PROJECT IDENTIFICATION FORM (PIF).
PROJECT TYPE: FULL SIZE
TYPE OF TRUST FUND: LDCF

For more information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

Project Title:	Mainstreaming climate risk considerations in food security and IWRM in Tsilima Plain			
Country:	Eritrea	GEF Project ID	6923	
GEF Agency:	UNDP	GEF Agency ID		4633
Other Executing partners	Ministries of Local Government; Agriculture, Irrigation & Water Development; Natural Resources, Energy & Environment,	Submission Date: Resubmission Date:		Sept. 15, 2014 Sept. 30, 2014
GEF Focal Area:	Climate Change	Duration		60 months
Parent Program:	N/A	Agency Fee ($):		855,475

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES[1]:

FA Objectives	Expected FA Outcomes	Expected FA Outputs	LDCF ($)	Co-Fin ($)
CCA-1: Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level	1.2: Reduced vulnerability to climate change in development sectors	1.2.1: Vulnerable physical, natural and social assets strengthened in response to climate change impacts, incl. variability	5,005,000	15,000,000
Objective CCA-2 - Increasing Adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level	Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced threats at country level and in targeted vulnerable areas	Output 2.1.1: Risk and vulnerability assessments conducted and updated	2,000,000	5,500,000
Objective CCA -3 - Adaptation Technology Transfer: Promote transfer and adoption of adaptation technology	Outcome 3.1: Successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas	Output 3.1.1: Relevant adaptation technology transferred to targeted groups	2,000,000	6,000,000
Sub Total			9,005,000	26,500,000
Project management cost			45,000	1,000,000
Total Project Cost			9,050,000	27,500,000

[1] When completing Table A, refer to the GEF Website, *Focal Area Results Framework* which is an *Excerpt from GEF-6 Programming Directions*.

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective:					
Project Component	**Financing Type**[2]	**Project Outcomes**	**Trust Fund**	**(in $)**	
				GEF Project Financing	**Co-financing**
1.Information on the impact of ecosystems degradation in aggravating vulnerability to climate change risks and reducing resilience of development gains understood and integrated into key decision-making processes	TA	**Outcome 1.1** Capacity of research institutions to undertake climate related research increased by over 50% as measured by changes in UNDP Capacity Scorecard: **Outcome 1.2:** Capacity of extension service institutions to provide knowledge based climate smart extension service to agriculture, livestock production and water management increased by over 50% as measured by changes in UNDP Capacity Scorecard: Collectively, outcome a and 2 above lead to: i) *increased use of climate risk information in decisions related to the implementation of the IWRM action plans and increasing food production in* ; ii) *an improved score on the Vulnerability and risk perception index, disaggregated by gender (baselines at ppg); iii) Five comprehensive landscape adaptation plans formulated using the information generated under this component, complemented by community based resilience assessments:*	LDCF	2,000,000	6,500,000
2. Incentives in place leading to adoption of long-term measures for watershed rehabilitation, groundwater recharge, climate smart agricultural and livestock production practices;	TA – 2,005,000; INV – 5,000,000	Outcome 2.1: Security of tenure improved for the communities of plains covering over 9000 hectares *(number of households and exact means of verification to be established during PPG);* Outcome 2.2: By 2018, the amount of water available for irrigation increases by 30% over current baseline (of 28 million cubic meters) increasing the area under irrigation from 400ha to about 1000ha); *baseline and target to be confirmed in PPG* Outcome 2.3: By 2018, more than 75% of farmers take up climate smart farming technologies and food production has increased by 30% , while livestock productivity increases by at least 30% (baseline determined at PPG); this leads i) over 75% of project beneficiaries have sufficient food and livestock products for most of the year; ii) an improved score on the "Vulnerability and risk perception index, disaggregated by gender"	LDCF	7,005,000	21,000,000
		Subtotal	LDCF	9,005,000	26,500,000
		Project Management Cost (PMC)[3]	LDCF	45,000	1,000,000
		Total Project Cost		9,050,000	27,500,000

[2] Financing type can be either investment or technical assistance.

