irrigation infrastructure. 2. Increase water availability through exploitation of groundwater and should include shallow wells and deep boreholes that should be used as a supplement to surface water during times of drought. The selection of sites for these boreholes should take into account livestock concentration in the area and should be accompanied by an Environmental Impact Assessment. It has been found that boreholes lead to unplanned settlements that further exacerbate the surrounding environment. 3. Establish a regulatory framework for sustainable management of water resources
Agriculture and Food Security	4. Watershed management through construction of water diversions from streams to farms for irrigation, establishment of boreholes for supply of water for irrigation and support for community-level water capture and storage for

	agricultural lands. 5. Training in production and marketing of agricultural products 6. Improve food security through the construction and maintenance of food storage facilities and seed banks and raising awareness amongst communities, particularly pastoralists on the importance of stockpiling food. 7. Introduction of high-value drought resistant crops 8. Encouraging Agro-forestry and planting of fruit tree
Animal Husbandry, Livestock and Rangelands Sector	9. Land management with emphasis on land-use planning, preventing deforestation, planting new trees, and establishing regulations for rotational grazing and protection and supervision of grazing areas. The government in the west and traditional leaders in the east should administer this program where governance structures are relatively weak. 10. Encourage pastoralists to shift to livestock farming to reduce their vulnerability, including the cultivation of fodder crops 11. Provision of veterinary services by the government, ensuring access to remote rural areas and ensuring availability of drugs 12. Establishment of livestock watering points
Health	13. Improve health status through establishment and/or upgrading of health facilities, particularly for maternal and child health and to address diseases related to malnutrition. Health posts and mobile health teams in rural areas should also be established to ensure access to remote and nomadic populations. 14. Establish well-equipped referral hospitals in major towns and regions 15. Awareness raising on water, sanitation and hygiene
Coastal and Marine Resources	16. Planting of mangrove trees and protection of coral reefs and their rehabilitation 17. Research on biodiversity in coastal waters with the objective to improve fisheries and establish a framework for fishing that takes into account fish populations and sustainable fishing
Biodiversity (forests, freshwater aquatic, marine and invasive alien species)	18. Protection of forests (particularly Almadow forest) through charcoal reduction by developing alternative energy plan, encouraging the use of fuel-efficient cooking stoves, supporting alternative livelihoods and banning exports of charcoal. 19. Construction of check-dams to reduce flooding and destruction of trees 20. Soil erosion control through large-scale tree-planting program which includes the panting of high-value productive trees 21. Widespread awareness campaign on the impacts resulting from the destruction of forests and other natural resources 22. Establish a research center that studies flora and fauna to understand the advantages and disadvantages of certain species and their impacts on land and water resources, and to further examine sustainable forestry, agriculture and fire management

Annex 3: Ranking of Consolidated Adaptation Measures

Table 19: Multi-Criteria Ranking

Sector	Adaptation Activity	ADRESS URGENT AND IMMEDIATE CC NEEDS	CONTRIBUTIONS TO POVERTY REDUCTION	COST EFFECTIVENESS	LINKS TO OTHER GOVT. PLANS	OVERALL SCORE
Water Sector	1. Improve access to water supply through provision of piped water supply to urban areas and IDP camps.	4	2	2	2	2.6
	2. Improve the quantity of water available through rehabilitation of dams, 'berkeds', boreholes and the construction of new dams, reservoirs, water diversions, livestock watering points and irrigation infrastructure. The selection of sites for these boreholes should take into account livestock concentration in the area and should be accompanied by an Environmental Impact Assessment.	**5**	**5**	**3**	**5**	**4.6**
	3. Improve water capture and natural storage through improved land management	5	3	4	4	4
	4. Establish a regulatory framework for water management along with local level management structures and capacities for water resource management.	4	3	5	5	4.1
	5. Improve water quality through water treatment plants that should be constructed alongside large-scale water storage projects, low-cost water treatment at the community level and legislation for water pollution control	2	3	1	2	2.1
	6. Construction of river embankments, check dams and retaining walls to protect flood-prone areas	**5**	**4**	**4**	**4**	**4.3**

Agriculture and Food Security	1. Government support to increase local production and prioritize it over exports through incentives such as small grants, provision of agricultural inputs, strong institutional support and guidance relating to finances, assets and technology and improved extension services.	4	5	3	4	4.1
	2. National and regional watershed management through construction of water diversions from streams to farms for irrigation, establishment of boreholes for supply of water for irrigation and support for community-level water capture and storage for agricultural lands.	**4**	**5**	**3**	**5**	**4.3**
	3. Sustainable land management and reforestation to reduce soil erosion	**5**	**4**	**4**	**5**	**4.5**
	4. Establishment of an agricultural research institute that employs Somali experts who are familiar with the local context and that focus on the study of hydrology and soils	3	2	2	1	2.1
	5. Establishment of an agricultural credit system for farmers along with agricultural cooperatives and associations	3	4	3	2	3.1
	6. Diversification of food production appropriate to the natural ecosystem and introduction of high-value drought resistant crops and agro-forestry	5	4	4	3	4.1
	7. Improve food security through the construction and maintenance of food storage facilities and seed banks and raising awareness amongst communities, particularly pastoralists on the importance of stockpiling food.	5	3	3	4	3.8
	8. Enhance farm-based livelihoods through the improvement of farm-to-market roads, creation of small agro-industries, training in the marketing of farm products and development of markets for agricultural produce	3	4	2	4	3.3
	9. Integrated Pest Management to protect crops and reduce risk/increase incentive to farmers	3	3	5	3	3.4

