



ADAPTATION FUND

AFB/PPRC.4/6
March 2, 2011

Adaptation Fund Board
Project and Programme Review Committee
Fourth Meeting
Bonn, March 16, 2011

PROPOSAL FOR ERITREA

I. Background

1. The Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, adopted by the Adaptation Fund Board, state in paragraph 41 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US\$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the approval by the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would finally require Board's approval.

2. The Templates Approved by the Adaptation Fund Board (Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, Annex 3) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.

3. The first four criteria mentioned above are:

1. Country Eligibility,
2. Project Eligibility,
3. Resource Availability, and
4. Eligibility of NIE/MIE.

4. Based on the Adaptation Fund Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Adaptation Fund was sent out on April 8, 2010.

5. According to the Adaptation Fund Board Decision Decision B.12/10, a project or programme proposal needs to be received by the secretariat not less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

6. The following project document titled "Climate Change Adaptation Programme In Water and Agriculture In Anseba Region, Eritrea" was submitted by the United Nations Development Programme (UNDP), which is a Multilateral Implementing Entity of the Adaptation Fund. This is the second submission of this proposal. It was first submitted as a fully-developed project document, using the one-step proposal process, for the 12th Adaptation Fund Board meeting, and not approved by the Board. It was received by the secretariat in time to be considered in the 13th Adaptation Fund Board meeting. The secretariat carried out a technical review of the project document, changed the assigned diary number AFB/MIE/Rural/2010/2 to ERI/MIE/Rural/2010/2, and filled in a review sheet.

7. In accordance with a request to the secretariat made by the Adaptation Fund Board in its 10th meeting, the secretariat shared this review sheet with the UNDP, and offered it the opportunity of providing responses before the review sheet was sent to the Project and Programme Committee of the Adaptation Fund.

8. The secretariat is submitting to the Project and Programme Review Committee the summary of the project, prepared by the secretariat, in Annex 1. The secretariat is also submitting to the Committee the technical review sheet and the responses provided by the UNDP, in an addendum to this document.

II. Project Summary

Eritrea – Climate Change Adaptation Programme In Water and Agriculture In Anseba Region, Eritrea

Implementing Entity: *UNDP*

Project/Programme Execution Cost: USD 587,000

Total Project/Programme Cost: USD 6,010,000

Implementing Fee: USD 510,850

Financing Requested: USD 6,520,850

Project Background and Context:

Eritrea is particularly vulnerable to climate change. Current adaptive capacity is low and the country has Africa's highest level of food insecurity, accompanied by high levels of malnutrition. Projected climate change impacts are significant and include a temperature increase above the mean global value, increasing variability in rainfall, more frequent dry spells and more severe droughts. The effects of these impacts on water resources and agriculture will exacerbate food insecurity. The overall **goal** of the programme is to promote increased food security in Eritrea through ecologically sustainable and climate-resilient improvements in agricultural production. The **objective** of the programme 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.

Component 1: Increased water availability for farmers (USD 3,056,400)

This component will address the key limitation to enhanced land and agricultural productivity in the programme area by increasing the availability of water, through floodwater harvesting and groundwater recharge.

Component 2: Climate-resilient production (USD 1,250,000)

This component will promote a range of climate-resilient technologies for enhanced agricultural and livestock production to climate-proof the livelihoods of the target population.

Component 3: Improved climate risk information and community preparedness (USD 750,000)

This component will address the identified barrier of lack of specific information on climate change risks. Improved climate risk information will be generated and disseminated amongst community, civil society and government stakeholders through a community-based early warning system.

Component 4: Knowledge management and policy advocacy (USD 366,600)

This component will implement a knowledge management system, to be institutionalised within the Zoba Anseba administration, to capture and disseminate lessons learned through programme activities, and to influence policy through advocacy activities



ADAPTATION FUND

**REQUEST FOR PROJECT/PROGRAMME FUNDING
FROM ADAPTATION FUND**

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN G6-602
Washington, DC. 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: secretariat@adaptation-fund.org



PROJECT/PROGRAMME PROPOSAL

■ PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	REGULAR PROJECT
COUNTRY/IES:	ERITREA
TITLE OF PROJECT/PROGRAMME:	CLIMATE CHANGE ADAPTATION PROGRAMME IN WATER AND AGRICULTURE IN ANSEBA REGION, ERITREA (UNDP PIMS ID 4540)
TYPE OF IMPLEMENTING ENTITY:	MULTILATERAL IMPLEMENTING ENTITY
IMPLEMENTING ENTITY:	UNDP
EXECUTING ENTITY/IES:	MINISTRY OF AGRICULTURE, ANSEBA REGION, ERITREA
AMOUNT OF FINANCING REQUESTED:	\$6,520,850

■ PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Brief description of the problem

Eritrea is particularly vulnerable to climate change. Current adaptive capacity is low and the country has Africa's highest level of food insecurity, accompanied by high levels of malnutrition. Projected climate change impacts are significant and include a temperature increase above the mean global value, increasing variability in rainfall, more frequent dry spells and more severe droughts. The effects of these impacts on water resources and agriculture will exacerbate food insecurity.

Projected climate change impacts

Climate models suggest that Africa's climate will generally become more variable, with high levels of uncertainty regarding climate projections in the Sahel zone. The main climate risks hazards identified in the assessments carried out to develop the Eritrean National Adaptation Programme of Action (NAPA) are as follows:

- *Increased climatic variability:* Relative to baseline conditions, there have been observed changes in average, range, and variability of temperature and precipitation throughout the country;
- *Recurring drought:* The occurrences of dry spells, seasonal droughts and multi-year droughts are more frequent than in the past;
- *Flash flooding:* there has been a perceived increase in episodes of torrential rainfall with heavy runoff and flooding; and
- *Sea level rise:* Coastal areas and the hundreds of Eritrean islands in the Red Sea are susceptible to rising sea levels associated with climate change.

The most recent projections of future climate for Eritrea use the latest SRES emission scenarios

of A2, B1, and A1B indicate that mean annual temperature is projected to increase by 1.1 to 3.8°C by the 2060s, and 1.6 to 5.4°C by the 2090s.¹ All projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in the current climate. Nights that are considered 'hot' for the annual climate of 1970-99 are projected to increase more quickly than hot days, occurring on 29 - 51% of nights by the 2060s and 30 - 66% of nights by the 2090s. Days that are considered 'hot' for their season are projected to increase, the most rapidly in JAS, occurring on 41- 90% of days in JAS by the 2090s. All projections indicate decrease in the frequency of days and nights that are considered 'cold' in current climate. Cold nights decrease in frequency more rapidly than cold days, not occurring at all in most model projections by the 2090s under the higher emissions scenarios (A2 and A1B).

There is no consensus between the projections of the different models as to the direction of change in mean annual rainfall. Projected changes range from -13 to +19 mm per month (- 30 to + 62%) by the 2090s. More than half of the models project increases in OND rainfall and decreases in JFM & AMJ rainfall. Increases in OND rainfall are greatest in the south-east of Eritrea, whilst the decreases in JFM and AMJ rainfall are greatest in the north-west. There is no consensus between models with respect to direction of change in the proportion of annual rainfall that falls in heavy events. Seasonally, the model ensemble range is large, but tends towards decreases in JFM & AMJ and increases in OND.

Despite current sources of uncertainty in some of the parameters, there is a high level of certainty that drought in Eritrea is projected to increase under climate change. Increased rates of evaporation related to increased temperature will nullify rainfall increments that may be observed and lead to decreased soil moisture and reduced productivity. Current projections do not provide much information on increased frequency of extreme events, such as flooding, although this was identified by the NAPA as a key threat. However, in a country like Eritrea in which drought has long been a significant and severe natural phenomenon, the high likelihood that climate change will increase incidence and severity of drought is a cause for considerable concern.

Climate change impacts on lives and livelihoods

Given Eritrea's already high levels of food insecurity and associated vulnerabilities, the projected climate change impacts, such as increased drought, higher temperatures and increasingly unpredictable rainfall, will have a significant and detrimental impact on food security, vulnerability, poverty and economic development. In particular, current low levels of agricultural productivity will be exacerbated, leading to decreased rural household incomes, increased malnutrition, and associated health impacts. This will mean that the number of people at risk from drought events will increase. Thus climate variability and change are creating poverty traps for many rural households, constantly thwarting efforts to build up assets and increase income. Secondary impacts will be on educational levels and future human resource development, and possible increased social conflict over water and land. Despite Eritrea's commitment to gender equality, climate change threatens to increase levels of inequality between women and men, thus further hampering the country's human resource development. Moreover, climate change is acting to increase the burden of all three of the kinds of situations requiring relief efforts: sudden disasters, slow-onset disasters, and complex emergencies. In Eritrea, this has mainly been experienced in the form of increased dry periods and drought.

The project location

Based on vulnerability criteria, including drought-proneness and levels of malnutrition, the

¹ All information on most recent climate change projections is taken from a presentation made by the Climate change Coordinator in the MLWE, Mr Seid Abdu Salih, at the Inception Workshop for this project proposal, held in Asmara on 24th September 2010.

Ministry of Agriculture, together with government departments dealing with coordination and planning, identified the project locality as the Anseba Region or Zoba. Within the zoba, the Governor's Office, together with relevant departments, identified the two sub-zobas of Hamelmalo and Habero for the site of the project interventions. Criteria for selection of the two sub-zobas include levels of vulnerability related to climate variability and change. **More specifically:**

- The two sub-zobas have been identified as having particularly vulnerable livelihood systems (semi-sedentary livestock-based agro-pastoralism, and irrigation-based agro-pastoralism. The 2008-2012 Anseba Regional Development Plan ranked Habero and Hamelmalo as in the top five (out of 11) sub-zobas most affected by food insecurity, due largely to drought. The Zoba Administration selected Habero and Hamelmalo for this project as other vulnerable areas are being better addressed by government through regular rangeland/livestock development programmes.
- A further selection criterion was that Habero and Hamelmalo are bisected by the Anseba, a major seasonal river with base flows that can be strategically harnessed to enhance the availability of water for increased productivity and thus adaptive capacity for vulnerable communities, by expanding small-scale irrigation for vegetable production and rangeland development.

Low agricultural productivity and land degradation have become major features of this zoba. The main constraint is recurrent drought. Over the last three decades, the zoba has experienced several droughts as well as erratically distributed rains. The effective rainy period is short, starting in mid June and extending to August. Sometimes rain starts too early and ends too early, with adverse effects on crop and livestock production. Other problems include cultivation of marginal land without fallowing and inappropriate land management, lack of investment in land improvement, inadequate animal feed, depletion of underground water and the natural limitations of the rugged topography. These problems are major setbacks to improvement of the agricultural resource base in the zoba. Furthermore, inadequacy of agricultural extension services has contributed to the low level of development of agriculture in this zoba.

The livestock population in Anseba is highly affected by shortage of feed. Most of the livestock are grazed freely in the rugged topography of valleys and plains. Cereal straw is also a major component of animal feed. However, overgrazing has contributed to land degradation, which in turn further depletes grazing land. To obtain better pasture land, herdsman in this zoba migrate westwards to Zoba Gash-Barka between July and September and to the eastern escarpment or the Northern Red Sea zoba from November to March. This traditional coping practice has been disturbed by a number of factors, including increasing conflicting land use pressures, land degradation, and newly established Government policies, for example on settling mobile people.

The two sub-zobas identified as having particularly vulnerable livelihood systems, Habero and Hamelmalo, are bisected by a major seasonal river, the Anseba. This has base flows that could be strategically harnessed to enhance the availability of water for increased productivity, by expanding small-scale irrigation for vegetable production and rangeland development, thus improving adaptive capacity. In previous decades, the base flow of the Anseba River was present throughout the year. This is now severely reduced to a couple of months, with groundwater flow having dropped to two to three metres below the stream surface, constraining both the irrigated crops and water supply for both human and livestock.

Current projections of climate change indicate a considerable impact on the Anseba River base flows and shallow groundwater along the stream bank. As noted in the NAPA, it is expected that increase in temperature and variability of rainfall will lower groundwater supply in general and

will increase crop water demand. It is likely that in the absence of adaptation actions, climate change will result in an ongoing or accelerated decrease in groundwater along the Anseba valley, leading to drying of most shallow wells.

While projections for the lowland regions of the project area indicate reductions in rainfall, these projections also point to increments in the highland regions. Thus it may be that the highland areas of the project site will experience more rain. As this may fall in more intense events, it may be that runoff will increase accordingly. Potential benefits may be offset by increased evaporation due to higher temperatures.

National socio-economic and development context

When Eritrea achieved independence from Ethiopia in 1993 after 30 years of war, the country's economy was in ruins, and public infrastructure and institutions were seriously damaged or destroyed. The new government embarked on a lengthy process to establish public sector organizations to stimulate economic growth and provide basic services. However, political tensions related to subsequent border conflicts with Ethiopia have had a significant impact on the socio-economic development of the country, with financial and human resources diverted to defence. Thus Eritrea remains one of the poorest countries in the world, with a Human Development Index (HDI) of 0.472, which gives the country a rank of 165 out of 182 countries with data². Development in Eritrea has further been seriously affected by the recurrent drought experienced in the Horn of Africa region. As a result of these and other causes, food production has fallen, as has investment in development, leading to increasing poverty and vulnerability. Poor communication and transportation infrastructure in the outlying areas further exacerbate development challenges.

The population of Eritrea is approximately 3.66 million³, with population growth at 2.74%.⁴ Much of the population is clustered in the cooler climates of the central highlands; more than 80% of the population live in rural areas⁵. According to the National Statistics Office, approximately 66% of the population was living below the poverty line in 2003. Eritrea's per capita GDP is US\$626, with a ranking of 177 out of 181 countries, and the country is the most food insecure in Africa⁶. Levels of malnutrition are extremely high, and 40% of children under five are underweight for their age. Life expectancy at birth is 59.2 years.⁷ According to the 2009 Human Development report, 40% of Eritreans do not have access to an improved water source⁸. The adult literacy rate is 36.8%, with the literacy rate for women being 69.6% of that of males. Eritrea's gender-related development index (GDI) is 0.459, which should be compared to its HDI value of 0.472. Its GDI value is 97.2% of its HDI value. Out of the 155 countries with both HDI and GDI values, 135 countries have a better ratio than Eritrea's⁹, indicating that additional efforts are required to achieve national goals of gender equality. About 30% of households in Eritrea are headed by women, of which 18% are widowed. On average, female employees earn less than half the amount that males do, and a majority of poor women in the rural areas are engaged in low-

² 2009 Human Development Report. The HDI goes beyond GDP to encompass a broader definition of well-being, and provides a composite measure of three dimensions of human development: living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and enrolment at the primary, secondary and tertiary level) and having a decent standard of living (measured by purchasing power parity, PPP, income). The index is not a comprehensive measure of human development, and does not, for example, include important indicators such as gender or income inequality and more difficult to measure indicators like respect for human rights and political freedoms.

³ National Demographic Health Survey, 2002. A further million Eritreans live abroad, mostly in Sudan with lesser numbers in Saudi Arabia, Germany, USA and elsewhere.

⁴ Eritrea Interim-Poverty Reduction Strategy Paper, April 2004

⁵ Eritrea National Adaptation Programme of Action, 2007

⁶ 2007 Africa Report of the World Bank

⁷ 2009 Human Development Report

⁸ 2009 Human Development Report

⁹ The gender-related development index (GDI), introduced in Human Development Report 1995, measures achievements in the same dimensions using the same indicators as the HDI but captures inequalities in achievement between women and men. It is simply the HDI adjusted downward for gender inequality. The greater the gender disparity in basic human development, the lower is a country's GDI relative to its HDI.

paying manual labour in construction and agriculture. Furthermore, female-headed households have fewer household assets including livestock than male-headed households. Rural women are less likely to be literate and numerate - about 40% leave school at an early stage due to marriage. Rural women often do not receive antenatal care and suffer from poor nutrition.

On a positive note, Eritrea is on track to achieve the Millennium Development Goal (MDG) dealing with gender equality at the primary school level by 2015. According to current trends, the country will also achieve the MDG targets regarding child health, maternal mortality, HIV/AIDS, malaria and other major diseases, and access to safe water. However, the goals of eradication of extreme poverty and achievement of universal primary education remain elusive.

Eritrea's economy is based primarily on agriculture, followed by industry, fisheries and the services sector including tourism. Over 80 per cent of the population relies on traditional subsistence crop cultivation and livestock husbandry¹⁰. Despite this, agriculture, which is primarily rain fed, accounts for just one-fifth of the gross domestic product (GDP). Less than 10% of arable land is irrigated.

Food security is a pressing issue in Eritrea, where, even in years with adequate rainfall, approximately half of the food that the country requires has to be imported. Poverty is closely linked to food security in Eritrea: rural households are the most severely affected by poverty because of the low productivity of their crops and livestock enterprises, with almost two thirds of all households lacking food security.¹¹ Many rural Eritreans lack access to safe drinking water. Inadequate communications infrastructure provides a further barrier to development: for example, in 2008, there were three fixed line and mobile phone subscribers per 100 people, and three internet users per 100 people, with an even lower number of personal computers (0.8 per 100 people in 2007)¹². While progress has been made in power generation, 77.3% of total energy consumption is derived from biomass.¹³

Despite their tough situation, rural communities across Eritrea have displayed remarkable resilience through traditional ways of protecting the poor. During times of extreme stress, wealthier households dispose of assets, mainly livestock, and then make loans to poorer relatives and neighbours. Labour-sharing is also common: at various times during the agricultural cycle, a community's wealthier adults will assist households that are unable to cultivate their land.¹⁴

Environmental context

A century ago, 30% of Eritrea was covered by forest, but less than 1% of this remained by 1995. Deforestation has resulted from expansion of agriculture, cutting of trees for fuel-wood, the long war of liberation during which military forces cut trees for the construction of fortifications, and the construction of materials-intensive traditional houses. Widespread land degradation is the most serious environmental concern of Eritrea, caused to a large extent by inappropriate land management, unsustainable agricultural practices, and overgrazing and deforestation resulting in clearing of vegetation cover and increased soil erosion. The annual rate of soil loss from cropland is estimated at 12–17 tons/ha and crop yield is declining at the rate of 0.5% per annum owing to soil erosion¹⁵. The overwhelming dependence on biomass (charcoal, firewood, agro-residues and cow dung) for domestic energy contributes significantly to clearing of forests and woodlands. A number of these unsustainable practices have resulted in a reduction in Eritrea's

¹⁰ Ministry of Land, Water and Environment. (2007). *National Adaptation Programme of Action*.(NAPA) . Asmara, Eritrea.

¹¹ IFAD Rural Poverty Profile of Eritrea, <http://www.ruralpovertyportal.org/web/guest/country/home/tags/eritrea> accessed 01/10/2010

¹² <http://www.ruralpovertyportal.org/web/guest/country/statistics/tags/eritrea> accessed 01/10/2010

¹³ Ministry of Energy and Mines, 1996

¹⁴ IFAD Rural Poverty Profile of Eritrea, <http://www.ruralpovertyportal.org/web/guest/country/home/tags/eritrea> accessed 01/10/2010

¹⁵ Source: ministry of Agriculture, quoted in UNDP Small Grants Programme Mobilisation Strategy

terrestrial biodiversity, although it appears that coastal and marine biodiversity resources have remained relatively stable.

The country has not compiled a State of Environment report and monitoring and reporting on natural resources is largely absent. As noted in the UNDP Country Programme, lack of adequate data on environmental sustainability has prevented a clear assessment of progress in this area.

Current climate variability

Seventy per cent of Eritrea's land area is classified as hot and arid, receiving average annual rainfall of less than 350 mm. The climate regime is highly variable, being influenced by the expanding Sahel-Saharan desert, the proximity to the Red Sea and the land's physical features. Altitude and topography play major roles in determining climate in general and temperature in particular. Typically, mean annual temperature declines by 1°C for each 200-metre rise in elevation. Ambient average temperatures vary considerably, with the eastern lowland having an annual mean of 31 °C reaching as high as 48 °C; while in the highland areas the annual mean is 21 °C with a maximum of 25 °C. In the western lowland areas, the annual mean is 29 °C with a maximum of 36 °C.

Based on climate, soil types and other parameters, Eritrea is divided into six agro-ecological zones: (i) moist highlands, (ii) arid highlands, (iii) sub-humid highlands, (iv) moist lowlands, (v) arid lowlands and (vi) semi-desert. These zones encompass two rainfall regimes, summer and winter, whose patterns and amounts are affected by the difference of physiognomic regions. The location of the proposed project in Hamelmalo and Habero sub-regions of the Anseba Region, discussed below, falls largely within the arid lowlands, with parts falling within the arid highlands zone. The summer rains are brought by south-westerly monsoon winds and are concentrated mainly in the months of July and August. They affect the central highland and the western lowland areas.¹⁶ More than 70% of the rainfall occurs in July and August.¹⁷ High rainfall intensity coupled with little vegetation cover results in high runoff, high evaporation and little recharge of underground aquifers. A main feature of rainfall patterns in Eritrea is the extreme variability within and between years, and spatial variation over very short distances.

