

### 3.0 Eritrea

CCAA	Climate Change Adaptation in Africa program
DFID	Department for International Development
GDP	Gross Domestic Product
GEF	Global Environment Fund
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
ILRI	International Livestock Research Institute
LDCF	Least Developed Country Fund
LGP	Length of growing period
NAPA	National Adaptation Programme of Action
NC	National Communication
MA	Ministry of Agriculture
MLWE	Ministry of Land, Water and Environment
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
USDS	United States Department of State

Located in the northern part of the Horn of Africa, Eritrea shares a border with Sudan, Ethiopia and Djibouti. Its terrain extends from highlands in the country's central and northern regions, to flat coastal plains in the eastern lowlands, and to flat plains of the western lowlands (MLWE, 2007). Eritrea also has jurisdiction over about 300 islands located in the Red Sea. No rivers flow throughout the year in Eritrea (USDS, 2011). Approximately 3.5 million people reside in Eritrea, with the majority of the population living in the cooler areas of the central highlands (MLWE, 2007).

With a level of Gross National Income of US\$640 per capita<sup>107</sup> (USDS, 2011), Eritrea is considered to be amount the least developed countries in the world. Agriculture, fisheries, industries, tourism and mining are important parts of the country's economy (MLWE, 2007).

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<sup>107</sup> Figure calculated by the World Bank using the Purchase Power Parity method (USDS, 2011).

Approximately 80 per cent of the population lives in rural areas and depends on subsistence rain-fed agriculture for their livelihoods, including both crop production and livestock (MLWE, 2007). In 2007, agriculture accounted for 21 per cent of Gross Domestic Product (GDP); industry accounted for 22 per cent of GDP, and the service sector 58 per cent (MLWE, 2007). Eritrea is one of the most food insecure countries in sub-Saharan Africa and has one of the highest rates of malnutrition; the country also imports roughly half of the food required to meet basic needs (MA, 2010).

### **A. Adaptation Needs and Priorities**

Eritrea's current climate is quite variable, and is impacted by the Sahel-Saharan desert, the Red Sea and its various physical characteristics (MLWE, 2007). Around 70 per cent of the country is characterized as hot and arid, receiving an annual rainfall of less than 350 mm (MLWE, 2007). The country is comprised of six agro-ecological zones that experience two rainfall seasons: the summer rains of July and August which affect the central highland and western lowlands (representing more than 70 per cent of annual rainfalls); and the winter rains of November to March which impact coastal areas and the eastern and southern regions (MA, 2010; MLWE, 2007). Rainfall in the country is characterized by considerable variability within and between years, as well as spatial variation over extremely short distances (MLWE, 2007).

In terms of the anticipated impacts of climate change, Eritrea is anticipated to experience temperature increases above the global average, with rises of 1.1 to 3.8°C by the 2060s, and 1.6-5.4°C by the 2090s (MA, 2010). All available projections suggest the country will experience a considerable increase in the number of hot days and nights compared to its current climate (MA, 2010). What is less clear are the potential changes in precipitation that the country will experience. In this regard, projections range from -13 to +19 mm per month (-30 to +62 per cent change) by the 2090s depending on the models used (MA, 2010). These predictions are made more difficult given that annual rains in Eritrea are heavily influenced by the Inter-Tropical Convergence Zone, a narrow belt of low pressure and heavy precipitation that forms near the equator and varies in position year to year (McSweeney et al., 2010). Understanding of how this zone will move as the climate changes is limited. While uncertainty around changes in precipitation persists, there is general agreement that the country will experience more frequent droughts (MA, 2010).

In its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), Eritrea notes its vulnerability to these projected changes given its limited adaptive capacity (MLWE, 2001). The country further is made vulnerable by its current state of land degradation, driven in part by deforestation; a century ago, 30 per cent of the country was forested, whereas less than 1 per cent remained in 1995 (MA, 2010). Though its National Adaptation Programme of Action (NAPA), Eritrea has identified the following key climate hazards: increased climate variability, recurring droughts, flash flooding and sea level rise. The most vulnerable



groups are those that depend on natural resources for their livelihoods, including rural dwellers, subsistence farmers, the urban poor, pastoralists, fishermen and island residents (MLWE, 2007).