Animal Husbandry, Livestock and Rangelands Sector	**1. Land management with emphasis on sustaining ecosystems and preventing deforestation, loss of rangelands, planting new trees, establishing regulations for rotational grazing and protection and supervision of grazing areas. This program should be administered by Ministry of Environment, District Officials and Traditional Elders and Leaders of the communities**	**5**	**5**	**5**	**5**	**5**
	2. Provision of veterinary services by the government, ensuring access to remote rural areas and establishing diagnostic labs	3	4	3	4	3.5
	3. Support pastoralists in becoming agro-pastoralists or livestock farmers, whereby their livelihoods are diversified. This should include support for the cultivation of fodder crops.	3	3	3	3	3
	4. Control the export of female livestock due to the negative impacts on the sector	1	1	2	1	1.2
	5. Cultivation of drought resistant fodder crops	5	3	3	3	3.6
	6. Enhance livestock-based livelihoods through support to small-scale industries (hides, tanning, milk) and training in marketing of animal products (cheeses and yogurt)	2	4	3	4	3.2
	7. Provide funding and mechanism for research into animal health	2	2	2	3	2.2
	8. Establishment of livestock associations and cooperatives and support to local NGOs working in the sector	2	2	4	2	2.4
Health	1. Improve health status through establishment and/or upgrading of health facilities, particularly for maternal and child health and to address diseases related to malnutrition. Health posts and mobile health teams in rural areas should also be established to ensure access to remote and nomadic populations.	3	4	3	5	3.7
	2. Expand community-level nutrition programs	4	3	4	2	3.3

	3. Establish early-warning systems for drought and food insecurity	**5**	**3**	**5**	**5**	**4.4**
	4. Monitoring and treatment of drinking water quality	3	3	3	4	3.2
	5. Training of public health workers, particularly those that reside/work in remote areas	**4**	**4**	**4**	**5**	**4.2**
	6. Launch a public health awareness campaign, targeting rural areas	4	3	5	5	4.1
	7. Establish a waste management system	3	3	2	3	2.8
	8. Carry out regular vaccination campaigns	2	3	4	4	3.1
	9. Develop and enforce regulations on pharmaceutical industries for quality assurance and safety	1	2	3	3	2.1
	10. Establish well-equipped referral hospitals in major towns and regions	1	1	2	2	1.4
	11. Re-training of doctors and nurses that are in the system to deal with climate related health problems	3	3	4	1	2.8
Coastal and Marine Resources	1. Immediate ceasing of illegal fishing and dumping of all wastes at sea through development and implementation of a legal framework, policy, and the establishment of a coastguard	2	3	2	4	2.7
	2. Research into diseases caused by toxic wastes that are known to have been dumped off the Somali coast	1	2	2	1	1.5
	3. Awareness raising on the importance of marine resources, protection of coastal resources and pollution prevention.	4	2	4	3	3.2
	4. Develop the fishing sector through government support in coastal cold-storage and modern fish processing	3	4	3	4	3.5
	5. Prevent the construction of housing and other infrastructure near the coast	4	1	4	1	2.5

	6. Mangrove plantation and awareness raising on protection of coastal resources	2	3	3	2	2.5
	7. Relocation of vulnerable coastal communities and provide necessary tools and skills for alternate livelihoods	2	3	1	1	1.9
	8. Research on biodiversity in coastal waters with the objective to improve fisheries and establish a framework for fishing that takes into account fish populations and sustainable fishing	3	1	2	1	1.8
Biodiversity (forests, freshwater aquatic, marine and invasive alien species)	1. Protection of forests through charcoal reduction by developing alternative energy plan, encouraging the use of fuel-efficient cooking stoves, supporting alternative livelihoods and banning exports of charcoal.	5	4	3	5	4.3
	2. Large-scale tree-planting program which includes the panting of high-value productive trees	**5**	**5**	**4**	**5**	**4.8**
	3. Construction of check-dams to reduce flooding and destruction of trees	4	4	3	4	3.8
	4. Protection of forests through legal frameworks and enforcement by the employment of rangers	5	3	3	4	3.8
	5. Widespread awareness campaign on the impacts resulting from the destruction of forests and other natural resources	4	3	4	4	3.7
	6. Protection of biodiversity and wildlife through policy measures, particularly focusing on endangered species	3	2	3	2	2.5
	7. Establish a research center that studies flora and fauna to understand the advantages and disadvantages of certain species and their impacts on land and water resources, and to further examine sustainable forestry, agriculture and fire management	3	2	2	2	2.3
Natural Disasters	**1. Establishment of a National-level disaster management agency responsible for coordination during emergencies, developing early warning systems and developing drought management and emergency preparedness**	**5**	**4**	**4**	**5**	**4.5**

	plans.					
	2. Enhanced coordination and information-sharing between relevant ministries and stakeholders	4	2	5	5	3.8
	3. Community mobilization and development to enhance ownership by communities of local development problems as they related to climate events so that they become more active participants in developing solutions. This should also include a national level community-based disaster management program.	5	3	3	4	3.8
	4. Installation of agro-meteorological stations	5	2	4	4	3.7
	5. Utilize local knowledge on forecasting, weather information and agriculture to inform planning and initiatives	4	3	5	2	3.5
	6. Create a fund for disasters to be administered by the Ministry of Interior and Local Government	4	4	2	3	3.4