Mean annual temperature has increased by 1.7⁰C since 1960, an average rate of 0.37⁰C per decade. The increase is most rapid in JAS¹⁸ at a rate of 0.55⁰C per decade. While increases in the frequency of 'hot' days have been small, increases in the frequency of hot nights are larger, and statistically significant in JJA, OND, and in the annual data. The average number of 'cold' nights per year has decreased by 34 (9.3% of days). Observations of rainfall over Eritrea show small, but not statistically significant, increasing trends in rainfall, but there are insufficient daily rainfall records available to identify trends in daily rainfall variability.

The programme location - context

Eritrea is composed of six regional administrations namely the Northern Red Sea, Southern Red Sea, Debub, Anseba, Central and Gash-Barka regions. Zoba Anseba is located in the north-west of Eritrea, with a total area of approximately 22,834.28 square kilometres, covering about one fifth of the country. Keren town, the capital of Zoba Anseba, with a population of approximately 100,000 people, is located 91 km north-west of Asmara, Eritrea's capital city. Administratively, Zoba Anseba is divided into 11 sub-regions (sub-zobas). The sub-regions or sub-zobas are sub-divided into 109 administrative kebabis (collection of villages) comprising

¹⁶ The winter rains typically occur from November to March and are influenced by the north-easterly continental winds. These rains affect coastal areas and the eastern and southern escarpments.

¹⁷ The main rainy season in most parts of the country is from June to September. A short rainy season involving a small number of highland areas occurs between March and May.

¹⁸ July, August, September

approximately 441 villages.

Agriculture including livestock is the principal economic activity for the people of the Anseba zoba. About 80% of the population mainly relies on this sector for food, income and employment. Agriculture is mainly rain-fed and subject to climatic variability. Out of the total land area only 368,088 ha (16%) is currently classified as potentially arable land and only about 17 percent (62,393 ha) of this potential arable land is cultivated annually for crop production¹⁹. The average land holding ranges between 1 and 2 hectares. As for the primary income sources of the population in Anseba zoba, 49.8% of the population are agriculturalists, 19.2% are agro-pastoralists, 12.2% are pastoralists and 18.8% are engaged in trade and small-scale industries (including both wage labor and self-employment).

Although there is no specific study on the historical and recent forest coverage for Anseba, it is believed that large parts have been deforested, particularly through wood cutting for house construction, firewood, and in certain areas for making charcoal. As forest cover has declined, the rugged topography of the area has resulted in steep slopes becoming exposed to severe soil erosion, reducing topsoil and making the forest and woodland regeneration difficult. Many of the valleys in between hills and mountains are too narrow to be used for large scale farming, although the soils in the valleys are relatively deeper and more fertile. The conversion of forests and woodlands into croplands has also been a major agent of the depletion of biological resources, and overgrazing contributes considerably to the loss of biological diversity.

The most common crops grown in the zoba in order of importance are sorghum, pearl millet, barley, maize, ground nut, wheat, and finger millet. When rainfall is within the normal range the average yields of the two major crops are about 0.36 tons per hectare²⁰. Vegetable and fruit production is carried out in limited areas along the banks of the major ephemeral rivers, namely the Barka, Anseba, Gadmay, Begu and Daerotay. Major livestock are cattle, sheep, goats, and pack animals (donkeys, horses, and camels). A recent estimate of livestock numbers is 540,000 goats, 165,000 cattle, 90,000 pack animals, 300,000 poultry and 3,000 bee colonies²¹. At the household level, livestock are used for food, income generation, as draught animals in farming transport and for manure.

The food security situation in the zoba is extremely precarious. In 2005, annual cereal consumption per head for the zoba was about 0.18 tons, which means that 80,803 tons of cereals would be required to feed the entire population of the zoba²². According to the Zoba Administration, over the past five years per capita food production has showed no growth. In most parts of the region crop production has stagnated and in others it is showing a decreasing trend. In 2002, a drought year, the estimated annual crop production was 454.75 tons which accounted for only one percent of the total annual food requirement of the region. The food production deficit contributes to a picture of overall food insecurity that renders the population of the zoba highly vulnerable to any external shock that may affect their food production and livestock.

The Ministry of Health has implemented interventions to improve the nutritional status of the population, particularly children and mothers, by promoting breast-feeding and complementary feeding of infants, and tackling macro-and micro-nutrient deficiencies.

Sub-zoba Hamelmalo begins 15 km north of Keren and extends for about 20- 25 km up to its northern neighbouring sub zobas of Halhal and Habero. The total area of the sub zoba is 454.3

¹⁹ Planning and Statistics of Zoba Anseba, 2010

²⁰ FEWS NET & NFIS, 2005, Baseline study of livelihood system in Eritrea, Phase 1: preliminary Identification of Livelihood Systems and Livelihood Profiling of Anseba Zoba (Region), Eritrea

²¹ (ARDP, 2010)

²² FEWS-NET & NFIS, 2005

square km. Hamelmalo has a total population estimated at 28,000 people of which 48 percent are women and 52 percent men. Population density is estimated at 62 persons per square km.

Sub zoba Habero is located in the eastern part of zoba Anseba and starts at 25 km from Keren and extends for about 80 kilometres in a north-north westerly direction. The total area of the sub zoba is 1034.4 square km, with a total population of about 39,500 people, of which 47 percent are women and 53% men. The population density is estimated at 38 persons per square km.

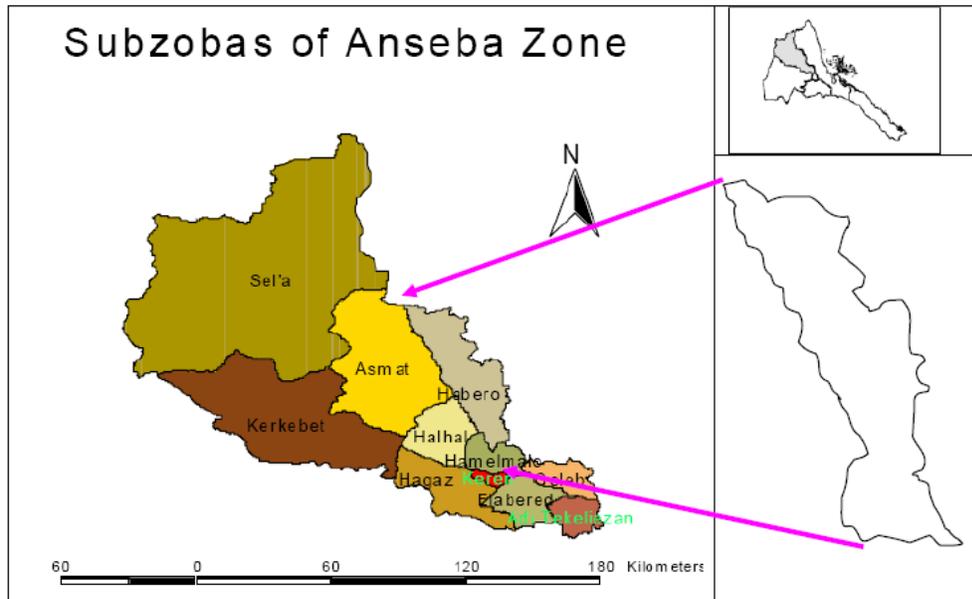


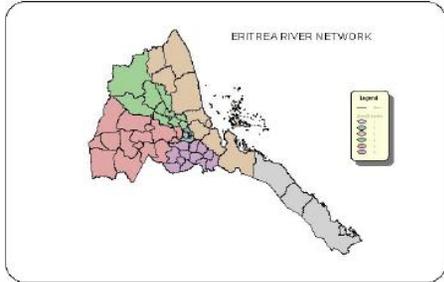
Figure 1 – location of Anseba region and the two project targeted sub zobas (Habero and Hamelmalo)

Both targeted sub-zobas are characterized by the hot and arid lowlands climate. The average annual rainfall for Habero is about 190 mm while for Hamelmalo it is about 367 mm. Since 1990, the two sub-regions have been seriously affected by drought. During 2002-2004 rainfall was particularly erratic and below average, especially in parts of Habero, resulting in loss of household assets such as livestock and greatly affected the livelihoods of communities.

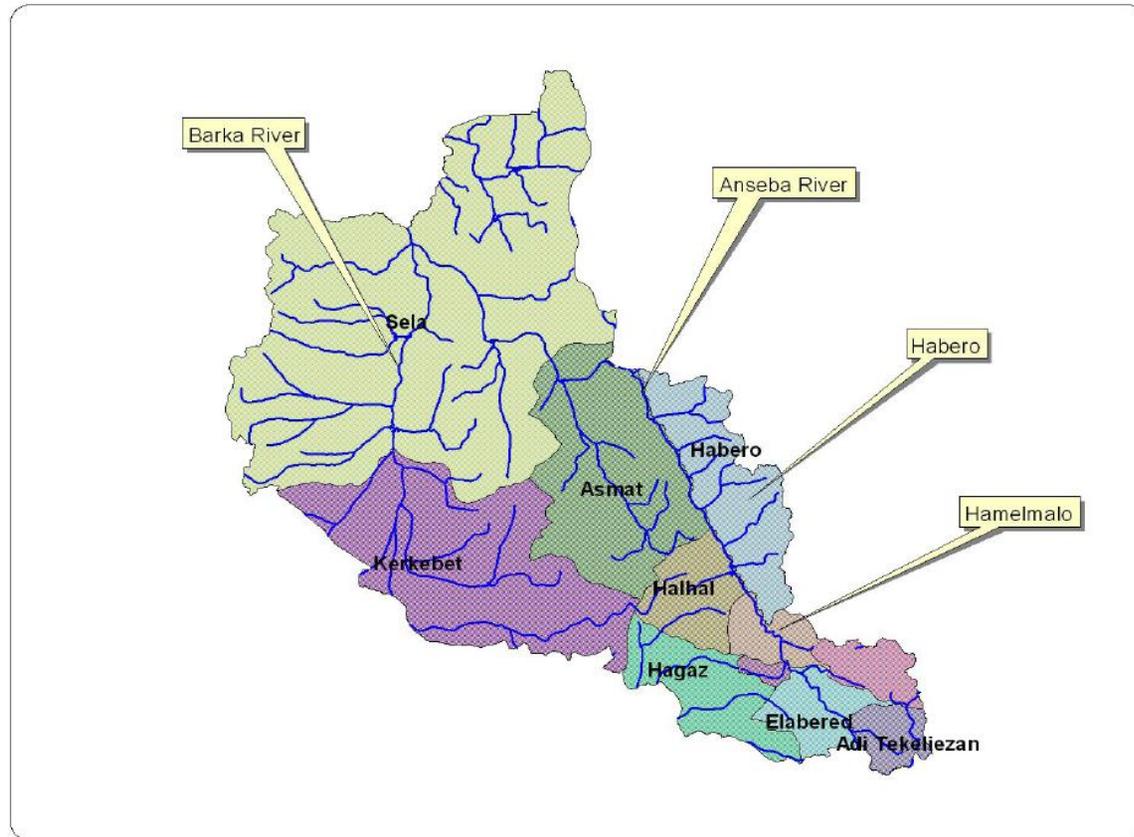
With the exception of the high grounds on the eastern boundary of the zoba, which lie in the Arid Highlands (ArH) agro-ecological zone, more than 80 percent of the two sub-zobas are located dominantly within the Arid Lowlands (ArL) agro-ecological zone. The two predominant livelihood systems of the programme area are semi-sedentary livestock based agro-pastoralism, and irrigation based agro-pastoralism.

Habero and Hamelmalo are bisected by the Anseba, a major seasonal river with base flows that can be strategically harnessed to enhance the availability of water for increased productivity and thus adaptive capacity for vulnerable communities, by expanding small-scale irrigation for vegetable production and rangeland development.

Figure 2 shows the location of the project area with major river network.



ANSEBA AND IT'S SUB REGIONS LOCATION MAP OF THE PROJECT AREA INCLUDING RIVER NETWORK



Those who practice semi-sedentary livestock based agro-pastoralism are located mainly in the south-eastern and southern parts of the Anseba zoba, including both the highlands and lowlands of Habero and Hamelmalo. These parts receive a mean annual rainfall of 300-500 mm and rain fed crop production is practiced from June to September. People falling within this livelihood system earn income from the sale of livestock and livestock products (cattle, goats, sheep and camels), supplemented by crops such as pearl millet and sorghum. This zone is also well known for its ground nut production. Additional livelihood activities include selling Doum palm leaves, wood and non-timber forest products (NTFPs) such as bark and leaves of certain trees, as well as wild fruits that are available during the dry season. In addition, vegetable and fruit crops are grown in small-scale irrigated fields (e.g. tomato, onion, pepper, okra, and guava). The populations live in villages with some movement between the upland and the lowland rivers of Barka, Anseba, and Gash rivers. During the dry season some household members migrate with their livestock to grazing areas close to the Barka, Gash and Anseba rivers.

Irrigation based agro-pastoralism is mainly found in the riverine areas of Hagaz, Elabered, Hamelmalo and Gheleb sub-zones. It depends upon irrigation-based crop production, supplemented by rain fed crop production and livestock (mainly cattle, camel, sheep, and goats). In the programme area, it is found along the Anseba river in Hamelmalo sub-zoba, where water for irrigation is pumped using motorised pumps from hand-dug wells located along the river banks and seasonal wadis. The landform is dominated by collo-alluvial plains and outwash fans as well as alluvial flood plains and low terraces. It has gentle slopes (0-3%) with an altitude range of 400-1600 metres. There are large differences in the amount of rainfall, ranging from 200-500 mm per annum with a growing period not exceeding 60 days. Sorghum and pearl millet are the dominant crops in this area. In the river banks, the vegetation is dominated by *Hyphaena thebica*, *Ziziphus spina Christ* and *Tamrix aphylla*; outside the riverbanks in the floodplains, *Acacia mellifera*, *Adansonia digitata*, and *Acacia tortilis* are found. Where irrigation systems are in place, agricultural productivity is high. Various fruit crops such as lemon, orange, mandarin, and guava are grown in commercial and semi-commercial farms along the valleys of Anseba river and its tributaries. Tomatoes, okra, pepper, and onion are grown on a small-scale for local consumption and sale in the markets.

In both Habero and Hamelmalo forest is an essential component of the traditional livestock production system, providing fodder, shelter, marketing place, and checkpoints for veterinary services. The dependency of livestock on forest and forest products usually increases during the drought years.

While no specific data is available for poverty amongst women and concerning women-headed households in the programme area, the I-PRSP notes that in general a majority of poor women in the rural areas of Eritrea are engaged in low-paying manual labour in construction and agriculture. Furthermore, female-headed households have fewer household assets including livestock than male-headed households. Rural women are less likely to be literate and numerate - about 40% leave school at an early stage due to marriage. Rural women often do not receive antenatal care and suffer from poor nutrition.

While malaria does exist in the programme area, this has been successfully tackled by the Malaria Control Programme in the region and the incidence of the disease has been significantly reduced. Thus malnutrition is the most pressing health issue in the programme area, and also one that is highly vulnerable to the projected climate change impacts for the programme area. While HIV prevalence is lower in the rural areas of Eritrea in general, prevalence in Keren, the capital of Anseba, is above the national average: the town is not, however, considered one of

the hotspots for HIV prevalence in the country.²³

■ PROJECT / PROGRAMME OBJECTIVES:

The overall **goal** of the programme is to promote increased food security in Eritrea through ecologically sustainable and climate-resilient improvements in agricultural production. The **objective** of the programme 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 programme will deliver on this objective through four outcomes:

OUTCOME 1: Increased water availability and erosion control through floodwater harvesting and irrigation technologies

OUTCOME 2: Enhanced climate-resilient agricultural and livestock production

OUTCOME 3: Improved climate risk information and climate monitoring used to raise awareness of and enhance community preparedness to climate change hazards

OUTCOME 4: Lessons learned and shared and policy influenced through knowledge management system

The programme is completely aligned with the priorities and programme profile set out in Eritrea's NAPA, as well as with the Interim Poverty Reduction Strategy Paper (I-PRSP), which provides the government's commitment to poverty reduction, and acknowledges drought as one of the major causes of poverty and food insecurity in the country. Eritrea is eligible to receive funding from the Adaptation Fund because it is a developing country party to the Kyoto Protocol and is particularly vulnerable to the adverse effects of climate change, due to its arid and semi-arid environment, propensity to desertification, its low-lying coastal area and fragile mountain ecosystem, and its existing high levels of human vulnerability to climate variability.

■ PROJECT / PROGRAMME COMPONENTS AND FINANCING:

Programme components relate to the four main outcomes, and the outputs identified to achieve them. The outcomes deliver the programme objective, while the outputs are the deliverables produced by the activities. Details of outputs and activities and their rationale are provided in Part II, Section A, and the specific output budgets, summarized below, are explained in Part III, Section D.

Table 1 Programme components and financing

PROGRAMME COMPONENTS	EXPECTED OUTCOMES	EXPECTED CONCRETE OUTPUTS	AMOUNT (US\$)
<p>1. Increased water availability for farmers</p> <p>This outcome will address the key limitation to enhanced land and</p>	<p>OUTCOME 1:</p> <p>Increased water availability and erosion control through groundwater</p>	<p>Output 1.1: Groundwater recharged and irrigation technology improved for crop and forage production by developing a sub-surface dam within the Anseba River</p>	<p>1,067,400</p>

²³ Ministry of Health and UNAIDS Eritrea, 2010

community, civil society and government stakeholders through a community-based early warning system.		system in sub-zobas Hamelmalo and Habero	Total Outcome 3 = US\$750,000
4. Knowledge management and policy advocacy This component will implement a knowledge management system, to be institutionalised within the Zoba Anseba administration, to capture and disseminate lessons learned through programme activities, and to influence policy through advocacy activities	OUTCOME 4: Lessons learned and shared and policy influenced through knowledge management system	Output 4.1: Knowledge management system established and knowledge management activities implemented Output 4.2: Policy advocacy activities implemented	224,000 142,600 Total Outcome 4 = US\$366,600
7. Programme Implementation – Total Costs			5,423,000
8. Programme/Programme Execution cost ²⁴			587,000
9. Total Programme/Programme Cost			6,010,000
10. Programme Cycle Management Fee charged by the Implementing Entity (8.5%) * Note			510,850
Amount of Financing Requested			\$6,520,850

Note: On the request of the Government of Eritrea, the project will be implemented by UNDP using the MIE modality. UNDP is able to provide the following implementation services through its country office, regional and headquarters networks: project identification, formulation, and appraisal; determination of execution modality and local capacity assessment of the national executing entity; briefing and de-briefing of project staff; oversight and monitoring of AF funds, including participation in project reviews; receipt, allocation and reporting to the AF Board of financial resources; thematic and technical capacity building and backstopping; support with knowledge transfer; policy advisory services; technical and quality assurance; and troubleshooting assistance to the national project staff. Further details on the types of specialized technical support services which may be provided are articulated in the table provided to the AFB Secretariat on 14 May 2010 (as annexed).

■ PROJECTED CALENDAR:

Indicate the dates of the following milestones for the proposed project/programme

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	January, 2011
Mid-term Review	June, 2013
Project/Programme Closing	December, 2015
Terminal Evaluation	October, 2015

²⁴ This total includes the costs over the five years of the project for the Project Coordinating Unit of \$367,000 plus the M&E costs of \$220,000

PART II: PROJECT / PROGRAMME JUSTIFICATION

The Programme 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 programme will adopt a participatory approach working with vulnerable groups in particularly drought-prone areas of Anseba Region, including small-scale farmers, agro-pastoralists and rural women.

Flood water will be harvested, water storage will be developed and soil erosion control measures and irrigation will be introduced. Climate-smart technology will be implemented, including drought-resistant and early maturing crops, by means of enhanced extension services. Rangeland management systems will be enhanced. Improved information on climate change risks will be generated and integrated into farmer and pastoralist practices. The programme will improve knowledge and understanding of climate change impacts among stakeholders, develop a community-based early warning system to reduce climate risks, and an action research approach linking traditional and scientific knowledge through the use of seasonal forecasts.

The programme will additionally have a strong learning and knowledge management component to capture and disseminate lessons learned. Every effort will be made to institutionalise this within the processes of the Ministry of Agriculture at the Zoba Anseba level, the executing agency.

The programme will be led by the Anseba Zoba Administration, working with local communities in Hamelmalo and Habero sub-regions, with support and oversight by central government.

Further detail of the programme activities and how these combine to form an integrated intervention is now provided, structured according to the four outcomes and their constituent outputs, i.e. the tangible products and services that the programme will deliver on.

OUTCOME 1: Increased water availability and erosion control through groundwater recharge, rainwater harvesting, irrigation and soil and water conservation measures

This outcome is designed to address the key limitation to enhanced livelihoods and increased sustainable agricultural productivity in the programme area: water. The component will also result in reduced land degradation and soil erosion through the implementation of on-farm and off-farm soil and water conservation measures. Ground water recharge will be enhanced by the development of a sub surface dam²⁵ built within the channel of the Anseba River. Depending on the specific locality, this may be replaced or supplemented by sand storage dams²⁶. Both sub-surface and sand storage dams are important structures to reduce evaporation, which will be one of the main impacts of the projected increase in temperature due to climate change in the programme area.