[3] For GEF Project Financing up to $2 million, PMC could be up to10% of the subtotal; above $2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

If Multi-Trust Fund project :PMC in this table should be the total and enter trust fund PMC breakdown here ( )

C. INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Type	Name	Type of Co-financing	Amount ($)
National Government	GoE	Grant	25,000,000
GEF Agency	UNDP	Grant	2,500,000
Total Co-financing			27,500,000

D. INDICATIVE TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS [a)]

GEF AGENCY	TRUST FUND	Country	Focal Area	Programming of Funds			
					Project financing	Agency fee	Total
UNDP	LDCF	Eritrea	CC		9,050,000	855,475	9,905,475
Total Grant Resources					9,050,000	855,475	9,905,475

a) No need to fill this table if it is a single Agency, single Trust Fund, single focal area and single country project.
b) Refer to the Fee Policy for GEF Partner Agencies.

E. PROJECT PREPARATION GRANT (PPG)[4]

Is Project Preparation Grant requested? Yes ☒ No ☐ If no, skip item E.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in $)		
					PPG (a)	Agency Fee[5] (b)	Total c = a + b
UNDP	LDCF	Eritrea ☐	CC	(select as applicable)	100,000	9,500	109,500
Total PPG Amount					100,000	9,500	109,500

[4] PPG requested amount is determined by the size of the GEF Project Financing (PF) as follows: Up to $50k for PF upto $1 mil; $100k for PF up to $3 mil; $150k for PF up to $6 mil; $200k for PF up to $10 mil; and $300k for PF above $10m. On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

[5] PPG fee percentage follows the percentage of the Agency fee over the GEF Project Financing amount requested.

F. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS[6]

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	*(Enter number of hectares)*
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	*(Enter number of hectares)*
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	*(Enter number of freshwater basins)*
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	*(Enter percent of fisheries, by volume)*
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO_{2e} mitigated (include both direct and indirect)	*(Enter number of tons)*
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides)	*(Enter number of tons)*
	Reduction of 1000 tons of Mercury	*(Enter number of tons)*
	Phase-out of 303.44 tons of ODP (HCFC)	*(Enter number of tons)*
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	*(Enter number of countries)*
	Functional environmental information systems are established to support decision-making in at least 10 countries	*(Enter number of countries)*

[6] Provide those indicator values in this table to the extent applicable to your proposed project. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the *GEF-6 Programming Directions*, will be aggregated and reported during mid-term and at the conclusion of the replenishment period.

PART II: PROJECT JUSTIFICATION

Project Overview

A.1. The global climate challenge, environmental problems, root causes and barriers that need to be addressed

1. Eritrea's high dependence on rainfed agriculture for food security and economic development makes it highly vulnerable to the impacts of climate change. The country has a mostly arid climate with about 70% of its land area classified as hot and arid and receiving average annual rainfall of less than 350 mm. The climate regime is highly variable within and between years and spatial variation over very short distances. It is highly 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-meter 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.

2. The main rainy season in most parts of the country is from June to September. There is also a short rainy season involving a small number of highland areas which occurs between March and May. In the eastern coastal areas and parts of the adjacent escarpment, the rainy season is between December and February. The eastern lowland has an average annual rainfall between 50 and 200 mm; while northern areas, given that they fall within the eastern limit of Sahelian Africa, receive less than 200 mm/year of rain. Southern areas experience average annual precipitation of 600 mm, with the central highland areas receiving about 400-500 mm per year. The southwest monsoon winds are responsible for the main and small summer rains in Eritrea. The northern and north-eastern continental air streams are responsible for the winter rains along the coast and in southern part of the escarpment of the central highlands. The northern and north-eastern winds are dry in their nature but take moisture while crossing the narrow Red Sea water body.