Annex 4: List of Participants that Attended Consultative Workshops

Table 20: List of Participants in Federal Somalia

	Name	Organization/ Representative Region	Group
1	Sucdi Dahar Diriye	SOSCENSA	Non state actor association
2	Abdi Khadar Mohamed	CCS	NGO
3	Ashi Duale	WEAVE	NGO
4	Duniya Abdi Mohamed	SOSCENSA Health sector	Non state actor association
5	Ayan Abdullahi Ali	SYL II	NGO
6	Abdishakur Mohamud Mohamed	National Youth Council Agency	Youth
7	Amaar Omar Mohamed	Somali Youth Development Agency	Youth
8	Hussein Muse Malishia	Ministry of National Resources	Government
9	Salax Fulax	SLA	NGO
10	Mukhtar Abdi Robble	Traditional Elder	Traditional Elder /agro-pastoralist
11	Awaise Isse Awale	Hormud Telecommunication Co	Private sector
12	Leyla Aded	Women SOSCENSA Member	Women
13	Sid Ali Abukar Hussein	Biniadam NGO	Women
14	Udbi Umar Wallin	WAANO NGO	Women
15	Rage Ali Osman	Ministry of Interior	Government
16	Abdulkadir Mohamed Halane	Elder; SOSCENSA	Traditional Elder /agro-pastoralist
17	Abdinur Omar Wahliye	OSPAD	NGO
18	Ahmed Dini Hassan	Somali Peace Line	NGO
19	Abdullahi Sheikh Mohamed	Ministry of Finance & Planning	Government
20	Abdirahman Mo'alin Ahmed	SOSCENSA	Civil Society
21	Hassan Abukar Hassan	Ministry of Finance & Planning	Government
22	Abdikafi Afrah	University of Somalia	Academia
23	Ciise M. Halane	University of Somalia	Academia
24	Umar Abdiladif Sh. Yusuf	Ministry of Trade and Industry	Government
25	Abdirahman Ma'alin Adow	SIMAD University	Academia
26	Hassan Mohamed Hassan	RMSN	NGO
27	Abdirahman Nur Qeily	Ministry of National Resources (MoNR)	Government
28	Abdi Ahmed	Ministry of National Resources	Government
29	Dr. Sowda Roble	Ministry of National Resources	Government
30	Suado Diriye Hassan	Ministry of National Resources	Government
31	Sadia Mohamed Elmi	SORDA NGO	NGO
32	Ziad Iye	Ministry of National Resources	Federal Somalia
33	Dr. Abdirizak Yussuf Ahmed	SOSCENSA	Civil Society
34	Hassan Abdi Ali	SORDA	Civil society

35	Zahra Ahmed Mohamed	Mogadishu University	Academia
36	Hussein Muse Malashia	Ministry of Agriculture	Government
37	Abdirashid Ali Adle	Mogadishu University	Academia
38	Ahmed Mohamed Iiman	MoNR; Fisheries & Environment	Government
39	Mohamed Mo'alin Osman	Ministry of National Resources (MoNR)	Government
40	Mohamud Mohamed Mohamed	Ministry of National Resources (MoNR)	Government

Table 21: List of Participants Puntland

	Name	Organization or Region/District	Group
1.	Abdikarin Farah Gutale	Bari/Bosaso	Pastoralists and Agropastoralists
2.	Abdulahi Gelle Mohamed	Karkaar/Qardho	Pastoralists and Agropastoralists
3.	Abdifatah Mohamed Sugulle	Mudug/Galkayo	Pastoralists and Agropastoralists
4.	Said Noor Mohamed	Sanag/Badhan	Pastoralists and Agropastoralists
5.	Ahmed Mohamed Salah	Haylaan/Dhahar	Pastoralists and Agropastoralists
6.	Feysal Khalif Barre	Sool/Las-anod	Pastoralists and Agropastoralists
7.	Feysal Mohamud Muse	Ayn/Buhodle	Pastoralists and Agropastoralists
8.	Ali Isse Fayte	Nugal/Garowe	Pastoralists and Agropastoralists
9.	Hassan Abukar Ali (Beydhabo)	Nugal/Garowe	Pastoralists and Agropastoralists
10.	Gedi Farah Mohamed	Nugal/Garowe	Pastoralists and Agropastoralists
11.	Maryan Osman Sudi	Nugal/Garowe	Pastoralists and Agropastoralists
12.	Yusuf Abdi Ali	Nugal/Garowe	Pastoralists and Agropastoralists
13.	Badriya Mohyadin Hussein	Bari/Bosaso	Youth & Women groups
14.	Mohamud Ahmed Mohamud	Karkaar/Qardho	Youth & Women groups
15.	Sundus Dahir Osman	Mudug/Galkayo	Youth & Women groups
16.	Abdirahman Ali Shire	Sanag/Badhan	Youth & Women groups
17.	Ahmed Mohamed Omar	Haylaan/Dhahar	Youth & Women groups
18.	Asha Abdulahi Salah	Sool/Las-anod	Youth & Women groups
19.	Faiza Abdi Dhalac	Ayn/Buhodle	Youth & Women groups
20.	Faduma Abdalle Yusuf	Nugal/Garowe	Youth & Women groups
21.	Faduma Abdikarim Abshir	Nugal/Garowe	Youth & Women groups
22.	Mohamed Abdikadir Islan Mohamed	Nugal/Garowe	Youth & Women groups
23.	Ardo Said Mohamed	Nugal/Garowe	Youth & Women groups
24.	Fatima Ahmed Herzi	Nugal/Garowe	Youth & Women groups
25.	Abdikadir Ahmed Ibraahim	Bari/Bosaso	Traditional & Religious Leaders
26.	Ali Ige Farah	Karkaar/Qardho	Traditional & Religious Leaders
27.	Sharmarke Abdijalil Aden	Mudug/Galdogob	Traditional & Religious Leaders