Supplementary irrigation will be enabled by the development of small diversion structures off tributaries of the Anseba River, to improve crop production and rangeland productivity. These will be simple, farmer-friendly structures, using locally available materials. Such structures do not require sophisticated design and construction, do not easily become silted up and can be operated and maintained by newly established or strengthened water users groups. It is

²⁵ A sub-surface dam is a physical structure constructed below ground level that obstructs the flow of groundwater and stores water below the ground surface. It is also used to raise the groundwater table in an aquifer with a limited flow of groundwater, which is thus made accessible for gravity diversion or pumping.

²⁶ When a sub surface dam is slightly raised above ground it starts impounding water in sediments caused to accumulate by the dam its self – this is known as a sand storage dam. Both are important structure to reduce evaporation which is one of the impacts of increase in temperature due to climate change.

envisaged that six small diversion schemes will be completed, and a total of about 120 ha of rangelands (65% in Haboro) and another 120 ha of cereal crop production area (65% in Hamelmalo) will be equipped with flood diversion and water spreading facilities that increase soil moisture for crop/forage production.

The crops most likely be planted on irrigated land are vegetables such as onions, tomatoes, peppers and okra, and fruits such as guava, which are the most dominant in the project area. These irrigated lands developed by the project will be located downstream of the sub-surface and small dams. Under the flood water diversion scheme, existing rain-fed cereal production will be supplemented by spreading flood water to grow mainly sorghum and pearl millet, and to some extent ground nut.

Inline with the National Food Security Strategy Paper, which defines food security as *access* by all people at all times to adequate *nutritious* food to lead a healthy and productive life. One of the project's aims is to promote resilience to climate change and its effects on food security by diversifying agricultural production and improving household income and purchasing power. Access to nutritious food will be promoted through increased production of cereal staple crops, forage for livestock and vegetables for household consumption and also for onward sale which should generate greater purchasing power of the targeted communities. **Output-1.1** sub surface dam will be designed to address forage production and irrigated vegetable production that will diversify income, increase purchasing power and increase availability of nutritious food while **Output 1.2** flood diversion irrigation scheme, **Output 1.3** Micro dams and **Output 1.4** soil and water conservation activities are designed to address staple cereal production, and improved rangeland management.

Vegetable production from the two villages has a reliable market in Keren, which has a population of 100,000. The Keren market constitutes the third largest share in the total market for vegetable production in the country. The two project sites are close to market: Hamelmalo and Habero are 15km and 25km distance from Keren respectively, connected by all-weather roads. The vegetable and fruit marketing cooperative in Keren gives farmers better confidence in securing a reliable market for the sale of their vegetable produce through contractual agreements, which have further outlets and links to other markets in the country.

The programme will further develop two micro dams, with an earth embankment not more than 10 meters in height, an outlet facility and a small lined conveyance canal, across small seasonal streams at localities away from the Anseba River bed. The purpose of these small dams will be to reduce agropastoralists' vulnerability to high rainfall variability and frequent occurrence of drought, both of which are projected to increase with climate change. The micro dams will provide a means to retain and store runoff water of small streams during the rainy season, for use to replenish the moisture deficiency of crops or pastures that have been subject to extended periods of no or low rainfall during the crop/pasture production season.

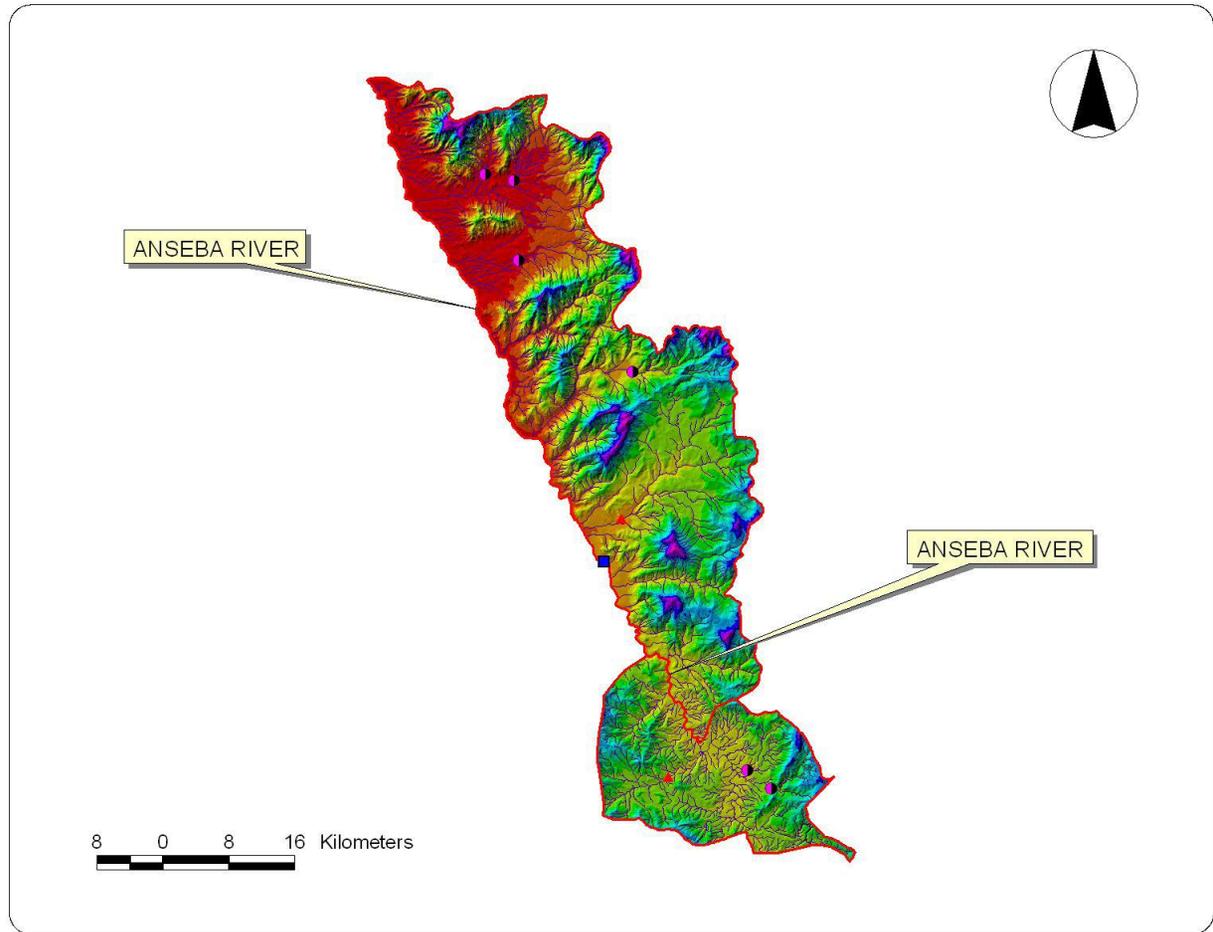
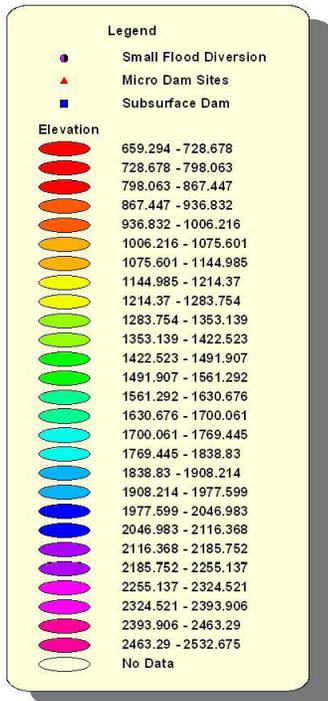
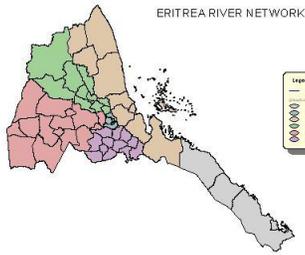
Finally, under this outcome, the programme will implement a range of soil and water conservation (SWC) activities, in order to improve runoff management and infiltration on both rangelands and arable areas. An integrated catchment management (ICM) approach will be adopted to guide planning and implementation of the SWC measures. In order to minimize the sedimentation rate of the micro dams, and reduce the intensity of runoff that could have a negative impact on agricultural land, and to facilitate the proposed afforestation and enclosure (permanent and temporary) development, the programme will construct physical structures such

as hillside soil and stone bunds, terraces, and check dams.²⁷ To rehabilitate and sustain the natural environment the programme will support the establishment and rehabilitation of nursery sites at the centre of the two programme sub-zoba. Trees will be planted and guarded until trees well established. To reduce land degradation of farm lands, improve soil fertility and soil structure and enhance in situ moisture conservation, activities such as farmland terraces will be undertaken. Community and household woodlots planted with multipurpose trees will be established, as well as within the premises of individual households.

Figure 3 shows the location of the proposed project infrastructure.

²⁷ SWC works are generally restricted between January and May when fields are not cultivated and labour is available from the communities and many members have poor access to food.

LOCATION OF PROPOSED WATER RETENTION AND DIVERSION SITES ANSEBA CLIMATE CHANGE ADAPTATION FUND PROGRAM



Output 1.1: Groundwater recharged and irrigation technologies implemented for crop and forage production by developing a sub-surface dam within the Anseba River

Activities

Activity 1.1.1: Complete a detailed technical design of the proposed sub-surface dam with its water abstraction, conveyance and distribution facilities. This will include an environmental impact assessment and mitigation plan as per the National Environmental Impact Assessment Procedures and Guidelines

Activity 1.1.2: Construct the sub-surface dam and associated irrigation technology

Activity 1.1.3: Establish effective participatory water management body for the dam and associated irrigation technology

Activity 1.1.4: Prepare manual on operation and maintenance of the irrigation technology

Activity 1.1.5: Sensitize and train communities to strengthen the basis for subsequent operation and maintenance of all new irrigation developments

Output 1.2.: Floodwater harvested to enable irrigation of rain-fed cereal production and rangelands.

Activities

Activity 1.2.1: Select the location for the proposed diversion weir, based on specified criteria to include priorities in the regional development plan, the vulnerability level of local communities due to climate change variability, potential to benefit most vulnerable households e.g. women-headed; and the existence of topographically suitable irrigable land

Activity 1.2.2: Prepare topographic map of sites, perform site investigation and hydrological analysis, and complete the design and detailed costing for small flood diversion schemes

Activity 1.2.3: Construct small diversion systems

Activity 1.2.4: Develop new or strengthen existing community-based water management structure to ensure effective and sustainable operation of the diversion systems

Activity 1.2.5: Develop manual on operation and maintenance of the flood diversion scheme and ensure that it is used

Output 1.3: Two micro dams constructed to retain and store rainfall run-off and to enable higher cereal and forage production levels as well as supply of water for livestock

Activities

Activity 1.3.1: Identify suitable locations for the two micro dams based on vulnerable communities, streamflow characteristics and irrigable potential of land

Activity 1.3.2: Complete hydrological analysis, determine crop water requirements, and complete geotechnical survey

Activity 1.3.3: Prepare construction level drawings with accurate costing for the construction of the micro dams and their appurtenant structures (spillway and outlet work)

Activity 1.3.4: Complete construction of the micro dams and develop manual on operation and maintenance of the irrigation structures and pumps

Activity 1.3.5: Sensitize and train communities to strengthen the basis for subsequent operation and maintenance of all new irrigation developments, and establish effective and sustainable water management structure

***Output 1.4:* Soil and water conservation measures implemented to improve runoff management and infiltration for improved rangeland management and enhanced cereal production.**

Activities

Activity 1.4.1: Undertake a comprehensive survey to identify specific sites to plan appropriate and relevant physical and biological soil and water conservation measures, adopting an integrated catchment management approach

Activity 1.4.2: Construct hillside terraces along contours in identified locations, using stone-faced hillside terraces in areas where stones are abundant

Activity 1.4.3: Construct check dams to slow down the speed of stream flow and check further gully formation, using appropriate materials depending upon the severity of the damage and gully formation in the catchment area. Check dam construction will be carried out by beneficiary communities through Cash for Work (CFW) during the dry season when households experience reduced demand for labour from their agricultural/livestock enterprises.

Activity 1.4.4: Implement planned enclosure and afforestation activities, using multipurpose trees

Activity 1.4.5: Provide incentives and training to farmers to construct physical soil conservation measures - mainly terraces, waterways and gully control on crop lands – to reduce the effect of slope length, and to intercept and slow down runoff water

Activity 1.4.6: Support community and individual households to establish woodlots that contribute to improving their household nutrition and income

Activity 1.4.7: Establish one new tree seedling and forage legumes nursery in Habero and rehabilitate the existing one in Hamelmalo

Activity 1.4.8: Over-sow catchments with improved native grass seeds and forage to enhance the restoration and protection of enclosures (permanent or temporary)

OUTCOME 2: Climate-resilient agricultural and livestock production enhanced

Increasing food security is high priority for the government of Eritrea. This is particularly important in the programme area, given its already high levels of food insecurity and malnutrition, both of which will be exacerbated by the projected climate change impacts for the area. In order to capitalise on the investments in water infrastructure and SWC structures covered under Outcome 1, it is essential that the necessary support is provided to the semi-sedentary livestock based-agro-pastoralists and irrigation based agro-pastoralists who comprise the populations living in the programme area, so that they may climate-proof their livelihoods.

Activities under this outcome include a number of measures that will contribute towards reorienting agricultural extension to respond more effectively to farmers' priority needs and demands. Extension agents will receive training on up-to-date methods for climate-resilient

agricultural and livestock production, in a wide range of disciplines, including SWC, integrated crop-livestock production systems, conservation agriculture, agroforestry, rangeland management, sustainable irrigation technologies, environmental regeneration and natural resource management. The MoA extension agents will also participate in activities that involve integrating seasonal weather forecasts into extension services for farmer-to-farmer learning and monitoring, e.g. through quarterly farmer to farmer workshops.²⁸ Seasonal forecasts will be provided through the enhanced meteorological capacity developed under Outcome 3, supported by the Meteorological Services Agency based at Asmara International Airport.²⁹ In the resultant empowering process, farmers could critically reflect on scientific forecasts and make informed land-use decisions based on an integrated interpretation of the data, plus presentation of a range of technological options by the research stations, and on their own knowledge.³⁰ Such a process would support locally-developed adaptation options and their upscaling. Through this and other programme components, collaboration will be increased with local educational stations, such as the Hamelmalo Agricultural College and the National Agricultural Research Institute (NARI), on integrated multi-disciplinary appropriate agro-ecological technologies.

The on-farm and off-farm soil and water conservation measures covered under Outcome 1 will underpin the climate – resilient production methods under Outcome 2. Extension programmes will be supported to make available inexpensive technologies and inputs (such as drought tolerant, relatively high yielding crop varieties) and short cycle livestock (such as poultry, sheep and goats) available to subsistence farmers. Attention will also be paid to conserving native fodder and crop species and varieties, and to enabling their use by small-scale farmers. Sustainable agricultural practices that are appropriate in the light of the climate threats faced by the programme area will be promoted through extension and training, and farmer-to-farmer learning. This will include conservation agriculture and agroforestry, drawing on successful experimentation on the part of the Hamelmalo Agricultural College and NARI.

Finally, as Eritrea has had success with the introduction of traditional improved energy-efficient stoves, and these are culturally acceptable and valuable both from an adaptation and a mitigation perspective, training and support will be provided in the programme area for the construction and installation of these stoves.

Output 2.1: A range of climate-resilient agricultural technologies and methods developed and transferred to farmers

Activities

Activity 2.1.1: Enhance capacity and effectiveness of agricultural extension agents through training and enhanced mobility and communications

Activity 2.1.2: Develop and provide a range of options to farmers, specifically targeting women-headed households, on climate-resilient technologies for enhanced and sustainable crop productivity, including agroforestry, conservation tillage, drought resistant, heat-tolerant and early maturing varieties, and including conservation of climate-resilient traditional varieties

²⁸ Seasonal forecasts could be presented to farmers, who could then retrospectively discuss the forecasts of the previous quarter and verify these with their own experience of climate in the area.

²⁹ Eritrea's seasonal forecasts are developed by the Meteorological Office at Asmara International Airport, with support from the IGAD Climate Prediction and Applications Centre (ICPAC) centre in Nairobi, as is the case with all the ICPAC countries. The regional centre is well staffed and equipped, and supported by international organizations. It has also undertaken human resources development targeting the ICPAC countries. Thus while it is not possible anywhere in the world to *ensure* the reliability of seasonal forecasts, those used in Eritrea are developed using best international practice and with appropriate support. In addition to helping communities to effectively use the seasonal forecasts (Output 2.2), the project will support the increasing reliability of these, by improving baseline meteorological information collection (outputs 3.1.3; 3.1.4; and 3.1.5) - which will be integrated into successive seasonal forecast to further fine-tune them - as well as by the inclusion of climate observations identified in the participatory farmer-led process (Output 3.3).

³⁰ This proposal is based directly upon the approach adopted in the WWF, EMG and Indigo Development project implemented in a marginal rain-fed farming area in South Africa, as set out in Malgas *et al*, 2007.

Activity 2.1.3: Develop and provide a range of options to agro-pastoralists, specifically targeting women-headed households, on climate-resilient technologies for enhanced and sustainable livestock productivity and rangeland management

Activity 2.1.4: Provide training and support for the construction and installation of traditional improved energy-efficient stoves

Output 2.2: *Seasonal forecasts used in a farmer-led collaborative action learning process to enhance adaptive capacity and climate-proof production systems*

Activities

Activity 2.2.1: Identify programme sites for the collaborative action learning process and hold introductory meetings at each locality, attended by farmers, research professionals and extension agents

Activity 2.2.2: Support farmers in an iterative process to use seasonal forecasts to guide production activities and to reflect on the usefulness of these

Activity 2.1.3: Monitor progress systematically and record lessons learned from the action learning seasonal forecasts component

OUTCOME 3: Improved climate risk information and climate monitoring used to raise awareness of and enhance community preparedness to climate change hazards

In order to overcome the identified barrier of lack of specific information on climate change risks, improved climate risk information will be generated and climate monitoring enhanced and used to raise awareness of and enhance community preparedness to climate change hazards. Improved climate risk information for the Zoba Anseba, and if possible for the specific programme area, will be generated by means of downscaled projections from multiple Global Circulation Models (GCMs)³¹. User-friendly knowledge dissemination products developed and used to raise awareness at different levels on the specific climate change risks facing Zoba Anseba, through the awareness raising campaign detailed under output 3.2. Children and youth could play a key role in the drama and radio components, based for example on UNICEF's successful child radio programmes in many countries.

Capacity will be developed for climate monitoring and analysis through targeted training and the purchase and installation of one Class 1 meteorological station in sub-zoba Habero and six Class 3 meteorological stations, three in each programme sub-zoba. Apart from providing a basis for the awareness raising campaign, enhanced climate risk information and meteorological capacity at the zoba level will be integrated into programme activities under Outcomes 1 and 2. Meteorological records in Eritrea are weak partly due to the non-operationality of some existing meteorological stations, which is due to insufficient commitment to maintaining these facilities linked to failure to fully grasp the importance and utility of meteorological information and climate records. To ensure that improved capacity for meteorological observation and analysis supported by this programme is sustainable, a study will be carried out to fully understand reasons for past non-operationality, and to make strategic recommendations to overcome identified constraints.

In order to help communities to track changes in local conditions that could signal the advent of

³¹ The accuracy of downscaled projections, given the uncertainties related to the ITCZ and the defining role this has on the summer rainfall in the western parts of Eritrea, where the project site is located, will depend on how divergently the GCMs represent these processes. The best practicable approach will be identified based on available data.

hardship, and to trigger the appropriate response, a community-based early warning system (CB EWS) will be developed from the ground up, complemented by enhanced ability at the zoba administrative level for response. The CB-EWS will build on the earlier initiative under the National Food Information System (NFIS) to establish a country-wide EWS. Through a community-based planning exercise, existing livelihoods maps for the two sub-zobas will be updated, and priority climate and related risks clarified by developing a synthesis of community observations, traditional knowledge and scientific information obtained from the downscaling process. Community members will be trained in household data collection and relevant community institutions will be strengthened, resulting in a functional CB EWS in the two sub-zobas. At the zoba administrative level, institutional strengthening will take place to ensure an enhanced response to early warnings collected by community data gatherers and sent to the zoba. This could entail reviving and broadening the mandate of the formerly-established Zoba Food Information Committee, and ensuring cross-sectoral and vertical coordination. As the CB EWS will be based on evidence, it will increase the ability of community leaders and the zoba administration to respond once potentially threatening trends are picked up. For instance, if there is a problem with food availability, this kind of tracking system will help local partners and the communities themselves develop solutions that address that problem very specifically.

There will be synergies between the seasonal forecast components set out under Outcome 2, output 2.2, and the CB EWS in Outcome 3. The CB EWS is a broad-scale tracking exercise for the purposes of preparing an institutional early preparedness response to food insecurity, while the seasonal forecast component is targeted specifically at farmers to help them adapt their farming practices. The CB EWS will be implemented across the two sub-zobas, and will track key variables at the village level such as water availability, livestock condition, fodder availability, health trends, conflict incidents and so on, allowing for the detection and early response to developing trends. The CB EWS is thus a community-wide mechanism that focuses on a wide range of variables that may signal increased risk for community members, including many that are linked with the key climate risk in the area: drought. The seasonal forecast component, on the other hand, is a tool supplied by Meteorological Services to farmers to help them make decisions about what crops to plant when, and how to tailor their livestock management activities for the season ahead in response to the forecast.