3. Eritrea is one of the poorest countries in the world, with an average annual per capita income of US$ 450 in 2012. The World Bank estimated the population of the country at 6.131 million in 2012, consisting of 79 percent rural population. About 80 percent of the Eritrean population livelihood relies on agriculture, livestock rearing and fishing. The GDP of the country in 2012 was valued at US$3.09 billion, with agriculture contributing less than 20%. The country has six agricultural zones defined by climate, altitude, and soils. The agricultural zones comprise the central highland with an altitude of over 1,500 m, and annual rainfall of over 500 mm; the western escarpment, with an altitude ranging between 600 and 1,500 m, warm to hot semi–arid climate and rainfall up to 500 mm; the south western lowlands at an altitude of 600 to 750 m, with annual rainfall in excess of 400 mm, and a hot semi-arid climate; the green belt of the eastern escarpment of the highlands, ranging in altitude between 750 and over 2,000 m, with rainfall of up to 1,000 mm and, unlike other zones, supporting perennial crops, such as coffee, without irrigation; the coastal plains having an altitude that ranges from sea level to 600 m, with Saharan climate and rainfall of less than 200 mm; and the north–western lowland, having an altitude ranging from 400 to 1,500m, with hot arid climate and annual rainfall of less than 300 mm.

4. Out of the total cultivable area estimated at around 1.6 million ha, only 640 000 ha was cultivated in 2005, of which 637 000 ha arable land and 3 000 ha permanent crops. The farming system comprises 3 distinct systems: i) rainfed crop systems using traditional methods with very low input levels, mainly in the central and southern highlands; ii) irrigated agriculture systems using mainly spate irrigation in the western and eastern lowlands; iii) agro-pastoralist and nomadic pastoralist systems, mainly in the lowlands and escarpment zone (agro-pastoralists derive their

livelihoods from cattle, sheep and goats, while nomadic pastoralists often keep camels as well). The main rainfed crops are: cereals composed of sorghum, pearl millet, barley, wheat, teff and maize; pulses composed of chickpea, field pea and horse bean; and oilseeds composed of sesame, cottonseed and groundnuts. Grain output reached a peak of about 472,200 metric tons in 1998; it then fell to 341,000, 133,200, 238,000 and 64,000 mt in 1999, 2000, 2001 and 2002, respectively, resulting in heavy food deficits. Eritrea is a food insecure country, producing about 60% of its total food needs in normal rainfall years and no more than 25% in drought years (I-PRSP, 2004). On average, the country experiences frequent droughts and is threatened with famine once every ten years.

5. Eritrean surface water resources have been divided into five major River Basin systems namely, Mereb-Gash; Barka-Anseba, Red Sea Basin, Danakil Basin and Setit. Due to inadequate published rainfall and stream flow data, the runoff of various River Basins has been estimated either from modelling (for ungauged catchments) or simulation (for catchments with short period of data) values (given in Annex 1). Impacts of climate change on availability of ground water are particularly evident in the Tsilima plain, which is the focus of the proposed LDCF project. The plain is considered the country's bread basket, and is an important part of the densely populated Central Highlands agro-ecological zone, where more than 60% of the Eritrean population is to be found. Ranging between 1,950 and 2,000 meters above sea level, the Tsilima plain is surrounded by hills constituting an upper catchment mountain range that rises to about 2,500 meters.

6. The project area lies within the upper Mereb catchment and is drained by three small ephemeral rivers, namely Mereb, Halhale and Mai–Mogoso. Mereb River originates near mountain Tekera and drains all areas south of the laterite ridge that separates Mereb from Nefhi catchment and flows in a south–east direction to from the north east and east boundary of Tsilima plain. Along its course Mereb is joined by a number of small streams, which originate from the upper, steep basaltic mountains west of the plain. The three streams have a total catchment area of 404 km2. The total volume of mean annual run–off generated within the project area and its upper catchment across the Tsilima plain is estimated to be 24 million m3. The total landmass of the area is 27,400 hectares, of which 14,900 hectares is the mountain range (upper catchment) and 12,500 hectares is flat plain (lower catchment). Around 9,500 hectares or 76 percent of the plain is arable land of which an average of 6,000 hectares is cultivated annually. About 400 hectares of this is used for irrigated crop production. The agricultural system is traditionally mixed crop/livestock with high rainfed cropping intensity. Intensified agriculture, though at a low scale, is emerging.