28.	Jama Mohamud Mohamed	Sanag/Badhan	Traditional & Religious Leaders
29.	Mursal Mohamed Abdi	Haylaan/Dhahar	Traditional & Religious Leaders
30.	Warsame Arshe Farah	Sool/Las-anod	Traditional & Religious Leaders
31.	Hassan Abdiqani Sh. Hassan	Ayn/Buhodle	Traditional & Religious Leaders
32.	Mohamed Yusuf Warsame	Nugal/Garowe	Traditional & Religious Leaders
33.	Dahir Sanweylood	Nugal/Garowe	Traditional & Religious Leaders
34.	Abdisalan Jama Ismail	Nugal/Garowe	Traditional & Religious Leaders
35.	AhmedNur Mohamed Ismail	Nugal/Garowe	Traditional & Religious Leaders
36.	Osman Mohamud Ahmed	Nugal/Garowe	Traditional & Religious Leaders
37.	Nasro Dahir Yusuf	Bari/Bosaso	NGO, PSD and Academia
38.	Halima Mohamed Jacfar	Karkaar/Qardho	NGO, PSD and Academia
39.	Abshir Mohamed Hersi	Mudug/Jariban	NGO, PSD and Academia
40.	Jibril Ahmed Mohamed	Sanag/Badhan	NGO, PSD and Academia
41.	Naimo Muse Elmi	Haylaan/Dhahar	NGO, PSD and Academia
42.	Yusuf Hussein Aden	Sool/Las-anod	NGO, PSD and Academia
43.	Malyun Ahmed Hassan	Ayn/Buhodle	NGO, PSD and Academia
44.	Abdimahad Ahmed Muse	Nugal/Garowe	NGO, PSD and Academia
45.	Mohamed Abshir Mohamed	Nugal/Garowe	NGO, PSD and Academia
46.	Abdirashid Sheikh Mohamed	Nugal/Garowe	NGO, PSD and Academia
47.	Kamal Abdi Mohamud	Nugal/Garowe	NGO, PSD and Academia
48.	Ibrahim Abudallahi Ali	Nugal/Garowe	NGO, PSD and Academia
49.	Asha Abdi Hussein	Nugal/Garowe	NGO, PSD and Academia
50.	Sowdo Jama Mohamud	Nugal/Garowe	NGO, PSD and Academia
51.	Jamal Hassan	Nugaal/Garowe	Consultant, Ministry of Interior
52.	Ahmed Mohamed Hassan	Nugaal/Garowe	DG, Ministry of Environment
53.	Abdirizak Nuh Ahmed	Nugaal/Garowe	DG, Ministry of Justice
54.	Shamis Warsame Osman	Nugaal/Garowe	Admin Director, MOWDAFA
55.	Yusuf Mumin Bide	Bari/Bosaso	Vice Governor, Bari
56.	Abdiquran Mohamed Aden	Karkaar/Qardho	Governor, Karkaar
57.	Mohamud Ismail Jama	Sanaag/Badhan	Governor, Sanaag
58.	Ahmed Ibrahim Farah	Sool/Las-anod	Governor, Sool
59.	Ahmed Aden Arab	Ayn/Buhodle	Governor, Ayn
60.	Salad Hassan Shire	Haylaan/Dhahar	Mayor, Dhahar
61.	Farah Mohamud Jama	Nugal/Burtinle	Mayor, Burtinle
62.	Said Abdi Farah	Mudug/Galkayo	Mayor, Galkayo
63.	Abdullahi Sheikh Said	Mudug/Galdogob	Mayor, Galdogob
64.	Abdikarim Sheikh Hassan	Mudug/Jariban	Mayor, Jariban
65.	Abdirizak Muse Hassan	Bari/Iskushuban	Mayor, Iskushuban
66.	Abdisamad Aden Ali	Bari/Ufeyn	Mayor, Ufeyn
67.	Mohamed Muse Mohamed	Karkaar/Qardho	Councilor, Qardho
68.	Abdisalan Bashir	Karkaar/Waaciye	Mayor, Waaciye
69.	Ahmed Hassan Shire	Sool/Boocame	Mayor, Boocame