Specific design principles and further delineation of activities

The design of the CB-EWS is based on principles contained in the UN/ISDR Platform for the Promotion of Early Warning, consistent with the Hyogo Framework of Action on building the resilience of nations and communities to disasters. Activities will cover the four key elements of people-centred early warning systems, which are set out below together with key questions to guide each element of the EWS development:³²

1. **Risk knowledge: *Systematically collect data and undertake risk assessments***
Are the hazards and the vulnerabilities well known? What are the patterns and trends in these factors? Are risk maps and data widely available?
2. **Monitoring and Warning Service: *Develop hazard monitoring and early warning services***
Are the right parameters being monitored? Can accurate and timely warnings be generated?
3. **Dissemination and Communication: *Communicate risk information and early warnings***
Do warnings reach all of those at risk? Are the risks and the warnings understood? Is the warning information clear and useable?

³² As set out in the ISDR PPEW 2006 publication 'Developing Early Warning Systems: A Checklist', developed after the Third International Conference on Early Warning.

4. Response Capability: *Build local and community response capabilities*
Are response plans up to date and tested? Are local capacities and knowledge made use of? Are people prepared and ready to react to warnings?

Good early warning systems have strong linkages between the four elements. In Anseba Zoba, activities will focus on building the capability of communities and the local administration to collect and disseminate climate risk information, and to respond timeously and effectively to this. Lessons learned and successes will be communicated to national policy makers to promote the development of EWS throughout Eritrea.

A local bottom-up approach to EW with the active participation of local communities enables a multi-dimensional response to problems and needs, allowing local communities, civic groups and traditional structures to contribute to the reduction of vulnerability and to the strengthening of local capacities.

The project will also draw on experience from similar initiatives from the region – for example the community-based early warning system for drought in East Africa developed with the support of Oxfam.

An initial step in the development of the CB-EWS will be a community-based planning exercise, during which existing livelihoods maps for the two sub-zobas will be updated, and priority climate and related risks will be clarified by developing a synthesis of community observations, traditional knowledge and scientific information obtained from the downscaling process (conducted under Output 3.1).

Thus community data collectors will be trained and will go from household to household according to delineated schedules to collect information on key variables such as water availability and levels in ponds and streams, with comparisons to the last season; incidence of cases of diarrhoea in the village this month, whether this is more or less than the last month; number of meals a day children and adults are getting; etc. Technical assistance will be provided and is included in the budget to assist with the development of the data collection procedures, in terms of both what data is collected as well as how this is recorded.

As an example, project implemented in the region, CB-EWS, data collectors spend 20 to 30 minutes at each of the five houses on their list, and plot the answers to 24 questions on a visual analog scale—a tool that gauges attitudes and perceptions that cannot be easily measured. This is a useful way to gather data from people who may not be able to read, and is also easily convertible for charting on a graph—from which the trends then become visible. In this way, scientific methodology can be used to convert feelings into comparable data.

At the same time, institutional strengthening will take place in the zoba administration (at zoba and sub-zoba levels) to ensure better processing and use of data collected by community data gatherers and sent to the zoba, as well as an enhanced response. This could entail reviving and broadening the mandate of the formerly-established Zoba Food Information Committee, and ensuring cross-sectoral and vertical coordination.

Information gathered by community data collectors will be compiled at the sub-zoba and zoba level, along with anecdotal comments gleaned from the villagers as well as statistics gathered from for example district markets and health posts.

The CB-EWS is thus based on evidence, which increases monitoring ability for the project, and allows for fine-tuning activities based on real information, rather than conjecture, as well as

allowing for an enhanced response to drought and other climatic risks. It will thus allow for existing responses to drought at the zoba level to be more sharply focused. For instance, if there is a problem with food availability, this kind of tracking system will help different ministries and departments and other partners, as well as the communities themselves, to develop solutions that address that problem very specifically.

As changes in local conditions usually occur seasonally, regular analysis of information will be carried out on for example a quarterly basis, in addition to immediate response when this is needed. Regular analysis will allow for stakeholders to pool their resources and develop timely solutions to identified problems. Given the severity of food insecurity and malnutrition in Anseba, and the obvious link with drought, the involvement of stakeholders such as the Ministry of Health will be extremely important, and will be facilitated through the economic development and planning department of the zoba, as well as through project structures.

In this kind of CB-EWS, local knowledge is used to inform climate-smart solutions. It is also an empowering process, in which communities discuss the data gathered and use the knowledge gleaned from it to prepare for drought. The utility of the data also goes beyond addressing specific extreme events - in the neighboring countries example, community elders indicated that they can use the data to address ongoing issues, too, such as the quantity and quality of water available for villages.

Output 3.1: *Improved climate risk information generated and capacity developed for climate monitoring and analysis*

Activities

Activity 3.1.1: Improved knowledge of climate risks generated through downscaled projections from multiple GCMs for the sub-national scale, using either station observations or satellite observations

Activity 3.1.2: User-friendly knowledge dissemination products developed and disseminated using improved climate risk information³³

Activity 3.1.3: Analytical study completed to explore reasons for non-operationality of existing Class 1 and other meteorological stations in Eritrea, and to make strategic recommendations to overcome identified constraints. These recommendations will inform the implementation of activities 3.1.4 and 3.1.5 and will be used for advocacy activities to develop commitment at the national level for enhanced and coordinated meteorological observations and analysis

Activity 3.1.4: Sites selected, equipment purchased and installed for one Class 1 meteorological station in sub-zoba Habero and six Class 3 meteorological stations, three in each programme sub-zoba

Activity 3.1.5: Staff trained on taking meteorological readings, standardised recording and reporting at the zoba and sub-zoba level, on analysis at the zoba level, and on developing and using seasonal forecasts, together with the civil aviation meteorological station at the Asmara International Airport, which leads this process

Output 3.2: *Awareness raised at different levels on climate change risks facing Zoba Anseba*

Activities

³³ Initial dissemination will begin through project structures and informally through the Zoba Anseba administration. The knowledge products will be used in the awareness raising campaign – see Output 1.2

Activity 3.2.1: Develop a detailed strategy for the climate change awareness raising campaign for the programme, spelling out a workplan, target audiences and modes of communication

Activity 3.2.2: Plan and hold a well-publicised launch event for the CC awareness raising campaign to capture public imagination and secure initial political commitment, accompanied by an ongoing radio campaign

Activity 3.2.3: Hold awareness raising events at the policy (zoba) level, sub-zoba level, and community level, two events for each target audience/location over the five-year programme, using innovative methods such as community drama groups and child radio programmes

Output 3.3: *Community preparedness enhanced through development of a community-based early warning system in sub-zobas Hamelmalo and Habero*

Activities

Activity 3.3.1: Carry out a stocktaking assessment of former and existing initiatives and structures for community preparedness to climate risks and early warning systems, such as the structures established under the National Food Information System (NFIS)

Activity 3.3.2: Initiate a community-based planning exercise to design the community-based early warning system, using a sustainable livelihoods approach to update and expand existing livelihoods maps for the two programme sub-zobas and to clarify priority climate and related risks. This will entail developing a synthesis of community observations, traditional knowledge and scientific information obtained from the downscaling process

Activity 3.3.3: Train community members in data collection, carry out institutional strengthening of relevant community institutions and establish community-based early warning system in the two programme sub-zobas

Activity 3.3.4: Build disaster risk reduction and early warning capacity in the zoba administration to support the community-based early warning system, and for enhanced response

OUTCOME 4: Lessons learned and shared and policy influenced through knowledge management system

Currently there is little collated information available on climate-related risks in the agricultural sector, either at the national or zoba level. Management and dissemination of information about climate change-related risks is not carried out systematically, which further also militates against an effective response. Moreover, any lessons learned are not being captured in a fashion that facilitates broader sharing, or that casts light on ways to address an aggravation of the food security situation as a result of climate change. Assisted by the Hamelmalo Agricultural College, the programme will implement a knowledge management system, to be institutionalise within the Zoba Anseba administration, to capture and disseminate lessons learned through programme activities. This will include lessons learned on the additional burden faced by women and children with respect to climate change. Lessons will be shared through various appropriate regional and global networks, such as the Adaptation Learning Mechanism, to facilitate learning across countries. The knowledge management system will include a feedback loop to policy makers at the zoba and national level, to facilitate uptake of lessons learned into policy

Output 4.1: *Knowledge management system established and knowledge management activities implemented*

Activities

Activity 4.1.1: Design and establish a knowledge management system for the programme, based on existing processes in the Zoba Anseba administration, to be institutionalised within the administration. This will include identifying a lead agency for this purpose, as well as a coordination mechanism between relevant departments for sharing lessons, and developing a standardised system for capturing lessons learned

Activity 4.1.2: Conduct a study tour to a country in the region with similar climate risks and environmental constraints, to enable sharing between programme stakeholders and the regional community.

Activities 4.1.3: Organize a regional forum to review and integrate climate risk reduction strategies and measures in the regional development plan and Integrated Water Resources Management Action Plan to facilitate mainstreaming of climate risk reduction measures into the policies, regulations and annual regional and national capital budgets.

Activity 4.1.4: Facilitate the review of existing standards and regulations relating to the design and implementation of water and agriculture infrastructures and climate-resilient related interventions, and support the National Agricultural Research Institute to incorporate research in climate resilient crop varieties in their research program.

Output 4.2: Policy advocacy activities implemented

Activities

Activity 4.2.1: Develop appropriate knowledge products, including photo stories, presentations and briefing notes, for use in policy advocacy activities

Activity 4.3.2: Conduct regular policy advocacy activities throughout the life of the programme, including at relevant national and regional events.

Activity 4.3.3: Ensure good media coverage for programme activities and to disseminate knowledge products, targeting outlets that are relevant for policy makers

- A. Describe how the project / programme provides **economic, social and environmental benefits**, with particular reference to the most vulnerable communities.

The primary stakeholders of the targeted intervention will constitute approximately 6,141 households, of which approximately 1350 are woman-headed households. Beneficiary farmers and households will be selected on the basis of greatest vulnerability, which translates into women-headed households and the poorest households as per the community wealth ranking, as well as those who have limited access to capital.

In addition, a far greater number of people in the two sub-zobas (67,500) and the Anseba region more widely could benefit from up-scaling of the programme intervention. Specific methodologies to reach the maximum number of households will include participatory community planning workshops, community groups, and using the existing village-level structures of key NGOs such as the National Union of Eritrean Women (NUEW) and the National Union of Eritrean Youth and Students (NUEYS). The media will also play a role through radio primarily, but also television and print. Equitable distribution of project benefits will be

assured by using the existing knowledge base in this regard of the NUEW and the NUEYS, as well as the zoba needs assessments carried out under the ongoing Anseba Local Development Programme. Specific tools to be used include Participatory Poverty and Wealth Ranking exercises.

The programme will have a range of interlinked social, environmental and economic benefits, all of which will contribute to increasing community resilience and adaptive capacity to increasing climate variability and projected climate change, as listed in. The programme specifically adopts a sustainable agricultural approach to the achievement of its outcomes, and will facilitate the use of methods such as agroforestry and conservation agriculture, which are accepted ecologically sustainable methods to improve agricultural production. The following table provides a summary of key benefits of the proposed programme.

Table 2 Summary of key benefits of the proposed programme

Benefits	Programme (over 5 years)	Baseline
Social Benefits	<p>Direct benefits to 6,141 households, of which 1,350 are female-headed. Benefits will include:</p> <ul style="list-style-type: none"> • Better community cohesion through working together on off-farm soil and water conservation and water management components. • Reduced social conflict between semi-mobile pastoralists and more settled communities because of increased water availability for households, crops and livestock. • More community empowerment achieved through the participatory approach in general, through enhanced knowledge and ability to act on climate change, and through implementation of the community-based early warning system. • Improvements to health and malnutrition levels due to better agricultural productivity and increased availability of (safe) groundwater. <p>Benefits of the climate change awareness raising campaign will reach a large proportion of the 67,500 people living in Zoba Anseba, and thus some of the social benefits noted above, that will accrue as a result of increased knowledge on climate change impacts, allowing people to enhance their autonomous adaptation strategies, will have far wider reach than the programme area.</p>	<p>If integrated water/agriculture adaptation actions are not implemented, Eritrea's rural areas will continue to experience increasing vulnerability and growing insecurity, due to decreased availability of water and conflicts between crop and livestock uses. This will damage the social fabric in rural areas and exacerbate existing migration to urban areas, thus resulting in increased urban joblessness and poverty. Women and children will be particularly hard hit.</p>
Economic Benefits – Outcome 1, 2 & 3.	<p>The sub-surface dam on the Anseba River, associated irrigation and introduction of climate resilient production practices will support the agro pastoralist</p>	<p>Vulnerable rural communities and their associated livelihoods would diminish over time, with loss of economic productivity and</p>

Benefits	Programme (over 5 years)	Baseline
	<p>community to change their 250 ha land used from subsistent rain-fed cereals production to irrigated vegetable production. Farmers will be able to produce at least twice a year. 500 households of agro-pastoralists (of which 22% are women headed households) using the water supply will increase their production by twenty-fold.</p> <p>Considering the 250 ha that will be converted to vegetable production and taking the average yield estimated at 20 tons per ha, the total production will reach to 5000 tons/year. Using the current vegetable price of US 200/ton the total annual production value will be US\$ 1,000,000, which implies an <i>additional</i> income of \$1800 per household relative to the baseline.</p> <p>The estimated beneficiaries from the <u>small floodwater diversions</u> and introduction of climate-resilient production practices are as follows: an estimated 460 households will benefit for improved rangeland management, and an additional 120 households will benefit from enhanced cereal production by means of these structures, making a total of 580 households. Of these beneficiaries, approximately 25% are women-headed households. Experience from similar programmes in other parts of the zoba shows that improving fodder productivity and quality on grazing areas will be reflected in an increase of livestock off-take, and increase in milk production which will increase household income by about US\$ 250 per year per HH.</p> <p>Irrigation of 120 ha cereal production (sorghum and pearl millet) could mean an increase in production from 0.36 t/ha (baseline) to 0.7 t/ ha, resulting in <i>increased</i> income of 0.34 t/ha. This multiplied by 120 ha = 40.8 tons; at US\$ 500/ton, this results in a production value of US\$ 20,400/year. This divided by the number of beneficiary households (120) gives a figure of \$170/hh <i>additional</i> income, which is a percentage increase of 95% over baseline income</p> <p>Local benefits from the construction of two <u>micro dams</u>, irrigation and introduction of climate-resilient production practices will</p>	<p>increased migration to urban areas, resulting on increasing pressure on already constrained urban economies.</p> <p>Cereal production levels are on average 0.36 tonnes per hectare. Average income per household is on average US \$180/annum.</p>

Benefits	Programme (over 5 years)	Baseline
	<p>include about 60 hectares of rain-fed cereal crop lands to benefit 60 households of agropastoralist in the Haboro and Hamelmalo sub-zobas. Of the beneficiaries 24 will be women headed households. <u>In addition</u> at least 400 HH additional agro pastoralists living in the vicinity will benefit by providing water for their livestock. The introduction of micro dams for supplementary irrigation is expected to increase cereal production from 0.36 t/ha to 1.0 tons/ha. Therefore, the economic benefit of this programme component is $0.64 \text{ t tons/ha} * 60 \text{ Ha} = 38.4 \text{ tons @ US\\$ 500/ton} = \text{USD } 19,200/\text{yr}$. Divided by the number of beneficiary households (60), this implies an <i>additional</i> income of \$320/household. This is a percentage increase of 178 % with the programme. In addition, experience from other parts of the sub-zoba indicates improving fodder productivity and quality on grazing areas will lead to an increase of livestock off-take, and increase in milk production which will increase household income by about US\$ 250 per year per HH.</p> <p>Agricultural production of farm lands under the <u>on-farm soil and water conservation</u> and introduction of climate-resilient production practices will be increased by 40%, benefitting 5000 households. Total cereal production area to benefit from the programme on-farm soil and water conservation is about 10,000 ha. With the programme, it is expected that cereal production will increase by 40%. Therefore, the <i>additional</i> economic benefit of on-farm SWC with the programme will be $0.14 \text{ tons/ha} * 10,000 \text{ Ha} = 1400 \text{ tons @ USD } 500/\text{ton} = \text{US\\$}700,000/\text{yr}$, which is a percentage increase of 40% over baseline income</p> <p>Reversing degradation of natural resources such as land, waters, forests and biodiversity will improve the livelihood of the programme's most vulnerable people. Introduction of multipurpose trees including forage and wild fruit trees within catchments and woodlots will reinforce communities' coping mechanism during times of drought to save their lives and</p>	

Benefits	Programme (over 5 years)	Baseline
	<p>their important assets like livestock.</p> <p>Risk of crop failure reduced: In areas where SWC on farmlands and flood diversion for supplementary irrigation is introduced, the risk of crop failure is reduced, crop yield is expected to increase, availability of animal feed is increased (crop residue and pasture land carrying capacity). The development and dissemination of drought-resistant and early-maturing seeds will similarly reduce the risk of crop failure.</p> <p>The dissemination of drought-resistant livestock and appropriate livestock management techniques will enhance the economic benefits of the off-farm SWC, and, together with the improved extension services, will result in improved rangeland management in the programme area, with associated economic and environmental benefits.</p> <p>Ancillary benefits for the interventions under Outcome 1 include improved health due to dietary improvements in the community, providing additional household income from Cash for Work schemes.</p>	
Environmental Benefits	<p>The programme will have a range of positive environmental impacts. For example, the soil and water conservation activities such as hillside terracing and enclosures will benefit the existing vegetation, due to retained soil moisture, and new regeneration of vegetation will be enhanced. In this way, ecosystem services in the programme site will be enhanced, which in turn will have a positive impact on livelihoods – for example, through the increased availability of non-timber forest products (NTFPs) in areas where enclosure is practised.</p> <p>Improve runoff management and infiltration on both rangelands and arable areas will reduce soil erosion and land degradation.</p> <p>Establishment and rehabilitation of nursery sites and tree planting, and expanding multipurpose trees in household woodlots and community</p>	<p>In the absence of the programme, increased climatic variability, reduced rainfall and increased incidence and severity of drought will exacerbate existing pressures on ecosystems already stressed through land degradation, soil erosion and reduced soil moisture. This will reduce the availability of ecosystem services in the programme areas and further hamper precarious livelihoods. There will be ongoing and increased out-migration in search of animal feed and water and the associated spread of slash-and-burn agriculture, which will have negative impacts on natural resources and on ecosystem functioning. Social conflict between different resource users, such as between pastoralists and sedentary farmers will increase.</p>

Benefits	Programme (over 5 years)	Baseline
	<p>enclosure areas, will enhance ecosystem services.</p> <p>Approximately 53 extension agents, zoba experts, programme staff and 17 institutions will directly benefit from training in climate-resilient development, which will translate into more ecologically sound agricultural and livestock development.</p> <p>Improving the capacity of vulnerable communities and their institutions to detect, plan and respond for the predicted and unpredicted climate change impacts and its adverse effects will be reflected by more effective natural resources management, improved famine/drought warning system, and timely information dissemination for adaptable agricultural practices.</p> <p>The sub-surface dam, floodwater harvesting and SWC will raise the groundwater table and assist with restoring / maintaining the integrity of the riverine ecosystem. The microdams will help to replenish ground water supplies through infiltration of stored water. In addition, the micro dams will also serve as flood stabilisation and reverse river bank erosion and associated farmland losses, and avoid losses associated with further reduction in ecosystem integrity.</p> <p>The programme will result in increased carbon sequestration through integrating tree planting within the SWC works outside of farm lands and by expanding temporary and permanent enclosures, which will enhance vegetation regeneration. Increase in crop plant coverage and density will also contribute on carbon sequestration from agricultural activities.</p> <p>Environmental degradation will be reduced by reducing vulnerable communities' high dependency on natural resources for fuel wood, construction and other purposes, through tree planting and woodlots and by the distribution of improved fuel-efficient traditional stoves.</p>	

No serious water use conflicts exist. However, to avoid possible water and other resources conflict that may arise during project implementation and beyond the project life, the project will support the establishment of Water Users Associations and will provide training to community WUA members and sub- zoba administrators on conflict resolution over natural resources. Steps to address possible water conflict will be taken under Activity 1.1.3, Activity 1.2.4, and Activity 1.3.5.

Concerning capacity to maintain the irrigation and water infrastructure and the question of a payment rate scheme, it is normal in most of the rural parts of Eritrea for communities to contribute annually in the form of cash or grain or to pay for operation and maintenance of water and irrigation infrastructure projects. In view of the poverty levels of target communities, the proposed small scale irrigation development schemes are designed to have a low O&M cost. O& M of the sub-surface dam, micro dams, flood diversion schemes and soil and water conservation (SWC) structures requires only manual labour, to be provided by beneficiary communities, and technical support from zoba and sub-zoba technicians. Therefore, the O&M costs of all the proposed irrigation and water retention infrastructures are minimal and affordable. Community ownership has been developed in the zoba through the 2002-2009 experience with the Anseba Local Development Project, in which communities took over direct implementation of project activities similar to the proposed project. The ALDP enabled considerable direct involvement of communities and enhanced community ownership. Additionally, a new regional regulation requires that beneficiary communities contribute one day of their labour every week throughout the project life time when such type and size of project are implemented within their kebabi or village.