Given the projected climatic changes, agriculture has been identified by Eritrea as its most vulnerable sector (MLWE, 2007). Reflecting the uncertainty in the projected changes in rainfall in the country, the impacts of climate change on the agriculture sector are unclear. Regional climate models foresee a 5 to 20 per cent gain in the length of growing period (LGP) in the highlands of the country, whereas another source indicates the majority of the country's population will experience moderate to large losses in LGP by 2050 (ILRI, 2009). The country's main crops, sorghum and potatoes, are grown in areas where a sharp drop in LGP is anticipated (ILRI, 2009). The National Communication indicates that climate change will have a variable impact on grain yields in the country; while sorghum (46 per cent of cereal production in country) is anticipated to increase, barley (15 per cent of current cereal production) is anticipated to decrease (MLWE, 2001). Changes in the country's LGP could further compound an already unstable food security situation (MA, 2010).

Eritrea's National Communication suggests the following measures to adapt to climate change in the agricultural sector: a policy framework; sustainable use of the natural resource base on which agriculture depends; improvement of existing crops, technologies and traditional knowledge systems; education of the public; construction of early warning system; linkage with regional and international networks; and coordination mechanism to enable stakeholders to participate in efforts to adapt to climate change. Eritrea's NAPA identifies number of priority adaptation projects to accelerate adaptation in the country, as listed in Table 3. Barriers mentioned to implementation of NAPA activities include: institutional coordination; human resource capacity; lack of regional and/or micro policies for various socioeconomic sectors; funding; and lack of clear institutional mandates.

## **B. National Level Policies and Strategic Documents**

Eritrea has prepared both a NAPA and National Communication under the UNFCCC, providing it with an understanding of the risk and priority needs related to adaptation. It has also released a National Environment Management Plan that outlines the country's broader environmental policy; however, adaptation is not explicitly mentioned in this policy.

**Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions**

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Initial National Communication under the UNFCCC <sup>108</sup>	Ministry of Land, Water and Environment	Submitted in 2002	Multi-sectoral	This document provides an overview of Eritrea’s greenhouse gas emissions profile and mitigation options, assesses the country’s vulnerability to climate change, discusses public awareness and training opportunities, and discusses financial and capacity building needs.
2.	National Adaptation Programme of Action <sup>109</sup>	Ministry of Land, Water and Environment	Submitted in 2007	Multi-sectoral	This document provides a broad overview of Eritrea’s current climate characteristics, the future anticipated impacts of climate change, the country’s key areas of vulnerability, and identifies priority adaptation actions for implementation.

### C. Current Adaptation Action

There are a very low number of adaptation projects underway in Eritrea relative to other East African countries, as listed in Table 2. The country’s two nationally-focused project are, however, quite significant. One is funded by the Least Developed Countries Fund (LDCF) and addresses adaptation in the livestock sector. It aims to improve livestock management practices, technical capacities, and develop lessons learned around adaptive livestock management practices. This project responds to a key adaptation priority identified in the country’s NAPA. The second project is being supported by the Adaptation Fund. It focused on freshwater and agriculture in the Anseba Region. The overall objective of the project would be to promote increased food security in Eritrea through climate-resilient improvements in agricultural production.<sup>110</sup> With respect to multi-country initiatives, Eritrea is participating in an Africa-wide project, “Great Green Wall”, which addressed desertification and food security through the creation of a biological through participating countries. It is also participating in a regional project funded by the Climate Change Adaptation in Africa program focused on adaptive capacity in the small-scale agriculture sector.

<sup>108</sup> UNFCCC, [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=3432#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=3432#beg)

<sup>109</sup> UNFCCC, [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=3432#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=3432#beg)