Table 21: List of Participants Somaliland

	Name	Organization / Representative Region	Duty Station
1	Hussein Yusuf Duale	Erigabo	Agropastoralist
2	Ali Abiib	Farawayne	Agropastoralist
3	Rashid Ahmed Mohamed	Hargeisa	D. Governor -Marodijeex
4	Yusuf Godir Mohamed	Hargeisa	Facilitator/transilator
5	Ahmed Ali Nur	Gabilay	Governor
6	Yusuf I. Gedi	Odwayne	Governor
7	Ahmed Hadi Sidci	Borama	Governor of Awdal
8	Ali Mohamed Elmi	Berbera	Governor of Saaxil
9	Adam Derie Egal	Erigabo	Governor of Sanaag
10	Saed Adan Hussein	Hargeisa	Hargeisa Municipality
11	Mohamed Haibe Guled	Hargeisa	Hargeisa Municipality
12	Mohamed Abdi Alamagan	Hargeisa	Hargeisa Water Agency
13	Dr. Saad H. Ali Shire	Hargeisa	Minister of NP&D
14	Ibrahim Omar Ibrahim	Hargeisa	MOA
15	Mohamed Dahir Warsame	Hargeisa	MOA
16	Mohamed Egeh Kille	Hargeisa	MoE&RD
17	Abdulkadir Abdi Aware	Hargeisa	MoE&RD
18	Hussein Yusuf Dhuule	Hargeisa	MoE&RD
19	AbdiAziz Mohamed H. Duale	Hargeisa	MoE&RD
20	Abdirashid Ibrahim Nur	Borama	MoE&RD
21	Abdikarim Adan Omar	Hargeisa	MoE&RD
22	Hussein Talaahi	Erigabo	MoERD, Acting Coordinator
23	Jama Hussein Mohamed	Hargeisa	MoERD, Coordinator
24	Fadxiya Yusuf Esse	Gebiley	MoERD, Coordinator
25	Ahmed Jama Ali	Berbera	MoERD, Coordinator
26	Yusuf Warsame Mire	Burao	MoERD, Coordinator
27	Hassan Hersi Farah	Las-Anod	MoERD, Coordinator
28	Sam Omar Guled	Hargeisa	MoF&MR
29	Liban Abdisamad Ahmed	Hargeisa	MoH
30	Abdifatah Yusuf Barud	Hargeisa	MoH
31	Ali Hassan Awale	Hargeisa	MOI
32	Abdiqadir Daud Egeh	Hargeisa	MOLSA
33	Awale M. Muse	Hargeisa	MOLSA
34	Mubarik Mohamed Ahmed	Hargeisa	MoNP&D
35	Ahmed Abdillahi Fadal	Hargeisa	MoNP&D
36	Mohamed Muse Awale	Hargeisa	NERAD
37	Abdirashiid Muse	Las-Anod	NGO
38	Mubaarik ibrahim	Hargeisa	NGO
39	Siyaad Mohamed	Borama	NGO
40	Janet Rito	Hargeisa	Oxfam

41	Abdinasir Sugal Farah	Eilafwein	Pastoralist
42	Mohamed Rayale Khayre	Borama	Pastoralist
43	Abdirashid Ahmed Mohamed	Burao	Pastoralist
44	Saed Mohamed Dahir	Gebiley	Pastoralist
45	Hassan Hirad Yasin	Berbera	Pastoralist
46	Abdi Musa kOSHIN	Berbera	Pastoralist
47	Mohamed Abdikarim Mohamoud	Baligubadle	Religious elder
48	Nur Aden shirdon	Borama	Religious elder
49	Hussein Hassan Mohamoud	Burao	Religious Elder
50	Sheikh Ali Dahir Elmi	Las-Anod	Religious Elder
51	Abdirizak Siyad Abdi	Hargeisa	Religious elder
52	Sheikh Ahmed Abdillahi	Baki	Religious elder
53	Muse Mohamed Dirie	Hargeisa	Traditional Elder
54	Abdulqadir Aware	Badhan	Traditional Elder
55	Saed Omer Dhimbiil	Borama	Traditional Elder
56	Ismail Omer Aden	Burao	Traditional Elder
57	Ismail Saleban Haji Yusuf	Las-Anod	Traditional Elder
58	Muse Yusuf Liban	Gebiley	Traditional Elder
59	Abdirahman Koosaar Mohamed	Burao	Traditional Elder
61	Ali Dahir Elmi	Las-Anod	Traditional Elder
62	Ismail Yusuf Ismail	Burao	Traditional Elder
63	Adan Warsame	Burao	Youth
64	Adam Ismail Abdi	Hargeisa	Youth
65	Hassan Abdi Shire	Erigabo	Youth
66	Muhyadin Ahmed Jibril	Hargeisa	youth
67	Sa'ad Muhumed Guled	Hargeisa	youth
68	Shukri Ali Rayale	Borama	Youth/women
69	Saedo Ahmed Abdi	Gebiley	Youth/women
70	Asha Hassan Ali	Berbera	Youth/women
71	Halimo Haji Mohamoud	Baligubadle	Youth/women
72	Farduus Mohamoud Gahayr	Hargeisa	Youth/women
73	Hinda Ibrahim	Hargeisa	Youth/women
74	Asmahan Abdisalaam	Hargeisa	Youth/women
75	Farah Ahmed Elmi	Hargeisa	Youth/women
76	Hodan Ahmed Abdillahi	Hargeisa	Youth/women
77	Rahma Yusuf Jama	Hargeisa	Youth/women