B. Describe or provide an analysis of the **cost-effectiveness of the proposed project / programme.**

A number of alternative options have been assessed during programme design, in order to ensure that the proposal is for the most cost-effective options. For example, a number of different options to promote groundwater recharge and increased water availability for improved productivity were weighed for cost-effectiveness and sustainability, before the current programme components were selected and elaborated. Thus an option to develop a large spate irrigation structure on the Anseba River was ruled out on the basis of increased costs to develop this, compared to those associated with a sub-surface dam, and on the basis of the increased risk related to developing this kind of structure on a river capable of the volume of seasonal flows of the Anseba River. The sub-surface dam option was also selected over a possible option to develop a dam on one of the tributaries of the Anseba, as, while the costs for these different water storage structures were similar, the water source is more secure on the Anseba River, and the sub-surface storage of water is more appropriate under conditions of increasing evapo-transpiration. Thus, despite similar costs, the sub-surface dam will be more cost-effective in the medium- to longer-term. Concerning the floodwater diversion structures off tributaries of the Anseba River, diversion and spreading of floodwater to increase soil moisture and maximize crop production is an essential approach, given the arid and semi-arid climate of the programme area, with its extremely limited water resources and short-lived seasonal flows of rivers. The construction of the farmer-friendly diversion system, using locally available material, will include construction of diversion weirs either from earth bund or masonry across small seasonal streams, coupled with water spreading systems.

The irrigation application method selected for the irrigation schemes are flood and surface irrigation application methods which are easily manageable, provide flexibility on the type of traditional cropping pattern practiced, have a low energy requirement, are not capital intensive

and therefore remain affordable to communities, and provide opportunity for regular leaching to prevent salinity - a common problem in arid and semi arid areas.

It is true that drip irrigation is the more efficient irrigation technology. However, drip irrigation is more capital intensive, energy intensive (energy is unavailable in the project area) and emitters are usually with permanently spaced, which will not give flexibility on cropping patterns for small farmholder with diversified cropping interest. In addition the poor water quality with high sediment load, algae and possible bacteria slim growth would bring about frequent clogging of emitters and small tubing (laterals). Finally, maintenance support for irrigation equipment, replacement parts, repair service, and skilled labor for system operation would be weak or non-existent.

The selection of technology for water sources securing infrastructure (headwork) is based on considering utilization of the locally available expertise (experts and farmers); experience in the design and construction of similar previous projects, the capacity to operate and maintain the system for sustainability and Cost effectiveness. On the other hand the alternative on headwork construction materials like reinforced concrete structures, rolled compacted concretes, still structures etc, will require sophisticated machineries, international expertise and high capital investment for its design and construction including operation and maintained.

Programme implementation will be almost exclusively undertaken by existing Government structures. This approach is believed to be particularly cost-effective, as it reduces the need for higher costs that would need to be spent on consultant-driven implementation, and it builds the capacity of the government system for ongoing and more widespread implementation of similar climate-sensitive development. The size of the programme coordination unit (PCU) has been carefully considered, in order to keep costs down while still ensuring effective management of the programme. It is likely that staff for the PCU will be largely selected from existing government staff, thus ensuring that capacity developed through the course of the programme will be endogenous capacity. Alternative implementation arrangements were considered, including a higher number of programme staff and national and international consultants in the design, but this implementation option was not further elaborated as it carries higher short-term costs and will generate less long-term sustainability.

The actions proposed in this programme document have been developed to address climate-related agricultural and water management priorities that are not only the most urgent and most pressing, but which can also be addressed through a bottom-up approach that generates lessons and case studies which can be used to develop a more systemic and systematic approach for a coherent national response to issues on the climate change-agriculture-food security interface. This will be promoted through the knowledge management and policy feedback loop components of the programme.

More than half of the programme budget (approximately 56%) will go to implementation of Outcome 1, which deals with a sub-surface dam on the Anseba river, floodwater harvesting, groundwater recharge and expanded irrigation. The cost effectiveness of these programme components is further elucidated and summarised in the table below.

Table 3 Cost effectiveness of programme components – Outcome 1

Programme Component	Programme Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost (US\$)
Output 1.1 Sub-	1,067,400	250 ha of	Losses averted.	Alternative 1: a

Programme Component	Programme Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost (US\$)
<p>surface dam on Anseba River</p> <p>The proposed sub surface dam is a structure that would be constructed below ground level to obstruct the flow of groundwater and stores water below the ground surface. This structure will not change the natural Anseba river surface water flowing regime both in terms of height and width and will not have inundation effect on the areas along its river bank. This structure will also help in recovering the groundwater level along the bank of Anseba which has been dropped significantly in the last drought years. The raised groundwater table can easily be diverted to lands along the river bank for irrigation or can be extracted using low head pumps which are within the financial capacity of farmers.</p> <p>The current practice of sub surface dam construction in Anseba is mainly by community participation with zoba engineers technical and management guidance and support. The main body of the structure will be made fully from masonry wall which is</p>		<p>small scale irrigation of crop and forage production will benefit 500 households of semi sedentary livestock based agro pastoralists. 22% of these are women headed households</p>	<p>Increase in crop production sustainably will Reduce loss of human and animal life due to drought and health problems associated with malnutrition.</p> <p>Benefit Generated – The programme investment on small scale irrigation will: 1) increase the annual income of the agro-pastoralist communities by 20 fold. 2) diversify household income (vegetable production, livestock etc) which increases community resilience for predicted and unanticipated climate change impacts and associated adverse effects</p>	<p>major storage dam across the Anseba River for bringing vast areas under irrigation. Cost: hundreds of millions of US dollars. Alternative rejected for the following reasons (i) this is not the priority of the national and regional development plan; (ii) cost is out of reach for the AF proposal; (iii) associated negative social and environmental impact (loss of fertile riverside farmland, damage to and loss of riverine vegetation, relocation of people, increased incidence of malaria).</p> <p>Alternative 2: Large-scale spate irrigation on Anseba River. Cost: Approx. US\$2 million. Alternative rejected for the following reasons: (i) increased cost of structure; (ii) increased risk of damage to structures from heavy floods; (iii) would necessitate extensive land levelling, which is difficult to implement successfully in the terrain and more costly</p>

Programme Component	Programme Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost (US\$)
<p>composed of rock and cement mortar.</p> <p>The construction of the sub-surface dam will have the following components: 1) Trench excavation across the Anseba river bed; 2) Construction of the sub surface dam (the barriers for groundwater flow) below the river bed; 3) construction of water abstraction facilities like a wide diameter dug well on the bank or within the groundwater storage area or an intake facility for gravity flow 4) provision and installation of pumping unit and pipes; 5) a conveyance channel lined with masonry of brick to avoid excessive seepage along the route, 6) construction of water distribution facilities like infield earth canals and turnouts within the farmers crop field and/or fodder production</p>				
<p>Output 1.2 Flood water harvesting</p> <p>Farmer-friendly diversion systems will be constructed, using locally available material, will include construction of diversion weirs either from earth bund or masonry across small seasonal streams,</p>	531,000	<p>Rangeland development: 460 households (HH)</p> <p>Cereal production: 120 HH</p>	<p>Losses averted: Increase in crop and fodder production will reduce loss of human and animal life due to drought and health problems associated with malnutrition</p> <p>Benefits Generated: By improving rangeland management the AF</p>	<p>Alternative 1: Construct diversion structures at a larger scale, with heavier infrastructure and using concrete. Cost: In excess of US\$1 million. Alternative rejected for the following reasons: (i) Cost of operation and maintenance; (ii) less flexible,</p>

Programme Component	Programme Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost (US\$)
<p>coupled with water spreading systems.</p> <p>The diversion structures will be constructed by farmers using hand tools like shovel, pickaxe or oxen pulled scrapers. The diversion structures will be built across small streams using either small masonry structures or gabions filled with rock. All material and skill to construct the structures are available within the region and with in the community.</p>			<p>programme could generate annually about US\$ 115,000 production increment for the 460 households of livestock producers; and US\$42,000 annually for the 120 household cereal producing farmers.</p> <p>The programme will also reduce livestock migration to other areas in search of animal feed and water.</p>	<p>spreading structures cannot be easily modified.</p>
<p>Output 1.3 Micro dams</p> <p>The proposed two micro dams, to be constructed across small seasonal streams, will have an earth embankment, an outlet facility and small lined conveyance canal. Construction of the micro dams will have the following components: 1) Site preparation by clearing the embankment/structure foundation, 2) Trench excavation for foundation; 3) embankment construction by properly placing and compacting fill materials for small earth dam or placing the retaining masonry</p>	<p>644,000</p>	<p>460 HH</p>	<p>Losses averted:</p> <p>Increased crop and fodder production will reduce loss of human and animal life in times of drought, and health problems associated with malnutrition.</p> <p>The micro dams will also serve as flood stabilisation and reverse river bank erosion and associated farmland losses, and avoid losses associated with further reduction in ecosystem integrity.</p> <p>Benefits generated:</p> <p>By providing small storage dams and irrigation water distribution system, the programme could generate annually approximately US\$19,200 production value increment for the</p>	<p>Alternative 1:</p> <p>Storage dam of one million cubic metres capacity on a tributary of the Anseba River, requiring high tech equipment (batching plant, concrete mix transporting facilities), laboratory facilities to control mix ratio and construction material quality, and significant amount of cement, rock crushing facilities which are not really an option in area where the communities are mostly agro pastoralist and located in the remote arid area of the country. The local experience in such type construction methodology is</p>

Programme Component	Programme Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost (US\$)
<p>wall using the appropriate size and type of rock material; 4) excavation work for spillway, construction of spillway side channel retaining wall and grouted or dry rip raps for spillway floors, 5) outlet works.</p> <p>The construction will be fully using earth moving equipment which will be available in the region on rental basis. Local companies and MoA engineers have extensive experience in design and implementing of such type of macro dams.</p>			<p>60 households of cereal producers (just under a two fold increase on baseline average incomes), as well as time and energy savings for 400 livestock owners, which could engage in higher productivity work. In addition, experience from other parts of the sub-zoba indicates improving fodder productivity and quality on grazing areas will lead to an increase of livestock off-take, and increase in milk production which will increase household income by about US\$ 250 per year per HH.</p>	<p>limited and usually constructed with international companies or external support.</p> <p>Cost: US\$1,2 million. Alternative rejected for the following reasons: (i) cost double that of the micro dams, to provide irrigation to the same size area (60 ha); (ii) uncertainty regarding seasonal flows for the identified site</p>
<p>Output 1.4 Soil & water conservation measures</p> <p>The programme will implement a total of (i) 1,000 km of hillside terraces; (ii) 10,000 ha of farm land terraces; (iii) 120 check dams to control gully erosion; (iv) promote the afforestation and enclosure establishment of 250 ha through planting of multi-purpose trees in the upper catchment of the proposed micro dams and other degraded catchment and watersheds; (v)</p>	814,000	5,000 HH	<p>Losses averted</p> <p>Increase in crop and fodder production sustainable will Reduce loss of human and animal life due to drought and health problems associated with malnutrition.</p> <p>Benefit Generated</p> <p>By implementing SWC within 10,000 hectares of agro-pastoralist farmlands the programme could generate annually about US\$700,000 production value increment for 5,000 households of cereal producers</p>	<p>Alternative 1: Do nothing. Cost: US\$0. Alternative rejected for the following reasons: Agriculture is the main source of employment and income generation in the programme area, where moisture is the most limiting factor in crop and pasture production, drought is on the increase, groundwater is on the decrease, and erosion is common on steep slopes. Thus the option of implementing no soil and water conservation</p>

Programme Component	Programme Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost (US\$)
promote 100 ha community woodlot and support 300 HH to establish household woodlots; (vi) rehabilitate and establish tree seedling and forage legumes nurseries at Hamelmalo and Habero respectively; and (vii) Over-sow catchments and temporary or permanent enclosures with improved grass and forage seeds				measures, which address all of the above constraints, would constitute a lost opportunity to enhance production in a sustainable way, while at the same time conserving and remediating the natural environment.

Note: For Outcome 2 the choice of climate-resilient production method chosen by the household will depend on the household and environmental context, which prevents cost effectiveness analysis at this point. Further cost effectiveness analysis for activities under this outcome will be developed during project implementation.

During the initial periods of the project, no additional investment for maintenance is expected. However, there will be some costs required at the later stages and beyond the project life. The infrastructure consists of a sub-surface dam, flood diversion schemes, micro dams, and SWC activities. As most of these are linked to gravity irrigation using labour-intensive methods, maintenance cost is foreseen to be low except for the sub-surface dam which will use several water pumps demanding repair investment. The investment will be covered by a Water Use Management Committee, with the necessary by-laws to charge farmers fees for use of water. Some of these collected fees will be annually budgeted to serve as maintenance investment. See Section A above for more detail on maintenance. If additional investment beyond O&M is required to maintain and sustain infrastructures (like major repair of partly damaged micro dams or sub-surface dam) then it will be the responsibility (mandate) of the Infrastructure Department of zoba Anseba and the national level Water Resources Department to support the communities both financially and technically to maintain and make it operational. This is the current practice and expected to continue in the future.

- C. Describe how the project / programme is **consistent with national or sub-national sustainable development strategies**, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

In response to the developmental context highlighted above, economic growth and food security have been the central objectives of the Government of Eritrea since independence in 1993. The programme is consistent with this overall goal, as well as with agricultural sector development programmes of the Government of the State of Eritrea. These highlight the commitment to ensuring food security, poverty reduction and environmental sustainability. The programme is

completely aligned with the priorities and programme profile set out in the NAPA, as well as with the Interim Poverty Reduction Strategy Paper (I-PRSP), which provides the government's commitment to poverty reduction, and acknowledges drought as one of the major causes of poverty and food insecurity in the country. The I-PRSP contains a comprehensive economic revival program aimed at reinvigorating economic growth (Pillar I), plus a multi-pronged poverty reduction strategy aimed at addressing the underlying causes of poverty in Eritrea. The I-PRSP proposes a number of actions that would improve the resilience of people vulnerable to climate change, including increasing water availability by harnessing seasonal water flows and improving storage capacity; improved water application techniques at the farm level; and improving productivity through *inter alia* widespread use of improved pest control and reducing post harvest losses, developing and disseminating more drought resistant, faster-maturing seed varieties, soil conservation measures (terracing, construction of check dams, planting/afforestation, and closure of areas to allow natural regeneration) to improve soil fertility and thereby crop production and productivity; protecting and restoring the rural environment; and reorienting agricultural extension and research to respond more effectively to farmers' priority needs and demands. The current programme includes many of these activities.

Concerning consistency with the NAPA, this document identifies the following sectors as the most vulnerable to climate change: agriculture, water resources, forestry, coastal environments, and human health. The programme specifically seeks to develop an integrated water management and agricultural development approach to address food security through climate-sensitive technologies, thereby assisting particularly vulnerable groups, as identified by the NAPA, to enhance their resilience to climate change and adaptive capacity. These vulnerable groups are small-scale farmers, agro-pastoralists and rural women living in the particularly drought-prone areas of Anseba Region that constitute the programme area. Programme components respond fully to three of the five highest priority adaptation programmes identified in the NAPA: breeding drought and disease resistant crops; encouraging afforestation and agroforestry through community forestry initiatives; and groundwater recharge for irrigation wells. Programme components also have elements that will contribute to the remaining two NAPA top priority projects, in the sense that they include improved community-based rangeland management in the northwestern lowlands; as well as community-based interventions to intensify existing production models in the northwestern lowlands selecting suitable sheep and goat breeds.

Project consistency with the 1994 Macro-Policy Document which outlines the background for Eritrea's national economic growth strategy includes the establishment of an efficient outward-looking market economy with the government playing a proactive role to stimulate private initiatives, with irrigation-based agriculture one of four key sectors targeted for development. The project also meets the Macro-Policy requirement to address the potential negative environmental impact of development activities; specifically: environmental impact assessment; introducing land use practices in the implementation of agricultural projects that will avoid land degradation and loss of biodiversity; and the introduction and development of early warning systems, for example for drought. The National Economic Policy Framework and Program (NEPFP) for 1998-2000, which was intended to operationalize the framework policy statements called for the following: (i) the restoration, enhancement and preservation of Eritrea's ecology; (ii) the prudent utilization of land, air and water resources; (iii) the establishment of sound environmental standards; and (iv) the introduction of sustainable land management practices; all of which form part of the project design and implementation activities.

The 2004 Food Security Strategy emphasized that ensuring food security is one of the top national priorities and the cornerstone for sustainable economic growth and poverty reduction in Eritrea. Food security at the household level is considered to be fundamental and this goal is

intended to be achieved by raising the incomes and quality of life of the poorest and most food-insecure segments of the population. It also entails assisting vulnerable groups to increase production and establish sustainable means of livelihood to become food-secure, all of which are consistent with the project goal and actions.

Project actions will be implemented in support of the 1995 National Environmental Management Plan for Eritrea, the 1999 National Environmental Impact Assessment Procedures and Guidelines, and the draft 2005 Environmental Impact Assessment Procedures Guidelines for Agricultural Projects, as discussed further in Section D below. Project actions will also be consistent with the 2000 National Biodiversity Strategy and Action Plan (NBSAP), in that degraded terrestrial ecosystems will be rehabilitated through the project soil and water conservation activities, and the project actions will promote the conservation and sustainable utilization of agricultural biodiversity resources for food security, income generation and agriculture, whilst ensuring the socially fair distribution of benefits arising from the use of national agricultural biodiversity resources.

Project activities are aligned with the Action Plan for Integrated Water Resources Management in Eritrea (2009), by adopting a catchment management approach to water resources assessment, development and protection; and water resources allocation and water use. Furthermore, the project is in accordance with the National Gender Action Plan, not only through the focus on women-headed households but also through its emphasis on empowering people and institutions; improving knowledge and addressing the concerns of vulnerable groups (women and pastoralists); reducing poverty through income-generation; and arresting land degradation and controlling desertification.

Country ownership: country eligibility and country drivenness

In line with its strong commitment to environmental issues, Eritrea has ratified, *inter alia*, the United Nations Convention to Combat Desertification (UNCCD) in 1995, the United Nations Convention on Biological Diversity (UNCBD) in 1996 and the United Nations Framework Convention on Climate Change (UNFCCC) in 1995. The National Action Programme for Adaptation (NAPA) was prepared in accordance with the UNFCCC guidelines and submitted in April 2007. The NAPA identified 102 potential adaptation projects. Similarly the National Action Programme (NAP) was prepared in accordance with UNCCD and submitted in January 2002. The programme is consistent with the provisions of these international agreements, and is further aligned with the Hyogo Framework for Action (2005-2015), particularly in terms of its emphasis on risk reduction, and in terms of the development of the community-based early warning system for climate hazards, predominantly drought in the programme area.

The proposed programme has strong government support at the national level, through both the Ministry of Agriculture and broadly in the Ministry of Land, Water and Environment, as well as through the UNFCCC Focal Point. Ongoing ownership and support will be sustained through the membership of these departments in the national Programme Steering Committee. There is also strong ownership at the regional level for the programme activities, as the Zoba Anseba administration will be the executing agent for the programme. The programme will contribute to the priorities of the Government of Eritrea by incorporating adaptive measures to address the primary priority of food security, through improved and sustainable production through climate-sensitive and environmentally sound agricultural and livestock production technologies and approaches. Moreover, this programme will contribute to the mainstreaming climate risks into the operations of the Ministry of Agriculture in the Anseba region.

Links with UNDAF and UNDP priorities

The programme is also synergistic with the United Nations Development Assistance Framework

(UNDAF, 2007-2011), which includes a wide range of climate change adaptation related activities including disaster preparedness, food security, sustainable agriculture, environmental protection and natural resources development.

The Objective and the Outcomes are aligned with UNDP's thematic focus on adaptation to climate change and will contribute directly to the key results area specified as 'Promote climate change adaptation'. The programme activities will contribute to the achievement of the following CPAP outcomes: Support development and protection of the environment and national resources; Improved access and availability of food; By 2011, a national coordination mechanism is established on a national, regional and local level for disaster prevention, preparedness and mitigation. The relevant CPAP outputs are: 10% of the poor are supported in income generation and livelihood related activities through micro credit financing; Wood fuel consumption reduced by 50% through energy-efficiency improved traditional cooking stoves; Strategy for disaster prevention, preparedness and mitigation developed.

As the multi-lateral implementing entity for the Adaptation Fund for this programme, UNDP has a comparative advantage that will serve the programme well. The programme is highly relevant to the UNDP mandate of capacity development, governance, poverty reduction and to the UNDP programme goal of promoting adaptation to climate change. The programme will contribute directly to the following UNDP Country Programme outcomes: Support development and protection of the environment and national resources; and Improved access and availability of food. Through its management role in the programme and in line with its ongoing support to the government of Eritrea, UNDP's involvement will assist with strengthening national capacities and partnerships to ensure lasting results.