<sup>110</sup> Adaptation Fund: <http://adaptation-fund.org/node/1085>

**Table 2: Current Adaptation Projects and Programs active in Eritrea**

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
<b>National Action</b>							
1. Adapting Livestock management to Climate Change in the North-western Lowlands of Eritrea <sup>111</sup>	The objective of this NAPA follow-up project is to enhance adaptive capacity of livestock production systems in the Kerkebet area. The project supports three outcomes: (1) livestock management systems piloted that effectively integrate climate change risk management techniques; (2) technical capacities enhanced among communities and relevant institutions on integrating climate change risks into livestock and water management; (3) lessons learned about adaptation of livestock management, and a knowledge management system established.	LDCF	UNDP; Ministry of Agriculture	Field implementation; Capacity building; Research	2009-?	Agriculture	Kerkebet area
2. Climate Change Adaptation Programme In Water and Agriculture In Anseba Region, Eritrea <sup>112</sup>	The overall goal of the program is to promote increased food security in Eritrea through ecologically sustainable and climate-resilient improvements in agricultural production. Its objective is to increase community resilience and adaptive capacity to climate change through an integrated water management and agricultural development approach in the sub-zobas of Hamelmalo and Habero, Anseba Region, Eritrea. The project consists of four components: (1) increased water availability for farmers; (2) climate-resilient production; (3) improved climate risk information and community preparedness; and (4) knowledge management and policy advocacy.	Adaptation Fund  Budget: US\$6,010,000	UNDP	Capacity building; Field implementation; Policy formation and integration	2011-2015	Freshwater supply; Agriculture; Disaster risk management	Hamelmalo and Habero, Anseba Region

<sup>111</sup> ALM, <http://www.adaptationlearning.net/projects/adapting-livestock-management-climate-change-northwestern-lowlands-eritrea>

<sup>112</sup> Adaptation Fund, [http://www.adaptation-fund.org/system/files/AFB.PPRC\\_4.6%20Proposal%20for%20Eritrea.pdf](http://www.adaptation-fund.org/system/files/AFB.PPRC_4.6%20Proposal%20for%20Eritrea.pdf)

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
<b>Participation in Regional and Global Actions</b>								
3.	Managing Risk, Reducing Vulnerability and Enhancing Productivity under a Changing Climate <sup>113</sup>	Using case studies from Ethiopia, Kenya, Sudan and Tanzania, this action-research project seeks to contribute to the development of adaptive strategies by gathering knowledge on vulnerability to drought within different social, political and economic contexts, and designing decision-making tools to reduce vulnerability. The impacts of climate induced crises will be mitigated and resilience improved through the adoption, by small-scale farmers, of innovative strategies that reduce climate risk and manage vulnerability.	DFID and IDRC through the CCAA program  Budget: CAD 1,626,100	Sokoine University of Agriculture (Tanzania)	Capacity building; Field implementation	2007–2011	Agriculture	Regional: Eritrea, Ethiopia, Kenya, Sudan, Tanzania
<i>In Eritrea: Further information required.</i>								
4.	Enhancing the Disaster Risk Reduction Capacity in Agriculture and Rural Development <sup>114</sup>	Preparation of 10 capacity building modules on pre- and post-disaster risk management and mainstreaming of disaster risk reduction in agriculture and rural development, with a focus on climate change adaptation.	Global Facility for Disaster Reduction and Recovery  Budget: US\$50,000	Agriculture and Rural Development (ARD) and Sustainable Agriculture Systems, Knowledge and Information (SASKI)	Capacity building	2008–2010 (closed)	Agriculture; Disaster risk management	African: Burkina Faso, Comoros, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Niger, Rwanda, Senegal, Seychelles
<i>In Eritrea: Further information required.</i>								

<sup>113</sup> IDRC, [http://web.idrc.ca/en/ev-118881-201\\_104146-1-IDRC\\_ADM\\_INFO.html](http://web.idrc.ca/en/ev-118881-201_104146-1-IDRC_ADM_INFO.html)

<sup>114</sup> GFDRR, [http://gfdrr.org/gfdrr/ca\\_projects/detail/1228](http://gfdrr.org/gfdrr/ca_projects/detail/1228)

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
5. Adapting to Climate Change Induced Water Stress in the Nile River Basin <sup>115</sup>	To build the resilience of ecosystems and economies that are most vulnerable to climate change induced water stress in the Nile Basin countries through building key adaptive capacity and piloting adaptation in "hotspots" with technical, policy and financial interventions.	SIDA	UNEP, Nile Basin Initiative	Assessment; Capacity building; Policy formation and integration	2009–2012	Freshwater supply; Disaster risk management; Security	African: Burundi, DRC, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda
<i>In Eritrea: Further information required.</i>							
6. Great Green Wall <sup>116</sup>	The project will address desertification and food security through the creation of a biological corridor along participating countries. The goal is to increase investment in appropriate sustainable land and water management and technologies. In addition the project seeks to encourage cooperation within and among participating countries and for countries to incorporate evidence-based policy development. The program's goals are to: "expand investment in sustainable land and water management technologies in order to help communities adapt production systems to climate variability and change; improve land use planning; and improve climate and water monitoring network improvements, institutional cooperation within and across countries, and evidence-based policy development." <sup>117</sup>	LDCF; SCCF; World Bank; AfDB  Budget: US\$3.108 billion		Capacity building; Research; Policy formation and integration	2011–?	Agriculture; Ecosystem restoration	African: Benin, Burkina Faso, Chad, Djibouti, Eritrea, Ethiopia, Ghana, Mali, Mauritania, Niger, Nigeria, Senegal Sudan and Togo
<i>In Eritrea: Further information required.</i>							