Table 22: List of Participants Attending the NAPA National Validation Meeting

	Name	Organization / Representative Region	Duty Station
1	Dr. Hussein H Aden	Coordinator SAHSP (Somalia Animal Health Services project)	Federal Somalia
2	Dr. Mohamed Hassan Ali	Veterinarian SAHSP	Federal Somalia
3	Ahmed Mohamed	Ministry of National Resources – Head of Sanitation	Federal Somalia
4	Nasrudin Rage Ali	Ministry of National Resources - Director of Utilities	Federal Somalia
5	Hussein Mohamed Hussein	Ministry of National Resources - Director of Water	Federal Somalia
6	Dr. Sowda M Roble	Ministry of National Resources – Livestock Advisor	Federal Somalia
7	Yusuf Ali Mohamed	Ministry of National Resources – ministerial advisor	Federal Somalia
8	Mohamed Bare Mohamed	SORDA Programme Officer	Federal Somalia
9	Abdi F Ahmed	Ministry of National Resources – planning and development advisor	Federal Somalia
10	Sulieka Ahmed Ali	SAGRA programme officer	Federal Somalia
11	Ahmed Elmi Gure	SAGRA Head of environment	Federal Somalia
12	Jaamal Geedi Weibyi	DALKA water section	Federal Somalia
13	Hussein Gaddain	FAO Chief Technical Advisor	Federal Somalia
14	Faisal Said Musa	Ministry of Planning – Director General	Federal Somalia
15	Ahmed Ibrahim Akram	Ministry of Planning – Vice Minister	Federal Somalia
16	Mohamed Abdi Elmi	PUNSAA Executive Director	Puntland
17	Burham Elmi Hersi	Puntland Ministry of Planning – Deputy Minister	Puntland
18	David Clapp	UNDP Somalia Country Director	Federal Somalia
19	Abdirisak Mohamed	Ministry of National Resources - Minister	Federal Somalia
20	Abdihakim Farrah	UNDP Programme Officer	Federal Somalia

ANNEX 5

Annex 5.1

Project Profile 1: ***Sustainable Land Management to Build Resilient Rural Livelihoods and Enable National Food Security***

RATIONALE

Around 65% of the Somali population are rural and engaged in pastoralism, agro-pastoralism, subsistence agriculture, and charcoal production, as livelihood options. All of these livelihoods are heavily reliant on - and severely deplete in the case of charcoal - the natural resource base and provision of ecosystem services. The sustainability of ecosystems to support pastoralist and agricultural livelihoods, are under threat from a combination of loss of vegetation and grazing land, deforestation due to charcoal production, loss of soil fertility, poor cultivation practices of productive land, insufficient dry season water supply, lack of alternative livelihoods, lack of alternative energy sources others than charcoal, physical access constraints, conflict over natural resources[3], land tenure disputes, underinvestment in supporting activities such as rotational grazing and livestock production systems, and a lack of agricultural extension services.

The NAPA consultations underlined the vulnerability of Somalia's traditional rural livelihoods systems to increasing climatic variability, particularly pastoralist activities across all of the country and agriculture activities in the south of the country. Concerns were raised over increases in the occurrence and severity of natural disasters, including extended drought events and flash flooding. Too little water is captured and stored during the wet season for use in the dry season.

With existing pastoralist and farming systems and methods already under threat from poor land management, it was universally felt that existing climatic variability combined with longer term impacts of climate change would inevitably undermine the entire sector and result in increased rural to urban migration, increased conflict over natural resources and the continued loss of lives and livelihoods. For these reasons the need for comprehensive measures to reduce vulnerabilities of pastoralists to climatic variability while simultaneously increasing investment into sustainable agriculture and farming practices - both clearly linked by the provision of a strong natural resource base and ecosystem services with a sustainable land management approach- was ranked 1 in the list of NAPA priorities.

DESCRIPTION

Component	Short-term Outputs	Potential Long-term Outcomes
Policy and Planning	• Engage climate vulnerable pastoralists and farmers and other key stakeholders (i.e. clan elders) in the formulation of local and district development plans focused on tenure, governance and land use management. • Introduce integrated land use management	• Climate risks integrated into national sectoral strategies and district planning for rural development, food security and livestock and agricultural management

[3] UNDSS recorded 61 known conflicts to have occurred over natural resources in Somalia during 2012

	(rangeland, reforestation, agro-forestry and watershed management) planning principles to district and community stakeholders. • Strengthen national and sub national capacity to engage with community and integrate climate risk analysis into community level development planning processes.	
Physical Investment and Demonstration	• Rehabilitation and reinstatement of degraded ecosystems, in particular rangeland areas, forests and areas with a high potential for cultivation, to provide sustainable grazing, forestry products, and agriculturally productive zones. • Demonstrate, through localized interventions, sustainable land management measures (reduce erosion, increase soil fertility, reduce crop losses, reduce burning, enhanced forest, shrub and grazing vegetation) to increase resilience to climate risks. • Demonstrate models to diversify rural household income, including agro-forestry based livelihoods models, rangeland and wildlife protection schemes, and investment into production of sustainable household energy appliances such as fuel efficient stoves.	• Rural stakeholders able to develop and apply adaptive practices to enhance food and livelihood security and promote economic diversification in rural livelihoods.
Awareness and Information Sharing	• Community based (with a focus on pastoralists and farmers) education and awareness measures on climate risks, land management and food production. • Provision of seasonal early warning system (easily accessible and understandable) and forecasting for pastoral livelihood security and farmers food security.	• Effective climate risk information supplied, understood and adopted by end users at the appropriate scale to protect rural livelihoods form the impacts of climate change.

DEVELOPMENT CONTEXT

The programmatic focus of this project profile supports the Federal Government of Somalia's Six Pillar Policy: in particular, Pillar 2 – Economic Recovery for Livelihoods; Pillar 3 – Peace building and Social

Reconciliation; and Pillar 4 – Service Delivery for Environment. It also supports the existing EC funded programme in the Puntland region aimed at strengthening livelihoods through improvements in rangelands and natural resources. It also supports all thirteen components of the Somalialnd 5 year development plan related to livelihoods, rangelands, the environment and management of natural resources.