Integration of development in Eritrea

Eritrean government plans and strategies identify the importance of integrated management, and ensuring this is the mandate nationally of the Ministry of National Development, which institution is responsible for facilitating better management and execution of the complex task of planning and co-ordination at all levels of government for a more effective use of scarce public resources, for the promotion of sustainable growth and the alleviation of poverty. No central government ministry is identifiably in charge of decentralisation matters. At the regional level there is the regional government of council (Baito) with councillors directly elected and supporting executive (administration). The region is responsible for preparation and implementation of regional development plans (RDP). At the sub-region level there are full time personnel but no elected councils. The sub-regions have full time staff in their locations. At the kebab level there are kebab administrators and deputy administrators locally elected and government salaried. In addition, in place is a community court of three elected judges; personnel, secretary and finance officers (all three to be appointed as full time staff); and committees for Land, Infrastructure, Economic Development, Social Affairs and National Service. The project is structured according to and will function through the structures for coordination and integration at the different levels, as is set out in Part III: Implementation Arrangements.

D. Describe how the project / programme meets relevant national technical standards, where applicable.

The relevant national and sub-national technical standards or regulations that this programme will need to comply with are the following:

- National Environmental Impact Assessment Procedures and Guidelines
- Environmental Impact Assessment Procedure Guidelines for Agricultural Projects

- 1988 procedure for carrying out construction projects, developed by the Ministry of Public Works
- Standard Design and Procedures in Construction of Water Works
- Requirements of the National Seed Committee regarding development and dissemination of improved seeds

In addition, although there are no standards for the installation of meteorological stations in Eritrea, the programme will follow the standards set out by the World Meteorological Organisation. Cost and time implications to comply with the various standards have already been incorporated into the programme budget and time frames.

National Environmental Impact Assessment Procedures and Guidelines: The National Environmental Management Plan for Eritrea was adopted in 1995 and is the basis for actions in environmental management and conservation. The NEMP-E emphasizes the need for integrated approach involving all relevant sectors, to improve the understanding of scientific and human interactions through integrated research and management and to take into consideration the human factors which stress the value of extensive public awareness programs. The programme deals with a number of the priorities identified by the NEMP to safeguard the nation's natural resource base, including promotion of water conservation measures, arresting land degradation, increasing public awareness about land degradation, increasing soil cover, empowering farmers to improve farming methods and land husbandry, capacity building for improved rangeland management, , afforestation and soil conservation; and area closure for natural regeneration. Thus the programme has been designed to generate net environmental benefits.

In 1995 the National Environmental Impact Assessment Procedures and Guidelines were developed. The NEAPG document contains a set of procedures such as the screening and categorizing projects. Based on their type, size, location, and mode of operation projects are classified into three major categories with different level of Environment Impact Assessment procedure based on their potential impact on the environment and the necessary mitigation measures. It is likely that the larger water investment components of the programme, including the sub-surface dam on the Anseba River, will fall under category B. Thus it will be necessary for the relevant programme components to pass through an Environmental Evaluation Questionnaire (EEQ) in order to obtain environmental clearance before programme approval can be granted. Provision has been made in the programme budget for any associated costs, and it is unlikely that any significant time delays will result, as the programme has been designed for maximum environmental benefits.

In 2005, Eritrea further developed Environmental Impact Assessment Procedure Guidelines for Agricultural Projects, dealing mainly with forestry, wildlife, agriculture and livestock. The guideline requires projects to be assigned in one of the three categories (A, B or C) according to the level of environmental risks they present. In this document, a set of initial environmental checklists, potential significant impacts of agricultural, livestock, forestry and biodiversity projects and known environmental sensitive area are presented to enable project screening and categorization. The screening, categorization and analysis of associated risk of the proposed adaptation programme components and development of mitigation plan will be undertaken by Soil and Water conservation, forestry and rangeland experts from the MoA zoba Anseba with close supervision of the Regulatory Service Division of the MoA during the first year of the programme parallel to the design of water infrastructures, identification of specific sites for SWC and natural resources protection and rehabilitation. The Regulatory Service Division of the MoA is the national institution, jointly with the Department of Environment, which is entitled to provide environmental clearance to agricultural projects in the country. All activities related to EIA for

this AF programme will be implemented by the staff of MoA and all the costs and time associated with this activity are included in the overall programme cost.

For all type of contracts involving construction work there is a procedure for carrying out construction projects which was developed in 1998 by Ministry of Public Works. In addition, there are construction materials standards like bricks, masonry, beams, reinforcement bars, aggregates, concrete work etc. which were issued by the Eritrean Standard Institute in 1999 under the Legal Notice No 34/1997 in order to provide standardization and quality assurance. To ensure compliance with these standards, all construction materials used under the AF programme will be certified by the Infrastructure Division of the Zoba Anseba in consultation with the Eritrean Standard Institute. In addition the programme coordination unit and the MoA zoba Anseba will ensure that construction materials purchased are from suppliers who can present a quality assurance certificate from the Standard Institute of Eritrea. Compliance with these standards is a routine procedure and therefore will not have cost or time implication.

Standard Design and Procedures in Construction of Water Works: As per the recent Eritrean Water Proclamation No. 162/2010 and the current practices, all type of water studies, proposals for surface and groundwater development, and technical design of water infrastructures need to pass through the Water Resources Department (WRD) of the Ministry of Land, Water and Environment for technical review and its approval. During development of this AF proposal consultation has been carried out with the Director General of the WRD and full support for the implementation of the programme has been secured. Following the approval of the AF programme all studies and designs of the water infrastructure components will be submitted to the Department of Water Resources at zoba level for technical review and approval. The head of department of water is also a member of the Zoba Anseba project technical committee which helps in facilitating the review and approval. Again this is a standard procedure to be followed and does not need separate budget and time.

Standards for the Installation of Meteorological Stations: The country has no standards for the installation of metrological stations. However, for the installation of class 1 and class 3 satellite climatic station the AF programme will work jointly with the Meteorological unit of the Civil Aviation Authority, Ministry of Agriculture and Water Resources Department in order to maintain uniformity with the existing World Meteorological Organisation (WMO) standards for the meteorological stations. The procurement and installation cost and time have been developed by considering the involvement of experts from these three institutions.

Procedures and standards in development and dissemination of improved seed, such as drought and disease resistant and early maturing crops: The overall responsibility of producing foundation seed, the identification and development of drought and disease resistant and early maturing crops is the responsibility of the National Agricultural Research Institute, while promotion and distribution using the extension network is under the Seed Unit of the Agricultural Development and Promotion Department of the MoA. On the other hand to oversee imported seed quality, conducting pest risk analysis and issuing of phytosanitary certification is the responsibility of Regulatory Service Department of the MoA. To simplify works related to seed development and dissemination there is a National Seed Committee composed of the three above-mentioned departments of the MoA, which this AF programme management will consult for detailed procedures and guidelines during the implementation of its improved seed development and dissemination components. If there is importation of plant materials (improved seeds), live animals (poultry) and other genetic materials under this AF programme, the programme management will comply with the guideline on phytosanitary and zoosanitary issued by MoA in 2003 and regulatory instruments on plant quarantine of 2006, No 156/2006. This action will contribute to conservation of crop and livestock species by effectively excluding or kept to a minimum damaging alien pests, diseases and invasive species from entering Eritrea.

A recent UNDP/GEF project in the Anseba Zoba through the LDCF was cancelled by the government citing a new regulation in Eritrea limiting water diversions from forest or riverine ecosystems. The new government policy does not prohibit or limit water uses from river drainage, but rather structures that have negative environmental impact on the ecosystems, particularly deforestation of riverine ecosystems. The proposed AF project will implement flood diversion measures for gravitational irrigation. The Environment Impact Assessment guidelines will be strictly followed and the regulations of the new policy will be adhered to. Hence, the policy and the proposed development interventions will be applied in tandem.

Government policy on the protection and management of riverine forest has already identified riverine forests area and ecosystem along the Gash, Barka and Lower Anseba rivers including Kerkebet (LDCF Project location) as hot spot sensitive areas where it limits water diversions from forest or riverine ecosystems. On the other hand all water development activities including river diversion under the "Climate Change Adaptation Program in Water and Agriculture in Anseba Region" are located on the upper part of Anseba rivers which is not identified as sensitive area under the policy.

This project will not divert surface flows that will negatively impact water supply for riverine ecosystems instead it will increase the availability of groundwater/base flows for the ecosystem through raising the groundwater table and extending though out the dry season by checking the groundwater flow, storing it underground and slowly releasing. This issue has been verified by Ministry of Water, Land and Environment which is the national institution with the mandate for applying the policy on riverine ecosystems.

Land tenure issues are not expected to arise during the implementation of the project. Barriers to sustainable land use stemming from the dessa system, whereby farming land is redistributed to all households of the community every 5-7 years, have been removed in Anseba Zoba, where this land rotation system is no longer implemented.

E. Describe if there is **duplication** of project / programme with other funding sources, if any.

The only externally-funded projects underway which have some bearing on adaptation to climate change in the agricultural sector in Eritrea are those implemented by UNDP. At this stage, the only project to consider is a GEF-funded sustainable land management (SLM) project, which is being implemented in the Central Highlands of the country. Thus although the theme is relevant, the activities and the agro-ecological zone and locality are different, and there is consequently no overlap or duplication. There are no other planned or ongoing projects of a similar nature in the sub-zobas that the project targets.

The Government of Eritrea implements similar activities to those included in this programme proposal, such as water storage, soil and water conservation and agricultural development activities, albeit not yet with a specific climate change focus. However, the programme locality has been specifically selected by the Government to avoid overlap with any other ongoing programmes.

F. If applicable, describe the **learning and knowledge management component** to capture and disseminate lessons learned.

Learning and knowledge management is recognized as an important component of the programme, reflecting one of the key themes of the Adaptation Fund. Outcome 4 deals

specifically with developing a knowledge management system and ensuring that this has feedback links to policy. Other programme components will produce results that will be encapsulated into the materials developed for required for subsequent capacity building and awareness raising. The generation of improved and up-to-date climate risk information through downscaled projections, which will be one of the first programme actions, under Outcome 3, will be used to fine-tune subsequent programme activities to ensure that they result in climate resilient development. For example, the downscaled projections will be integrated into programme feasibility studies for the water-related infrastructure and to design the most appropriate soil and water conservation measures. They will also be used to develop materials for the ensuing public awareness raising campaign, which will start with a launch event in Anseba Region, followed by targeted activities at different localities in Keren and in the programme area, using radio and community drama groups. Under Outcome 2, selected locations in the programme area will be involved in learning-by-doing activities in which farmers develop their own capacities for applying on-farm adaptive strategies. These components will promote integration of scientific knowledge, climate information and local practices in a farmer-led approach. In the resultant empowering process, farmers could critically reflect on scientific forecasts and make informed land-use decisions based on an integrated interpretation of the data, plus presentation of a range of technological options by the research stations, and on their own knowledge. Such a process would support locally-developed adaptation options and their upscaling. Through this and other programme components, collaboration will be increased with local research and educational stations, such as the Hamelmalo Agricultural College and NARI, on integrated multi-disciplinary appropriate agro-ecological technologies.

Knowledge management outputs for the programme include those covered under Outcome 4, which is the knowledge management component of the programme, as well as a number of outputs that fall under other outcomes. The programme thus includes the following knowledge management outputs:

- Improved knowledge of climate risks generated through downscaled projections from multiple GCMs for the sub-national scale, using either station observations or satellite observations
- User-friendly knowledge dissemination products developed and disseminated using improved climate risk information³⁴
- Detailed strategy for the climate change awareness raising campaign for the programme, spelling out a workplan, target audiences and modes of communication
- Well-publicised launch event for the CC awareness raising campaign to capture public imagination and secure initial political commitment, accompanied by an ongoing TV and radio campaign
- Awareness raising events at the policy (zoba) level, sub-zoba level, and community level, two events for each target audience/location over the five-year programme, using innovative methods such as community drama groups and child radio programmes
- Stocktaking assessment of former and existing initiatives and structures for community preparedness to climate risks and early warning systems, such as the structures established under the National Food Information System (NFIS)
- Community-based early warning system developed, using a sustainable livelihoods approach to update and expand existing livelihoods maps for the two sub-zobas and to

³⁴ Initial dissemination will begin through project structures and informally through the Zoba Anseba administration. The knowledge products will be used in the awareness raising campaign – see Output 1.2

clarify priority climate and related risks. This will entail developing a synthesis of community observations, traditional knowledge and scientific information obtained from the downscaling process

- A knowledge management system established for the programme, based on existing processes in the Zoba Anseba administration, to be institutionalised within the administration. This will include identifying a lead agency for this purpose, as well as a coordination mechanism between relevant departments for sharing lessons, and developing a standardised system for capturing lessons learned
- Study tour to a country in the region with similar climate risks and environmental constraints, to enable sharing between programme stakeholders (government and local community) and the regional community. This is expected to enhance the capacity of regional administration staff to plan and implement and monitor climate change risk reduction programs and activities through out the Anseba region.
- Organize a regional forum to review and integrate climate risk reduction strategies and measures in the regional development plan and Integrated Water Resources Management Action Plan to facilitate mainstreaming of climate risk reduction measures into the policies, regulations and annual regional and national capital budgets.
- Facilitate the review of existing standards and regulations relating to the design and implementation of water and agriculture infrastructures and climate-resilient related interventions.
- Appropriate knowledge products developed for policy advocacy activities, including photo stories, presentations and briefing notes
- Regular policy advocacy activities conducted throughout the life of the programme, including at relevant national and regional events
- Good media coverage for programme activities and to disseminate knowledge products, targeting outlets that are relevant for policy makers as well as the public
- Farmer-to-farmer seasonal forecast workshops to assist farmers in developing their own capacities to apply on-farm adaptive strategies in the face of changing climate conditions, through an action learning process that involves farmers, the scientific community, research institutions and the meteorological services in a collaborative learning process
- Lessons shared through various appropriate regional and global networks, such as the Adaptation Learning Mechanism, to facilitate learning across countries
- Feedback loop to policy makers at the zoba and national level, to facilitate uptake of lessons learned into policy

The feedback loop to national policy makers will be developed by capturing lessons learned from the project and disseminating them at the national policy level through policy advocacy activities which are listed above. The project will explore the best possible way to institutionalise this, which will most likely be through the Economic Development department in Zoba Anseba.

The repository for data and information generated through the project will be located in the Ministry of Agriculture at the zoba level. The Hamelmalo Agricultural College will assist the ministry of Agriculture with capacity development and backstopping for upkeep of the repository.

In addition to the programme-specific knowledge management activities, the Government of Eritrea and UNDP will take advantage of various sponsored networks to disseminate

programme results and to increase awareness of what the programme is addressing and how it is doing that. This will include the Adaptation Learning Mechanism (ALM) and “wikiADAPT”, with a focus on documenting the following:

- assessment of the costs and benefits of adaptation
- best practices in integrating adaptation into local development and national policy, and programme design and implementation mechanisms
- the conditions for success, and failure factors, with regard to replication and scaling up

Annual programme monitoring visits and quarterly and annual reporting will ensure that lessons can be captured as they are generated, both to refine programme design and direction, as required, and to feed into the broader mechanisms referred to above. All monitoring information and any reflections on the programme will be shared with the various programme managers and stakeholder representatives, so that a common understanding of appropriate programme design, implementation measures, and necessary flexibility is developed, which will assist with designing the required replications of the programme adaptation measures throughout Eritrea and elsewhere in the region.

G. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.

An early internal concept note was developed for an adaptation project in the agricultural sector in Eritrea, for which all major Government stakeholders were consulted and consensus was developed with regard to the main theme of the programme. This original concept has been refined to ensure that the programme encapsulates tangible adaptation activities.

For development of the full proposal, the following stakeholder consultation process was carried out in September/October 2010:

Given that Eritrea currently lacks a national climate change coordinating committee, it was necessary to approach key stakeholders individually and not through an overarching institutional arrangement. Nevertheless, the UNFCCC Focal Point in the Department of Environment within the Ministry of Land, Water and Environment has played a key role, supported by the UNDP Country Office, in raising awareness and providing initial guidance to key stakeholders on the criteria of the AF and the purpose of the programme formulation mission.

As the executing entity for the proposed programme, the **Ministry of Agriculture** is a primary stakeholder and will play an important role in guiding the development of the programme document. The programme formulation mission held a number of meetings with the MoA, starting with an inception meeting with the Director General of the Agricultural Promotion and Development Department. After consultations with the Minister of Agriculture and with the DG of Environment, the MoA selected the Anseba region as the programme location, an inland region in the north west of the country. Criteria for selection include equitable distribution of development programmes between Eritrea’s six regions, poverty (Anseba region has the highest levels of poverty in Eritrea) and vulnerability to climate change (Anseba region is already the most drought-prone area in the country). A number of follow-up meetings were held with the MoA to elaborate on the focus of the programme, in line with national priorities and NAPA priority projects.

Individual meetings were held with the state **Department of Water, Department of Land and Department of Energy** in Asmara, as well as the **Meteorological Services Agency**. A number of meetings were held with the **Department of Environment**, including with the Climate Change Coordinator. While **NGOs** are limited in number in Eritrea, a number of NGO

representatives were present at the Inception Workshop – see Annex 1 – and the programme development team additionally met with the National Union of Eritrean Women (NUEW) in Keren, Anseba.

An Inception Workshop was held in Asmara at an early stage of programme formulation, and was attended by approximately 30 stakeholders. The objectives of the Inception Workshop were:

- To provide information to key stakeholders on the Adaptation Fund and the current proposal development process
- To facilitate integration of the inputs of key stakeholders into the early stages of the proposal development process, to maximize sustainability, equity and efficiency of the programme

Workshop participants agreed that the proposed possible adaptation options were consistent with national policy and priority and provided some valuable inputs and suggestions for additional options to consider and for fine-tuning proposed activities, and supported the inclusion of an **early warning system** for drought as a programme component.

The programme development team made a field trip to Anseba region to further discuss and refine programme activities with key stakeholders at the zoba and sub-zoba level. Initial meetings were held in Keren, the regional capital, with the Governor to ensure ownership and co-operation, and with key stakeholders in the Anseba administration, including the Department of Economic Planning and the Ministry of Agriculture (MoA). The team then travelled from Keren to the field site in Hamelmalo, together with relevant MoA and Regional Administration officials/experts, and met with the administrator of the sub-zoba region, as well as staff of the Hamelmalo Agricultural College, who will play a key role in implementation. Additional meetings were held with the Ministry of Health and the National Union of Eritrean Women (NUEW).

Regarding involvement of community members in the project design and activity selection, in preparation for the mission, the Ministry of Agriculture Anseba branch sent, on 10 September 2010, experts to the two sub-zobas to undertake confirmation of the community needs that had been already reflected in the Regional Development Plan which the Regional Administration prepares regularly. The Development Plan is a bottom-up process that aggregates and refines the sub-zoba and village area plans and which eventually feeds into the national plan for apportionment of regular and capital budgets. Once the Formulation Mission was on board, a lengthy presentation on the development priority needs of the region was provided by the Regional Governor and the two sub-zobas selected. The field trip, made between 19-22 September 2010, verified the selection of the activities proposed after discussing with sub-zoba Administrators, representatives of village elders, and consulting to community members that included vulnerable group representatives.

Annex 1 contains a full list of stakeholders consulted during the programme development stage.

Key stakeholders were provided with the draft programme proposal, so that their inputs on specific elements of the programme could be integrated into the final draft.

H. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

OUTCOME 1: Increased water availability and erosion control through groundwater recharge, rainwater harvesting, irrigation and soil and water conservation measures

Baseline:

Water is the most limiting factor to improved agricultural production in the drought-prone programme area located along the Anseba River, in the sub-zobas of Hamelmalo and Habero, where extremely variable seasonal and inter-annual rainfall and productivity is often insufficient to support existing livestock and human populations. In addition, land degradation and soil erosion are considered to be serious environmental problems. These constraints are projected to increase as the impacts of climate change become more severe. While Eritrea has a great deal of experience with soil and water conservation technologies and infrastructure, this has not always been accompanied by sufficient ongoing investment into these approaches. As a result, optimal use has not always been harnessed from the extensive efforts that have indeed been made. The anticipated reduced annual flow of the Anseba River and its tributaries that recharge the major groundwater aquifers (alluvials and colluvial) and base flow along the Anseba stream bank will have a significant impact on the two livelihood system of the programme area: semi-sedentary livestock based-agro-pastoralism, and irrigation based agro-pastoralism by negatively impacting the water supply for irrigation and human and livestock consumption. Increased temperature and reduced rainfall will further reduce soil moisture. While the Zoba Anseba administration is aware of these climate-related problems, and has plans for improving groundwater recharge and floodwater harvesting, it lacks resources and budget to put in place the necessary interventions. Notwithstanding the inherent limitations in water availability and associated low levels of production in these sub-zobas, optimal use of the available water resources of the seasonal flow of the Anseba River is not being made.