7. **The climate challenge, environmental problems and root causes:** The economic development of Eritrea is highly dependent on the flow of ecosystem goods and services, particularly water regulation, soil formation and pollination. However, climate change poses a threat to these services by affecting water resources through reduced groundwater recharge brought about by a complex mix of circumstances which include decreased precipitation, shorter more intense rainy seasons which promotes run-off, and/or increased temperatures and evaporation. 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 most recent projections of future climate for Eritrea using the latest SRES emission scenarios of A2, B1, and A1B indicate that mean annual temperature is projected to increase by 1.1 to 3.8^0C by the 2060s, and 1.6 to 5.4^0C by the 2090s.[7] 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

[7] 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.

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).

8. 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. The frequency of dry spells and seasonal and multi-year droughts are expected to increase and become more severe in terms of impacts (such as animals lost).

9. Despite current sources of uncertainty in some of the parameters, communities and scientist report that both the frequency and severity of extreme weather events have increased in the country in general and in Tsilima Plains in particular. The country is indeed already witnessing significant alterations to water and ambient air temperatures and precipitation patterns. Droughts occurred in 1975, 1984, 1985, 1989, 1991, 2002, 2005, 2008, 2009, and 2010. The assessments undertaken during the formulation of the NAPA reported the following observations on the changes in climate risks hazards:

- *Increased climatic variability:* Relative to baseline conditions, changes have been observed in average, range, and variability of temperature and precipitation throughout the country;
- *Recurring drought: O*ccurrences 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;
- *Sea level rise:* Coastal areas and the hundreds of Eritrean islands in the Red Sea are increasingly susceptible to rising sea levels associated with climate change.

BASELINE SCENARIO AND ASSOCIATED BASELINE PROGRAM

10. **Baseline Scenario:** 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. Climate change threatens to make this dire situation worse by affecting water resources through reduced groundwater recharge brought about by decreased precipitation and/or increased temperatures and evaporation. Changes in spatial and temporal precipitation patterns and ambient air temperatures and humidity are likely to affect the hydrological regime. There are already reported noticeable changes in river/stream flow patterns stimulated by factors such as changes in rainfall regimes. In particular, current low levels of agricultural productivity will be exacerbated, leading to decreased rural household incomes, increased malnutrition, and associated health impacts. 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.

11. **Baseline programs:** Since the Tsilima is amongst the most agriculturally productive lands in Eritrea, it has been the focus of both baseline programs (Improving food security and IWRM).

12. The government's strategy for improving food security: Recognizing that food security is critical for sustainable economic growth, the government has embarked on an ambitious program to secure national and household food security for the majority of Eritreans. First developed in 2004, the strategy aims to ensure that at the national level, food is available in market throughout the country from domestic production, commercial imports, or food assistance; and that at the household level, all household members have affordable access at all times to the food they need for a healthy life. The Food security strategy has three pillars: Enhancing the Productive Capacity of Small Scale Farmers; Enhancing household Purchasing Power; and, Public Assistance Programs Targeted at the Poor & Vulnerable.

13. Under pillar 1, which forms the core of the baseline program for the proposed LDCF project, the government applies the following priority initiatives, whose effectiveness is now being compromised by climate change.