The primary target of this programme is pastoralists and farming communities with limited access to assets and resources, including an emphasis on women and youth among these communities.

IMPLEMENTATION

Project Duration: 4 years

Lead Agency: Government of Federal Somalia (GFS) Ministry of National Resources

Other *Potential* Key Stakeholders: GFS Department of Agriculture and Livestock; GFS Department of Environment and Wildlife; GFS Department of Water, Minerals and Energy; Ministry of Planning Puntland; Ministry of Environment Puntland; Ministry of Planning Somalialnd; Ministry of Environment Somalialnd; State Authorities; UN agencies, INGOs, Development Banks; NGOs; Academic and Research Institutions.

FINANCIAL RESOURCES

Indicative Budget: 6.45 USD million

Component	**Cost (USD)**
Policy and Planning	0.75 million
Physical investment and demonstration	3.75 million
Awareness and information sharing	0.75 million
Project management	1.20 million
Total	**6.45 million**

Annex 5.2

Project Profile 2: ***Integrated Water Resources Management to Ensure Water Access and Supply to Vulnerable Populations and Sectors***

RATIONALE

As set out in section 2 of the Somalia NAPA document, climate change could result in a slight increase in the amount of rain received each year. However, the variability of rainfall patterns is also set to increase from an existing very high variable range. Because of this high variability in rainfall patterns, it is not clear how seasonal rainfall (both wet and dry seasons alike) will change. El Nino events, which results in delayed onset of rainfall and less rainfall at certain times of the year, may also become more frequent and severe in effect. This may have far reaching implications on the incidents of drought, floods and water quality within the context of a sector, which in Somalia, remains largely under-developed. Progressive climate change is also likely to affect the yield of ground water and shallow water reservoirs, from year to year. In coastal areas sea level rise is likely to increasingly affect groundwater through coastal erosion, surface inundation and seawater intrusion into coastal aquifers.

In relation to water resources management and protection, the NAPA consultations revealed a number of specific concerns, notably the inability to capture and contain rainfall - particularly intense rainfall events that lead to flash flooding creating damage to land, gullying, soil erosion and loss of soil fertility, existing water supply schemes and damage to infrastructure. This trend is combined with frequent and persistent water scarcity events across the whole of the country resulting from delays in rainfall onset and an extension in the dry season, sometimes lasting for many months. Consequently, the need for the protection of water resources through integrated and strategic approaches was ranked second in the list of NAPA priorities.

Priority adaptation measures that emerged from the consultation included the need for protection of critical water resources through the construction of medium to large-scale water storage infrastructure (e.g. reservoirs) including diversions for irrigation, livestock watering points and boreholes. Also community level infrastructure including berkeds, shallow wells, and ponds were prioritized. Water resources protection, harvesting and storage is needed during extreme events to reduce vulnerability during dry season water shortages.

DESCRIPTION

Component	Short-term Outputs	Potential Long-term Outcomes
Policy and Planning	• National, regional and community level water resources management policies and plans. • Climate risk and vulnerability assessments with a specific focus on drought prone areas and conflict sensitive areas. • Groundwater and surface water resource data collection and monitoring	• Integrated Water Resource Management policy based on climate risk information and approaches

Institutional Development	• Establishment of a government-led participatory mechanism for water sector coordination based on IWRM principles, with a specific focus on supporting the livestock and agricultural sectors and provision of reliable clean drinking water at the community level • Capacity development in climate induced impacts on water resources for policy makers and planners at national and district level	• Institutions strengthened for cross sectoral formulation and implementation of climate resilient integrated water resources management, plans, policies and strategies
Physical Investment and Demonstration	• Construction of large scale water capture and storage facilities and equitable distribution and access systems. • Construction and rehabilitation of community level infrastructure including berkeds, shallow wells, ponds and other appropriate technologies, ensuring that a mechanism for maintenance of the schemes is in place • Construction of embankments/gabions and check-dams to protect flood-prone areas • Physical protection of critical water resources (rivers, springs, wells, groundwater) to provide safe water supply during climate change extreme events.	• Improved access to safe water and sanitation under the conditions of changing climate by adoption of new technologies and participatory water management at household and community level.

DEVELOPMENT CONTEXT

Water is a scarce and critical resource that is under-developed in Somalia. At the community level water is primarily supplied through shallow dug wells or through boreholes. Among the nomadic pastoralist communities, ensuring access to watering points is a matter of survival. During the dry season water sources sometimes reduce significantly in flow and can lead to communities needing to travel far to reach alternative sources. Watering points have an inherent potential to act as conflict triggers between nomadic peoples, particularly during times of drought.

The south of Somalia hosts the country's only two permanent rivers, the Juba and Shabelle, which supply water for irrigation of the country's most promising cultivatable land, and to urban centers including the capital Mogadishu. During intense rainfall events water is quickly lost to through gullying, while also removing valuable topsoil in the process. Groundwater resources (aquifers) are believed to exist though deep water aquifers are not currently accessed. Shallow water aquifers and wells are

accessed ad-hoc with little understanding of downstream hydrological impacts. Often during periods of drought water is tankered to areas of need.

There is currently no coordinated oversight and understanding of Somalia's water resources, access and supply. This proposed project profile intends to initiate a comprehensive approach to managing water resources in Somalia, through developing and implementing an integrated water resources management approach using participatory and community based decision making.