Adaptation alternative:

The programme will promote groundwater recharge and implement harvesting of flood water and water storage by developing a range of climate-proofed mechanisms, including a sub-surface dam on the Anseba River, small floodwater diversions off a tributary of the Anseba, two micro dams, and off-farm and on-farm soil and water conservation structures and methods. An integrated and holistic response will be developed to managing climate risks in the Hamelmalo and Habero sub-regions, with programme activities targeting vulnerable communities along the seasonal Anseba River, in order to unlock development opportunities through improved water management and groundwater recharge. A sub-surface dam is an important structure to reduce evaporation, which will be one of the main impacts of the projected increase in temperature due to climate change in the programme area. Supplementary irrigation will be enabled by the development of small diversion structures off tributaries of the Anseba River, to improve crop production and rangeland productivity. The two micro dams will assist agropastoralists to strengthen their coping mechanisms and reduce their vulnerability to high rainfall variability and frequent occurrence of drought, both of which are projected to increase with climate change. The micro dams will provide a means to retain and store runoff water of small streams during the rainy season, for use to replenish the moisture deficiency of crops or pastures that have been subject to extended periods of no or low rainfall during the crop/pasture production season. The proposed soil and water conservation activities will improve runoff management and infiltration on both rangelands and arable areas. The programme will construct physical structures such as hillside soil and stone bunds, terraces, and check dams to minimize the sedimentation rate of the micro dams, and reduce the intensity of runoff, which is projected to increase in terms of the expected climate change impacts. These structures will also facilitate the proposed afforestation and enclosure (permanent and temporary) development. To reduce land degradation of farm lands, improve soil fertility and soil structure and enhance in situ moisture conservation, activities such as farmland terraces will be undertaken. The community and household woodlots to be established and planted with multipurpose trees, will contribute to building adaptive capacity and enhancing resilience of households by improving soil retention and fertility to enable increased and sustainable production, and by providing opportunities for increased and diversified household income through use of non-timber products.

The cost of activities under Outcome 1 is US\$3,056,400.

OUTCOME 2: Climate-resilient agricultural and livestock production enhanced

Baseline:

Since 1990, the two sub-zobas that constitute the programme area have been seriously affected by drought, which has resulted in reduced production, increased food insecurity and malnutrition, loss of household assets such as livestock and severe impacts on the livelihoods of the agro-pastoralist communities. There is an urgent need to assist these vulnerable communities to build adaptive capacity through enhancing climate-resilient agricultural and livestock production. As indicated in Eritrea's National Capacity Self-Assessment (NCSA) for Global Environmental Management³⁵, there is a serious deficiency of institutional, technical, human resources, managerial and financial capacity at the national, regional and local level to address these kinds of impacts. This is not to deny that significant strides have been made in the country that contribute to promoting adaptation to climate change, within the existing limited capacity. In addition to experience with soil and water conservation methods, the country has experience in agricultural technologies that have adaptive value, such as agroforestry and the development of drought-resistant crops and livestock. However, climate change projections have not been formally integrated into the choice of technological options, and the extension services are under-resourced and often unable to be effective due to inadequate communications and transport. Extension officers require additional skilling in updated technologies that are specifically geared towards promoting adaptation. While strengthening national agricultural research and development and extension services was a high priority for the new Eritrean government after independence, and progress has been made, economic and other constraints have militated against full achievement of this priority.

In order to combat land degradation, specific capacity needs identified in the NCSA include awareness creation for effective participation of land users; transfer and exchange of local technology, including moisture retention and groundwater conservation activities; and information and increased knowledge base on the process of desertification.

Adaptation alternative:

Under the adaptation alternative, an integrated and holistic response will be developed to managing climate risks in the Hamelmalo and Habero sub-regions, with programme activities targeting vulnerable communities along the seasonal Anseba River, in order to unlock development opportunities through the improved water management and groundwater recharge (Outcome 1). Climate-smart technology for enhanced production will be developed and disseminated by means of enhanced extension services. A range of climate-resilient agricultural technologies and methods will be developed and transferred to farmers e.g. drought- and disease-resistant varieties, integrated crop-livestock production systems, conservation agriculture, agroforestry, and enhanced rangeland management. Training will be implemented to increase the distribution and use of improved fuel-efficient traditional stoves. Additionally, seasonal forecasts will be used in a farmer-led collaborative action learning process that integrates scientific and traditional/local knowledge to enhance adaptive capacity and climate-proof production systems.

The cost of activities under Outcome 2 is US\$1,250,000.

OUTCOME 3: Improved climate risk information and climate monitoring used to raise

³⁵ State of Eritrea Ministry of Land, Water and Environment, July 2007

awareness of and enhance community preparedness to climate change hazards

Baseline:

There has been little downscaling of climate change projections for Eritrea to date and considerable uncertainties exist. Extensive data gaps exist with respect to assessing impacts, and developing adaptation strategies. There is consensus that Eritrean capacity to analyse climate change trends is poorly coordinated and underfunded. Downscaling exercises have only been conducted in the broadest terms, and this is not yet felt to be sufficiently accurate. The Meteorological Services does not yet have an adequate database, observations are not always systematically conducted and information received from the regions is not computerized, and may be unreliable. All of these factors mean that climate risk information, both in terms of climate observations and projections, is scanty and poorly understood by policy makers and civil society. An in-depth assessment of the potential changes in climate from national to local/community scale has yet to be undertaken. Understanding of the vulnerability and impacts, as well as options for adaptation, is yet to be developed in an evidence-based fashion, using monitoring, ground truthing and modeling tools. As stated in the NCSA, in order to address climate change Eritrea needs to promote education and awareness for mainstreaming climate change concerns at different levels in society; and, stated broadly, to develop capacities to climate proof development at the national and sectoral level. A previous initiative to develop a national early warning system, linked to the National Food Information System (NFIS) has not been taken to fruition, meaning that communities in Eritrea lack systematic advance warning of climate risks such as drought, hampering their ability to build adaptive capacity.

Adaptation alternative:

The proposed alternative is to improve climate information and the sharing of this in a coordinated fashion, to enhance adaptation responses. The relevant activities under the adaptation alternative include developing enhanced downscaled projections for the region, raising awareness of the expected climate change impacts in the area, and developing a community-based early warning system to allow for a more proactive approach to reducing risks to livelihoods and health associated with drought and other. Downscaled projections will be used to integrate improved climate risk information into programme activities, for example by reviewing and fine-tuning feasibility studies for groundwater recharge and floodwater harvesting structures (Outcome 1) to ensure that they constitute appropriate and sustainable mechanisms in light of expected changes; and to guide technology choice for climate-sensitive options to improve agricultural and livestock production (under Outcome 2). Capacity for meteorological observations will be developed through iterative training, equipment and institutional development at the zoba level to ensure sustainability of the enhanced meteorological observation and analysis capacity.

The cost of activities under Outcome 3 is US\$750,000.

OUTCOME 4: Lessons learned and shared and policy influenced through knowledge management system

Baseline:

While policy makers and planners are becoming more aware of the importance of an enhanced response to climate change, Eritrea has not yet developed a national or sub-national climate change policy or strategy. An important gap highlighted during the programme formulation phase was the lack of awareness of the significance of climate change impacts. While at the

local level, people are very aware of the increasing climatic variability that is negatively affecting their livelihoods, they lack an understanding of the global issue. Despite progress, there remains a lack of understanding of the sectoral and development implications of climate change effects in line ministries. This is an underlying cause of the current situation, in which climate change in general and adaptation in particular is not mainstreamed into development planning processes. This is the case both nationally and in the regions. Currently there is little collated information available on climate-related risks in the agricultural sector, either at the national or zoba level. Management and dissemination of information about climate change-related risks is not carried out systematically, which further also militates against an effective response. Moreover, any lessons learned are not being captured in a fashion that facilitates broader sharing, or that casts light on ways to address an aggravation of the food security situation as a result of climate change. Thus opportunities for cross-fertilisation between projects and regions, and to influence policy, are being lost.

Adaptation alternative:

The programme will have a strong learning and knowledge management component to capture and disseminate lessons learned and to influence policy. The knowledge management system will be institutionalised within Zoba Anseba administration, which will in itself provide lessons to guide the other regions. This will include lessons learned on the additional burden faced by women and children with respect to climate change. Lessons will be shared through various appropriate regional and global networks, such as the Adaptation Learning Mechanism, to facilitate learning across countries. The knowledge management system will include a feedback loop to policy makers at the zoba and national level, to facilitate uptake of lessons learned into policy.

The cost of activities under Outcome 4 is US\$366,600.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation

The programme will be implemented over a five-year period, commencing in January 2011. The implementing entity (IE) for the programme will be the UNDP, in its capacity as a Multi-lateral Implementing Entity for the Adaptation Fund. The programme will be executed under UNDP National Execution (NEX) procedures. The executing entity (EE) for the programme will be the Ministry of Agriculture at the Anseba Zoba Administration.

The programme organogram below indicates the management structures for the programme and how these will interact with each other and at the different levels. The National Steering Committee (NSC) will guide and oversee the programme and will facilitate access to additional technical assistance when required. It will be composed of representatives of the Ministry of Land, Water and Environment (Central), the MoA (Central), the Economic Development and Infrastructure Departments of the Zoba Anseba administration, as well as the Zoba Finance office, and UNDP. The NSC Secretariat, which will convene meetings of the NSC, will be composed of the UNFCCC Focal Point and the National Programme Coordinator. The NSC will meet at least twice a year.

The Programme Technical Committee (PTC), which will meet quarterly, will be the technical committee guiding programme implementation. It will be chaired by the National Programme Coordinator (NPC), and will include representatives of the Land, Water and Environment Divisions within the Infrastructure Services Department of the Zoba Anseba administration, the

NUEW, NUEYS, Hamalmelo Agricultural College, NARI, and representatives from the Zoba Anseba Agriculture department.

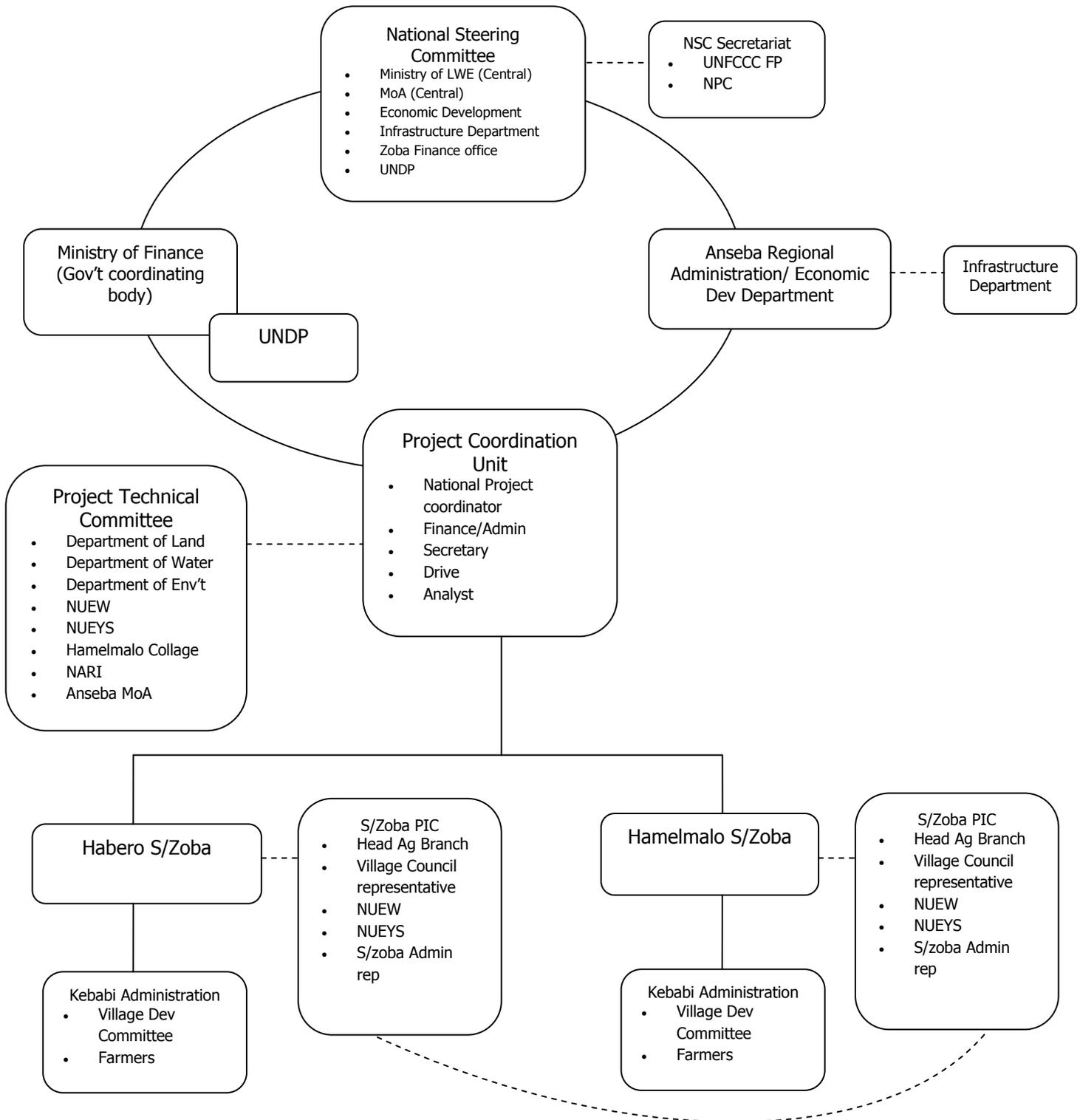
The five-person Programme Coordination Unit (PCU) will be responsible for day-to-day management of the programme activities. It will be headed by the NPC, and will include a Programme Analyst, Programme Finance and Administration Associate, Programme Assistant, and Programme Driver. Direct supervision of the PCU will be by the Economic Development department of the Zoba administration, with the second level of supervision by the NSC. The PCU will be assisted by the zoba-level PTC.

The highest level of authority at the sub zoba level regarding the programme implementation rests upon the Sub zoba Administration. The branch office of the Ministry of Agriculture at the sub zoba will be directly responsible for implementation of programme activities in both sub zobas.

The Ministry of Agriculture Head will be assisted by a sub zoba Programme Implementation Committee (PIC). This Committee will be chaired regularly by the local Administrator and the group will provide technical inputs and expert advices including support towards effective implementation of the programme. The members of the PIC will include National Union of Eritrean Women, National Union of Eritrean Youth and Students, Sub Zoba administration, village council representatives and the MOA which will serve as Secretary of the Committee.

The Kebabi administration areas (1-3 villages) will be the direct beneficiaries of the programme interventions and will be responsible for mobilizing communities for labour and other contributions required of them. In addition, they will play an active role in identifying beneficiaries, specific areas for development work and in meeting other requirements.

Figure 2 Programme Organogram



The National Steering Committee is responsible for making management decisions for a programme in particular when guidance is required by the National Programme Coordinator. The NSC plays a critical role in programme monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the programme or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the NPC and any delegation of its Programme Assurance responsibilities. Based on the approved Annual WorkPlan, the NSC can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

In order to ensure UNDP's ultimate accountability for the programme results, NSC decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Programme Manager.

Potential members of the NSC are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the NSC as appropriate. The NSC contains three distinct roles, including:

An Executive: individual representing the programme ownership to chair the group by *Representative of the Government Cooperating Agency*

Senior Supplier: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing programmes and/or technical expertise to the programme. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the programme by *representative of the Implementing Partner and/or UNDP*.

Senior Beneficiary: individual or group of individuals representing the interests of those who will ultimately benefit from the programme. The Senior Beneficiary's primary function within the Board is to ensure the realization of programme results from the perspective of programme beneficiaries and will be carried out by *representative of the Government*.

The **Programme Assurance** role supports the Programme Board Executive by carrying out objective and independent programme oversight and monitoring functions. The Programme Manager and Programme Assurance roles should never be held by the same individual for the same programme. In this case, *UNDP Staff member typically holds the Programme Assurance role*.

National Programme Coordinator: The NPC has the authority to run the programme on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the NSC and the PTC. The Programme Manager's prime responsibility is to ensure that the programme produces the results specified in the programme document, to the required standard of quality and within the specified constraints of time and cost.

Programme Support: The Programme Support role provides programme administration, management and technical support to the Programme Manager as required by the needs of the individual programme or Programme Manager.

Table 4 Proposed functions of management entities

ORGANISATIONS	PROPOSED COMPOSITION	PROPOSED FUNCTIONS ³⁶
National Steering Committee (NSC)	<ul style="list-style-type: none"> • Multi-stakeholder • Ministry of Land, Water and Environment (Central) • MoA (Central) • Economic Development and Infrastructure Departments of the Zoba Anseba administration • Zoba Anseba Finance office • UNDP 	<ul style="list-style-type: none"> • Overall responsible to ensure programme implementation on behalf of Anseba Region Administration/UNDP • Approves AWP&B • Approves strategy adjustment • Appoints auditor • Reviews programme reports • Integration of local lessons learnt into national policy context • Knowledge management contribution • Up-scaling of successful activities
Programme Technical Committee (PTC)	<ul style="list-style-type: none"> • Economic Development Department, Anseba • MoA, branch, Anseba • Environment division, Infrastructure Department of Anseba • Land Division, Infrastructure Department of Anseba • Water Division, Infrastructure Department of Anseba • NUEW • NUEYS • NARI • Hamelmalo Agricultural College 	<ul style="list-style-type: none"> • Reports to the Governor • Responsible for technical support • Supervision of technical works • Updating, readjustment of technical elements
Sub-Zoba Programme Implementation Committee (PIC)	<ul style="list-style-type: none"> • MoA branch, Anseba • Village Council representative • NUEW • NUEYS • Sub-zoba Administration representative 	<ul style="list-style-type: none"> • Coordination of implementation at local level • M&E • Reports to Sub-Zoba Administration
Programme Coordinating Unit (PCU)	<ul style="list-style-type: none"> • National Programme Coordinator • Programme Analyst • Finance and administration associate • Programme Assistant • Programme Driver 	<ul style="list-style-type: none"> • Responsible for management and operational arrangements at programme level • Facilitation of implementation • Prepares AWP&B • Prepares progress and financial report

³⁶ Detailed TORs will be developed during the project inception phase.

		<ul style="list-style-type: none"> • Prepares internal M&E reports • Programme resource management • Arranges meeting of the PTC • Reports to the NSC • Coordinates implementation Partners • Arranges external auditor service
NARI/Hamelalo Agricultural College, other academic institutions, NGOs and other interested institutions	<ul style="list-style-type: none"> • Feed, rangeland • Livestock • Irrigation • Crop 	<ul style="list-style-type: none"> • Training • Participatory research • Implementation of specialist consultancies • Technical committee members on request • Assists with formalised knowledge management system

B. Describe the measures for financial and project / programme risk management.

During the programme formulation phase, a number of risks to the successful achievement of the programme objectives were identified. These are tabulated in Table 1, together with an assessment of the degree of each risk, and the mitigation measures identified to mitigate against the risks. It is assumed that all programme risks are “owned” by both UNDP, as the Implementing Entity, and the Ministry of Agriculture, as the Executing Entity, although UNDP has the ultimate responsibility with regard to all financial risks, and the right of cessation of activities, or withdrawal of funding in the event of risks that cannot be otherwise managed.

Table 5 Risks and mitigation measures

	Risk description	Degree	Mitigation/ Comment
1	Severe drought or other extreme weather events	High	Particularly severe drought and linked temperature increases will result in higher evapotranspiration levels; while greater rainfall variability could result in higher soil erosion rates and reduced ground water recharge. Higher wind speed could lead to dust storms (<i>kamsin</i>), especially in the dry season. While the programme interventions are designed specifically to address the effects of increasing climate variability, such extreme weather events could negate programme benefits in some years. In order to mitigate this, updated and improved downscaled climate change projections will be developed and used to fine-tune technical aspects of programme activities, such as specific design of soil and water conservation measures. The programme will have an ongoing learning-by-doing component that will allow for iterative and adaptive management. Lessons learned will be generated to inform sustainability and replicability of similar interventions elsewhere in the region and in the country.
2	Groundwater level dropping and salinisation of wells leading to potential scarcity and competition, possibly leading to conflict	High	While the risk of further lowering of ground water levels is high, based on observed trends, a number of programme activities, such as the sub-surface dam and SWC technologies have been designed specifically to recharge groundwater levels. Thus implementation of programme activities will mitigate against this risk and reduce levels of competition for this scarce resource.