<sup>115</sup> UNEP, <http://www.unep.org/climatechange/adaptation/EcosystemBasedAdaptation/NileRiverBasin/tabid/29584/Default.aspx>

<sup>116</sup> GEF, <http://www.thegef.org/gef/node/4503>

<sup>117</sup> IISD, <http://climate-1.iisd.org/news/gef-council-approves-programme-that-includes-great-green-wall-initiative/>

## D. Proposed Adaptation Action

Eritrea’s NAPA describes five priority adaptation actions in the agriculture, forestry and water sectors. The objectives of the first project described below—rangeland management improvements in lowland areas—are being addressed through an active project funded by the LDCF. The remainder of the proposed projects focus on community-based adaptation, capacity building, and field implementation activities within the areas of pastoralism, forestry, water, and agriculture.

**Table 3: Proposed Adaptation Projects and Programs in Eritrea**

Name		Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
1.	Introducing community-based pilot rangeland improvement and management in selected agro-ecological areas in eastern and north-western lowlands rangelands	The objectives of the project are to improve rangeland productivity, improve livestock productivity, increase incomes of pastoralists, establish the livelihood of pastoralists on a sustainable basis, and improve nutrition of the population and children.	Community-based adaptation; Capacity building	Pastoralism	Eastern and north-western lowlands
<b>Notes:</b>					
2.	Introducing community-based pilot projects to intensify existing production models, area and species in lowlands selecting suitable sheep and goat breeds	The objective of the project is to increase incomes of the population by reducing direct loss of animals due to lack of feed and water to increase individual animal production through the use of selected breeds and improved management; improve nutrition of the population by producing meat and milk; and enable communities to cope with current impacts of climate variability and drought.	Community-based adaptation; Capacity building	Agriculture	Eastern and north-western lowlands
<b>Notes:</b>					
3.	Encourage afforestation and agroforestry through community forestry initiative	The objective of the project is to rehabilitate degraded landscapes through afforestation, control run-off and loss of arable land on downstream areas through soil erosion; create healthy and well managed forest plantations so as to withstand the impacts of climate change; and courage individual households in a community to plant and own trees and produce sustainable wood, fruit and fodder.	Community-based adaptation; Field implementation; Knowledge sharing	Forestry; Ecosystem restoration	
<b>Notes:</b>					
4.	Groundwater recharge for irrigation wells	The objective of this project is to enhance ground water recharging, to ensure easily accessible water supply for domestic and agricultural uses, to increase spring water	Capacity building; Field implementation	Freshwater supply	
<b>Notes:</b>					



Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
	supply and protect natural forest and wild animals from extinction, and to prevent coastal ground water supply from salt water intrusion.			
5.	Introduction and expansion of irrigated agriculture for crop and livestock production The objectives of this project are to increase food crop production by avoiding crop failure due to climate variability and drought, and to increase cash income and protein food of animal origin by avoiding direct loss of animals and poor productivity due to starvation.	Capacity building; Field implementation <b>Notes:</b>	Agriculture; Freshwater supply	

### E. Assessment

Eritrea’s current adaptation actions are focused on the agricultural sector, noted by the country’s NAPA and National Communication as one of its most vulnerable areas to climate change. There is still a need to address a broader range of adaptation issues in the country, including those related to water resources management as well as reforestation. As discussed in the NAPA, it is possible that certain barriers to implementation may be interfering with the advancement of adaptation in the country.

Going forward, Eritrea may consider investing in meteorological and climate modeling research so as to better anticipate the country’s range of climate risks. Given that the country is already experiencing climate conditions that mirror the anticipated effects of climate change (such as prolonged droughts, shifts in precipitation, etc.), it may be worthwhile to research current indigenous adaptive responses in order to highlight lessons learned and/or capacity building needs. Further, there are no projects focused primarily on gender and climate change, nor on the impacts of climate change on human health.

### References:

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