IMPLEMENTATION

Project Duration: 5 years

Lead Agency: Government of Federal Somalia (GFS) Ministry of National Resources

Other *Potential* Key Stakeholders: GFS Department of Water, Minerals and Energy; GFS Department of Agriculture and Livestock; GFS Department of Environment and Wildlife; Ministry of Planning Puntland; Ministry of Environment Puntland; Ministry of Planning Somalialnd; Ministry of Environment Somalialnd; State Authorities; UN agencies, INGOs, Development Banks; NGOs; Academic and Research Institutions.

FINANCIAL RESOURCES

Indicative Budget: 8.1 USD million

Component	**Cost (USD)**
Policy and Planning	0.75 million
Institutional Development	0.50 million
Physical investment and demonstration	5.50 million
Project management	1.35 million
Total	**8.10 million**

Annex 5.3

Project Profile 3: ***Reducing Risks among Vulnerable Populations from Natural Disasters***

RATIONALE

The NAPA process has highlighted significant concerns that natural disasters (in particular severe drought events and flash flooding) already constitute a development risk that are becoming more frequent, widespread and intense across the country, with the potential to cause significant further loss of livelihoods and lives. Some 14 major drought events have been recorded in the last 50 years adversely affecting over 6 million people. Specific issues raised during consultations include the potential for increases in injury and death as a result of drought, increase in incidence of conflict over diminishing natural resources such as water and grazing land, significant migration and displacement of people, and loss of primary assets such as livestock.

To address the risks faced by vulnerable populations during natural disasters, a climate risk management approach needs to be put in place that focuses not just on recovery and response measures, but also at prevention measures though improved management of natural resources such as water, forests, grazing pasture and land. Specific measures are required to development and implement an early warning system and put in place a combination of planning engineering and design measures to reduce risk. This broader 'preventative' as well as responsive DRR approach will require strengthening national disaster management authority so that is also able to coordinate and direct cross-sectotal ministries and institutions to deliver joint planning activities. This approach both reinforces and adds value to the project outputs of NAPA project profiles 1 and 2 for Somalia.

DESCRIPTION

Component	Short-term Outputs	Potential Long-term Outcomes
Policy and Planning	• Strengthen the National and Regional Disaster Risk Management Authorities with a preventive as well as responsive remit • Integrate the National Disaster Risk Management Policy principles into key GFS sectoral policies with a specific focus on climate risks • Awareness raising for senior officials and policy makers in key sectors for linkages between disaster risk management and climate related risks • Develop government strategies in responding to drought and flash flood events	• Improved disaster prevention through expanded DRM within key sector policies, plans and budgets that incorporate climate risks and provide incentives for lower risk development

Climate Risk Planning and Management	• Data collection and analysis on incidence of key climate related disaster events (droughts, floods, dusts storms, strong winds). • Institutional establishment of national early warning system with a focus on climate related risks in areas of high vulnerability. • Community level mapping of high vulnerability areas to risks of drought and flooding, dusts storms and strong winds, and integration into local disaster risk management plans and responses.	• Early warning systems for droughts (and floods) strengthened by incorporating and communicating climate risk information.
Investment and Demonstration	• Identification, field demonstration and appraisal of targeted climate risk reduction measures including, *inter alia*: improved land and water management practices; livelihoods protection; improved settlement construction and physical infrastructure. • Training programme for national, district, and community level professionals to support strengthened planning competencies for climate risk reduction.	• National, district and community planners aware of and putting into practice improved and cost effective climate related disaster prevention measures through local level demonstration.
Institutional Development	• Promote National Disaster Management Authority (NDMA)-led coordination and information sharing and disaster risk management and climate risk reduction with key ministries and at a district level, including early warning response. • Build capacity at regional and district level to enable building of community level awareness, disaster preparedness and response capacity. • Establish relations with regional (east Africa) institutions to promote information exchange and joint action at national and district levels in Somalia.	• National and district institutions are able to provide a coordinated response in disaster risk reduction through the integration of climate risk information.

DEVELOPMENT CONTEXT

The frequency of occurrence and the severity of impacts from natural disasters, such as drought, is apparent across all Somalia and its significance is acknowledged throughout government. The programmatic focus of this project profile supports the Federal Government of Somalia's Six Pillar Policy: in particular, Pillar 2 – Economic Recovery for Livelihoods; Pillar 3 – Peace building and Social Reconciliation; and Pillar 4 – Service Delivery for Environment. However the government currently has neither the institution itself - in the form of a national disaster risks management authority - or the human resource or intuitional capacity to address reducing risks to populations. Developing and implementing an early warning system will be a core component of this project.

IMPLEMENTATION

Project Duration: 4 years

Lead Agency: Federal Government of Somalia (GFS) Ministry of National Resources

Other *Potential* Key Stakeholders: GFS Department of Water, Minerals and Energy; GFS Department of Agriculture and Livestock; GFS Department of Environment and Wildlife; Ministry of Planning Puntland; Ministry of Environment Puntland; Ministry of Planning Somalialnd; Ministry of Environment Somalialnd; State Authorities; UN agencies, INGOs, Development Banks; NGOs; Academic and Research Institutions.

FINANCIAL RESOURCES

Indicative Budget: 4.1 USD million

Component	**Cost (USD)**
Policy and Planning	0.75 million
Climate Risk Planning	0.50 million
Investment and demonstration	1.50 million
Institutional Development	0.75 million
Project management	0.60 million
Total	**4.10 million**