3	Low human and institutional capacity for the implementation of CC related interventions, especially at the zoba and sub-zoba level	Moderate	The programme has a strong capacity building and training component, designed to promote effectiveness and sustainability at the community and the sub-zoba and zoba administrative levels.
4	Delays in programme implementation, and particularly in the development of infrastructure interventions	High	The regional administration has carried out feasibility studies for a number of the proposed water-related infrastructure components, such as the sub-surface dam in the Anseba River. An early step in programme implementation will be to re-visit feasibility studies in the light of improved climate risk information. This will also include assessing and mitigating against any cumulative impacts, and in identifying any possible bottlenecks in implementation. Delays in projects are often related to capacity issues, which will be mitigated against as noted above. Ownership by the Government has been high during the preparation phase, and this will such ownership, will reduce this risk.
5	Price escalation and unavailability of commodities and materials	Moderate	Escalating prices are beyond the control of the programme and can only be mitigated by ensuring that the budget has been adequately planned to accommodate a reasonable degree of escalation. The integrated feasibility study will ensure that budgets for infrastructural components are adequate. Strong Government support will guarantee that sufficient fuel resources will be available to the programme.
6	Failure of zoba administration to institutionalize early warning system and meteorological/climate observation components -	Moderate	While the government has shown high levels of commitment to the programme during the preparation stage, this will need to be translated into budget lines so that early warning system and meteorological/observational components are institutionalised and continue to be operational after the life of the programme. Lobbying and advocacy to show the utility and value of these components for sound planning at the zoba level will an ongoing programme activity to promote this.
7	Migration of human and livestock population under conditions of extreme severity to localities with a better natural resource base	Low	Programme activities are designed to unlock the development potential of the programme site and improve access to the most limiting resource, which is water. When effectively implemented, they will result in enhanced climate resilience for target communities. This is likely to stem any trend towards migration out from the programme area.
8	Accessibility and communications in the programme	Low	The main road linking the programme area to the zoba capital of Keren could exhibit seasonal deterioration due to increased runoff. There are plans to asphalt the road up to Hamelmalo. The road running through the Habero area traverses a number of wadis that can become impassable. The programme will provide cost-effective off-road motorbikes to improve access on the part of extension agents to these areas. Existing communication problems will be reduced through the provision of mobile phones to enable the community-based early warning system.
9	Potential country conflict with neighboring Ethiopia	Low	Current commitments by Government suggest that Eritrea maintains stable political relationships

C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The programme will be monitored through the following M&E activities. The M&E budget is provided in the table below.

Programme start:

A Programme Initiation Workshop will be held within the first 2 months of programme start with those with assigned roles in the programme organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Initiation Workshop is crucial to building ownership for the programme results and to plan the first year annual work plan.

The Initiation Workshop should address a number of key issues including:

- a) Assist all partners to fully understand and take ownership of the programme.
- b) Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis à vis the programme team.
- c) Discuss the roles, functions, and responsibilities within the programme's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for programme staff will be discussed again as needed.
- d) Based on the programme results framework and the relevant SOF (e.g. GEF) Tracking Tool if appropriate, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- e) Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- f) Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- g) Plan and schedule Programme Board meetings. Roles and responsibilities of all programme organisation structures should be clarified and meetings planned. The first Programme Board meeting should be held within the first 12 months following the inception workshop.

An Initiation Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly

- Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.
- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high.
- Based on the information recorded in Atlas, a Programme Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs can be used to monitor issues, lessons learned etc... The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually

Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and SOF (e.g. GEF) reporting requirements.

The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward programme objective and programme outcomes - each with

indicators, baseline data and end-of-programme targets (cumulative)

- Programme outputs delivered per programme outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management
- ATLAS QPR
- Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

Periodic Monitoring through site visits

UNDP CO and the UNDP RCU will conduct visits to programme sites based on the agreed schedule in the programme's Inception Report/Annual Work Plan to assess first hand programme progress. Other members of the Programme Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the programme team and Programme Board members.

Mid-term of programme cycle

The programme will undergo an independent Mid-Term Evaluation at the mid-point of programme implementation (insert date). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of programme implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about programme design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the programme's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the programme document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-EEG. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the [UNDP Evaluation Office Evaluation Resource Center \(ERC\)](#).

End of Programme

An independent Final Evaluation will take place three months prior to the final Programme Board meeting and will be undertaken in accordance with UNDP and SOF (e.g. GEF) guidance. The final evaluation will focus on the delivery of the programme's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-EEG.

The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the [UNDP Evaluation Office Evaluation Resource Center \(ERC\)](#).

During the last three months, the programme team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure

sustainability and replicability of the programme's results.

Learning and knowledge sharing

Results from the programme will be disseminated within and beyond the programme intervention zone through existing information sharing networks and forums. The programme will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to programme implementation though lessons learned. The programme will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future programmes. Finally, there will be a two-way flow of information between this programme and other projects of a similar focus. See Part II, section G for additional information on knowledge management.

Table 6 M&E workplan and budget

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding programme team staff time</i>	Time frame
Initiation Workshop and Report	<ul style="list-style-type: none"> ▪ Programme Manager ▪ UNDP CO, UNDP CCA 	Indicative cost: 10,000	Within first two months of programme start up
Measurement of Means of Verification of programme results.	<ul style="list-style-type: none"> ▪ UNDP CCA RTA/Programme Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. 	Indicative cost: 30,000 To be finalized in Inception Phase and Workshop.	Start, mid and end of programme (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Programme Progress on <i>output and implementation</i>	<ul style="list-style-type: none"> ▪ Oversight by Programme Manager ▪ Programme team 	Indicative cost:30,000 To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> ▪ Programme manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG 	None	Annually
Periodic status/ progress reports	<ul style="list-style-type: none"> ▪ Programme manager and team 	None	Quarterly
Mid-term Evaluation	<ul style="list-style-type: none"> ▪ Programme manager and team ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	Indicative cost: 40,000	At the mid-point of programme implementation.
Final Evaluation	<ul style="list-style-type: none"> ▪ Programme manager and team, ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	Indicative cost : 40,000	At least three months before the end of programme implementation
Programme Terminal Report	<ul style="list-style-type: none"> ▪ Programme manager and team ▪ UNDP CO ▪ local consultant 	20,000	At least three months before the end of the programme
Audit	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Programme manager and team 	Indicative cost per year: 4,000	Yearly
Visits to field sites	<ul style="list-style-type: none"> ▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives 	30,000	Yearly
TOTAL indicative COST Excluding programme team staff time and UNDP staff and travel expenses		US\$220,000 (+/- 3.67% of total budget)	

D. Include a results framework for the project proposal, including milestones, targets and indicators.

The results framework for the proposed programme is noted below, with required inputs (detailed budgets), expected outputs for each outcome, performance indicators, means of verification, and responsibilities. Activity budgets are also summarized by Programme Component in Part I.

Programme Results Framework

Intended Outcome as stated in the Country Programme Results and Resource Framework:

Applicable Key Result Area (from 2008-11 Strategic Plan): **Promote climate change adaptation.**

Programme title and ATLAS IDS: **INCREASING COMMUNITY RESILIENCE AND ADAPTIVE CAPACITY TO CLIMATE CHANGE THROUGH AN INTEGRATED WATER MANAGEMENT AND AGRICULTURAL DEVELOPMENT APPROACH IN ANSEBA REGION, ERITREA**

Outcomes	Outcome Targets	Outputs	Output Indicators	Means of Verification		Responsible Parties	Inputs & Cost (US\$)
				Outcome Level			
				Method	Timing		
Outcome 1 Increased water availability and erosion control through groundwater recharge, rainwater harvesting, irrigation and soil and water conservation measures <u>Indicators</u> - Change in level of renewable water resources	By 2015, 5.3 million cubic meters of renewable water resources used in programme area (an increase of 4.3 million m ³)	Output 1.1: <i>Groundwater recharged and irrigation technologies implemented for crop and forage production by developing a sub-surface dam within the Anseba River</i> Output 1.2.: <i>Floodwater harvested to enable irrigation of rain-fed cereal production and rangelands</i> Output 1.3: <i>Two micro dams</i>	Indicator 1.1.1: Sub-surface dam with associated pumping and irrigation water distribution facilities completed Indicator 1.1.2: Number of households of agropastoralists using the water supply to increase their agricultural and rangeland productivity by twenty-fold Indicator 1.2.1: Number of hectares of rangeland that become fully under supplementary irrigation and have an increased productivity of 40% Indicator 1.2.2: Number of hectares of cereal production that are converted to be fully under supplementary irrigation Indicator 1.2.3: Number of hectares of the dominant cereal crops (sorghum and pearl millet) that have an increased production of from 0.36 (baseline) tons per hectare to 0.7 tons per hectare Indicator 1.3.1: Number of hectares	- Annual survey - Project terminal evaluation	Annually and at the end of the programme	1. Ministry of Agriculture; Ministry of Land, Water and Environment ; Zoba Anseba Administration; Village Councils; community members	1.1 Local consultant 40,000 Travel 25,000 Contractual services 875,000 Materials and goods 126,400 Total 1,067,400 1.2 Contractual services 480,000 Travel 21,000 Materials and goods 30,000

Outcomes	Outcome Targets	Outputs	Output Indicators	Means of Verification Outcome Level		Responsible Parties	Inputs & Cost (US\$)
				Method	Timing		
<p>used in programme area</p> <p><u>Baseline</u></p> <p>Only about 1million cubic meters is put in use</p>		<p><i>constructed to retain and store rainfall run-off.</i></p> <p>Output 1.4: <i>Soil and water conservation measures implemented to improve runoff management and infiltration</i></p>	<p>of cereal production that is converted to be fully under supplementary irrigation and in which the production of the dominant cereal crops (sorghum and pearl millet) is increased from 0.36 tons per hectare (baseline) to 1.0 tons per hectare</p> <p>Indicator 1.3.2 Increase in forage production per ha of irrigated land. Indicator 1.3.3: Amount of time spent in search of water and forage for livestock. Indicator 1.4.1: Livestock carrying capacity of rangelands under this protection and rehabilitation programme</p> <p>Indicator 1.4.2: Agricultural production of farm lands under the on farm soil and water conservation programme</p> <p>Indicator 1.4.3: Percentage of households migrating to other areas due to climatic shock</p>				<p>Total 531,000</p> <p>1.3 Local consultant 20,000 Travel 30,000 Contractual services 560,000 Materials and good 34,000 Total 644,000</p> <p>1.4 Contractual services 614,100 Materials and goods 189,900 Travel 10,000 Total 814,000</p> <p>Total for 1: US\$3,056,400</p>
Outcome 2 Climate-resilient agricultural	By 2015, 70% of programme beneficiaries	Output 2.1: A range of climate-resilient	Indicator 2.1.1 Number of project beneficiaries involved in capacity development for implementation of specific agricultural and/or livestock	- Annual livelihoods survey	Annually, to the end of the programm	2. Ministry of Agriculture; Ministry of	2.1 International consultant 60,000

Outcomes	Outcome Targets	Outputs	Output Indicators	Means of Verification Outcome Level		Responsible Parties	Inputs & Cost (US\$)
				Method	Timing		
<p>and livestock production enhanced</p> <p><u>Indicator</u> Change in food security in the programme area as a result of using climate-resilient agricultural and livestock production methods, measured as # of months per year additionally covered by local production</p> <p><u>Baseline</u> (Baseline to be established by programme through livelihoods survey³⁷)</p>	<p>have sufficient food for at least an additional three months per year</p>	<p>agricultural technologies and methods developed and transferred to farmers e.g. drought- and disease-resistant varieties, integrated crop-livestock production systems, conservation agriculture, agroforestry, rangeland management; and traditional improved fuel-efficient stoves</p> <p>Output 2.2: Seasonal forecasts used in a farmer-led collaborative action learning process to enhance adaptive capacity and climate-proof</p>	<p>adaptation measures, disaggregated according to gender Indicator 2.1.2: Number of professionals involved in capacity development to enable rolling out of climate-resilient agricultural production technologies and methods, disaggregated according to gender Indicator 2.1.3: Percent change in beneficiaries' capacities to make resource management decisions based on climate information Indicator 2.1.4: Increased agricultural and livestock production as a result of implementing climate-resilient technologies and methods Indicator 2.1.5: Number of improved traditional energy-efficient stoves distributed and in regular use</p> <p>Indicator 2.2.1: Number of farmers using seasonal forecasts to develop on-farm adaptive strategies Indicator 2.2.2: Increased production and farm income as a result of using seasonal forecasts to guide on-farm activities</p>	<p>- National food security monitoring system</p> <p>- Project terminal evaluation</p>	<p>e. Annually, to the end of the programme. End of programme</p>	<p>Land, Water and Environment ; Zoba Anseba Administration; Village Councils; community members; Hamelmalo Agricultural College; National Agricultural Research Institute, National Union of Eritrean Women; National Union of Eritrean Youth and Students</p>	<p>Local consultant 40,000 Travel – community exchange visits 60,000 Communications and travel equipment for extension services 140,000 Training for extension services 50,000 Travel for technology transfer 40,000 Stationery 15,000 Materials and goods (livestock purchase, seeds, stoves etc) 476,000 Contractual services 110,000 Total 991,000</p>

³⁷ No baseline figures for food security exist for the project sub-zobas. However, the food security situation throughout zoba Anseba is extremely serious – for example, in 2002, a drought year, the estimated annual crop production for the zoba was 454.75 tons which accounted for only one percent of the total annual food requirement of the region.

Outcomes	Outcome Targets	Outputs	Output Indicators	Means of Verification Outcome Level		Responsible Parties	Inputs & Cost (US\$)
				Method	Timing		
		production systems					2.2 Community workshops 70,000 Contractual services 110,000 Local consultant 30,000 Travel 45,000 Stationery 4,000 Total 259,000 Total for 2: US\$1,250,000
Outcome 3 Improved climate risk information and climate monitoring used to raise awareness of and enhance community preparedness to climate change hazards <u>Indicator</u>	By 2015, 70% of programme beneficiaries make use of improved climate risk information	Output 3.1.: Improved climate risk information generated and capacity developed for climate monitoring and analysis Output 3.2.: Awareness raised at different levels on climate	Indicator 3.1.1: Downscaled climate change projections at the sub-national scale from multiple GCMs for Zoba Anseba Indicator 3.1.2: Number of gender-sensitive knowledge products developed and disseminated using improved climate risk information Indicator 3.1.3: Class 1 meteorological station installed in sub-zoba Habero and six Class 3 meteorological stations installed, three in each sub-zoba Indicator 3.1.4: Number of staff trained on meteorological observation and analysis,	Survey	Annually and on programme completion	3. Ministry of Agriculture; Ministry of Land, Water and Environment ; Zoba Anseba Administration; Village Councils; community members;	3.1 International consultant 30,000 National consultant 40,000 Materials and goods 199,000 Total 269,000 3.2 Local consultant 10,000

Outcomes	Outcome Targets	Outputs	Output Indicators	Means of Verification Outcome Level		Responsible Parties	Inputs & Cost (US\$)
				Method	Timing		
<p>Percentage of programme beneficiaries making use of improved climate risk information and climate monitoring processes, disaggregated according to gender</p> <p><u>Baseline</u> Baseline is zero – no improved climate risk information yet available</p>		<p>change risks facing Zoba Anseba</p> <p>Output 3.3: Community preparedness enhanced through development of a community-based early warning system in sub-zobas Hamelmalo and Habero</p>	<p>disaggregated according to gender Indicator 3.2.1: Number of stakeholders participating in awareness raising events, disaggregated according to gender and age where possible Indicator 3.2.2: Perceived change in decision making as a result of participation in awareness raising activities Indicator 3.3.1: Number of community members trained on EWS Indicator 3.3.2: Number of stakeholders served by community-based EWS Indicator 3.3.3: Losses resulting from climate-related disasters (e.g. mortality, injury, property or infrastructure lost or damaged) compared with recent historical experience or projected baseline, in the area served by the community-based EWS</p>			<p>Meteorological Services; Hamelmalo Agricultural College; National Agricultural Research Institute, National Union of Eritrean Women; National Union of Eritrean Youth and Students</p>	<p>Contractual services 181,000 Total 191,000</p> <p>3.3 International consultant 84,000 Local consultant 20,000 Contractual services 162,000 Materials and goods 24,000 Total 290,000</p> <p>Total for 3: US\$750,000</p>
<p>Outcome 4 Knowledge management system established and knowledge management activities implemented</p> <p><u>Indicators</u> Number of</p>	By 2015, at least five lessons learned codified and disseminated	<p>Output 4.1: Knowledge management system established and knowledge management activities implemented</p> <p>Output 4.2: Policy advocacy</p>	<p>Indicator 4.1.1: Number of 'lessons learned' codified Indicator 4.1.2: Number of relevant networks or communities through which lessons learned are disseminated</p> <p>Indicator 4.2.1: Number of knowledge products developed for use in policy advocacy activities Indicator 4.2.2: Number of policies/plans/strategies/programmes revised or developed as a result</p>	Project terminal evaluation	End of the programme	<p>4. Ministry of Agriculture; Zoba Anseba Administration; Hamelmalo Agricultural College</p>	<p>4.1 Local consultant 10,000 Travel 35,000 Stationery 5,000 Materials and goods 24,000 Contractual services</p>

Outcomes	Outcome Targets	Outputs	Output Indicators	Means of Verification Outcome Level		Responsible Parties	Inputs & Cost (US\$)
				Method	Timing		
'lessons learned' about natural resource management in the context of climate change as a result of the programme <u>Baseline</u> Baseline is zero – no relevant lessons learned are currently being captured or disseminated		activities implemented	of policy advocacy activities				30,000 Study tours and knowledge sharing 120,000 Total 224,000 4.2 Knowledge products (publications, website etc) 75,000 Contractual services 57,600 Travel 5,000 Stationery 5,000 Total 142,600 Total for 4: US\$ 366,600
Total Inputs (January 2011 – December 2015)							US\$ 5,423,000

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT³⁸ *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Mr Mogos Woldeyohannes Bairu Director General, Department of Environment Ministry of Land, Water and Environment, Eritrea	Date: (Month, day, year)
---	--------------------------

B. IMPLEMENTING ENTITY CERTIFICATION *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this programme.

²⁴ Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.



Yannick Glemarec
Director
Environmental Finance
Implementing Entity Coordinator

Date: January 12, 2011

Tel. and email: +1 – 212 906-6843
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Programme Contact Person: Jessica Troni

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Annex 1 List of Stakeholders Interviewed

Stakeholders interviewed in Asmara

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10	ISAAC FISSEHA	METEOROLOGY OF AIAM	Tel. 07158700 isaacfesseha@yahoo.com
11	Kifle Teklearub	Programme Specialist, MDG Achievement and Poverty Reduction, UNDP	
12	TEDROS DEMOZ	SMALL GRANTS PROGRAM	Tel. 07237463
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			odalod@unaids.org
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Participants in the Inception Workshop

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27	YOSEPH ADMEKOM	UNDP	YOSEPH.ADMEKOM@UNDP.ORG

Stakeholders interviewed in Zoba Anseba

ID	NAME	INSTITUTION/ORGANIZATION	ADDRESS - TELEPHONE & E-MAIL
1	Ghergish Girmay	Administrator of Zoba Anseba	Zoba Anseba
2	Kibrom Andemicael	Head of Economic Department of Zoba Anseba Administration	Zoba Anseba
3	Jabir Ahmed	Head of Ministry of Agriculture Zoba	Zoba Anseba

		Anseba	
4	Ibrahim Salih Romedan	Head of Static's Soil & Water cons.	iromedan@yahoo.com
5	Ibrahim Edris	Head of Statistic and Planning zoba Anseba administration	Tel 07150637
6	Butsuamlak Tsegay (Dr)	Head of Animal science	Zoba Anseba
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Annex 3 UNDP Fees for Support to Adaptation Fund Project: (4540: Climate Change Adaptation Programme in Water and Agriculture in Anseba Region, Eritrea)

Stage	UNDP Services	UNDP Fee (8.5%)
Identification, Sourcing and Screening of Ideas	Provide information on substantive issues in adaptation associated with the purpose of the Adaptation Fund (AF). Engage in upstream policy dialogue related to a potential application to the AF. Verify soundness and potential eligibility of identified idea for AF.	\$25,542.5 (5%)
Feasibility Assessment / Due Diligence Review	Provide up-front guidance on converting general idea into a feasible project/programme. Source technical expertise in line with the scope of the project/programme. Verify technical reports and project conceptualization. Provide guidance on AF Board expectations and requirements. Provide detailed screening against technical, financial, social and risk criteria and provide statement of likely eligibility against AF requirements. Assist in identifying technical partners. Validate partner technical abilities. Obtain clearances from AF.	\$76,627.5 (15%)
Development & Preparation	Provide technical support, backstopping and troubleshooting to convert the idea into a technically feasible and operationally viable project/programme. Source technical expertise in line with the scope of the project/programme needs. Verify technical reports and project conceptualization. Provide guidance on AF expectations and requirements. Verify technical soundness, quality of preparation, and match with AF expectations. Negotiate and obtain clearances by AF. Respond to information requests, arrange revisions etc.	\$102,170 (20%)
Implementation	Technical support in preparing TORs and verifying expertise for technical positions. Participate, guide and train project teams on setting up operational plan for	\$229,882.5 (45%)

Stage	UNDP Services	UNDP Fee (8.5%)
	<p>implementation of the project during inception phases of the approved project.</p> <p>Verification of technical validity / match with AF expectations of inception report.</p> <p>Provide technical information as needed to facilitate implementation of the project activities.</p> <p>Provide advisory services as required.</p> <p>Provide technical support, participation as necessary during project activities.</p> <p>Provide troubleshooting support if needed.</p> <p>Undertake a minimum of one technical support and oversight visit per year.</p> <p>Provide additional support and oversight missions as necessary.</p> <p>Provide technical monitoring, progress monitoring, validation and quality assurance throughout.</p> <p>Allocate and monitor Annual Spending Limits based on agreed workplans.</p> <p>Return unspent funds to AF.</p>	
Evaluation and Reporting	<p>Provide technical support in preparing TOR and verifying expertise for technical positions involving evaluation and reporting.</p> <p>Participate in briefing / debriefing.</p> <p>Verify technical validity / match with AF expectations of all evaluation and other reports</p> <p>Undertake technical analysis, validate results, compile lessons.</p> <p>Disseminate technical findings</p>	\$76,627.5 (15%)