- Improving productivity of rain-fed agriculture: The strategy aims to increase domestic agricultural production in rain-fed areas by strengthening appropriate intensive and extensive farming in the lowlands, complemented by an increase in intensity and diversification in the highlands. This is supported by reorientation of the extension and research system towards addressing priority problems and concerns of subsistence farmers. The strategy emphasizes adoption of appropriate technologies employing modern agricultural inputs and practices, improved farming techniques, increased use of fertilizer and other inputs, use of improved pest control and reducing post-harvest losses (amongst others).
- Increasing water availability: The objective is to harness the seasonal water flows and augment water storage capacity through the construction of reservoirs, small dams, lining of watercourses, and rehabilitation of degraded catchments. The strategy also supports the development of smallholder irrigation with priority given to irrigation schemes that have high levels of community participation in planning, cost-sharing in construction (mainly in labor), and full operation and maintenance of the schemes. The government aims to increase areas under irrigation and to double the cultivation intensity in the irrigated areas, through effective use of surface and ground water. Commercial farming is also encouraged through introduction of industrial crops, promoting the use of tube wells, construction of micro dams and small water storage facilities, opening up roads to high potential agricultural areas like the Gash Barka, and providing extension advice on cultivation techniques and marketing facilities. Estimates of irrigation potential vary from 107,000 ha to 567,000 ha, the latter not taking into account the water availability. Based on water availability, it can be estimated at 187 500 ha. The total land area developed for irrigation is about 22,000 ha, while 12,500 ha is cultivated for producing a variety of high value agricultural crops including fruits, vegetables, and cotton. The potential of spate irrigation is estimated in the order of 90,000ha, but the area equipped for spate irrigation covers 17,490 ha, of which 15,650 ha in the eastern lowlands and 1,840 ha at Alighider on the lower Gash and a small area along the Barka. The traditional technique of spate irrigation depends on the diversion of floods, a resource that is available at irregular and unpredictable intervals. The contribution of the spate irrigation to total crop production can be increased by efficient water management systems.
- Developing and implementing integrated agro-livestock-rangeland support systems in the traditional pastoral areas. The objective is to enhance livestock production and marketing system, particularly for pastoral communities in the main livestock producing areas in Gash Barka and Debub; the

Government will support the drilling of boreholes by co-financing necessary pumps, motors, overhead tanks, and pipe connections. The local communities will be organized into user associations and provided with training on how to operate the water points. Special attention will be paid to ensuring greater participation of women, especially female heads of households

- Development and protection of forestry and wildlife by adopting more effective measures including proper tree and land tenure schemes, development of alternative sources of energy (to minimize the use of fire wood); and providing seedlings and guidance to communities that want to establish woodlands and enhancing the tree survival rates to above 70% of seedlings planted. Furthermore, rangeland areas that require protection by temporary closure would be identified and protected.

Baseline Program 2: Implementation of the Integrated Water Resources Management Action Plans: 2009 – 2016: The total cost of implementing all the project portfolios is about US$ 19.8 million.

14. In line with its international commitments, Eritrea formulated an Integrated Water Resources Management (IWRM) in 2008. The IWRM planning process started in 2005 with the formation the Country Water Partnership (CWP), constituted by all water sector and related stakeholders. The objective of contributing to the implementation of integrated water resources management in the country, fully linked and coherent with the government's policies, laws and strategies to enable equity, efficiency and environmentally sustainable management of the water resources. Specific objectives of the action plan are: To enhance the creation of an appropriate enabling environment for water resources management, development and use; To facilitate the creation of institutional frameworks for water resources management, development and use at national, regional, sub regional and community levels; To improve the knowledge base on which rational water resources decisions will be made; To improve the water resources assessment capabilities of the water sector through the introduction of appropriate analytical tools and upgrading the institutional and human resources capacity. To facilitate the implementation of the future framework of water resources management of the country; and to prioritize and classify action plans in terms of short, medium and long term.

15. The IWRM is being implemented through the action plans covering the period 2009-2016, focusing on seven thematic/action areas: Water resources assessment, development and protection; Water resources allocation and water use; Disaster management; Enabling environment; Implementation and financing mechanism; Research and information exchange; and Basin Management Plan.

16. Objective 1 of the action plan aims to improve the knowledge base on the nation's water resources and their potential for sustainable water resources management, development and protection. Strategies 2, 3 and 4 under the objective have direct relevance to the proposed LDCF project. Strategy 2 deals with undertaking groundwater inventory to improve knowledge level on the main aquifers, groundwater resources and development problems. This strategy will be implemented through two major activities: undertaking groundwater inventory and, collecting and compiling all existing dug or drilled well information from drilling and contracting companies. Strategy 3 deals with the design and establishment of national groundwater monitoring network aimed at improving the knowledge level of the country's ground water resources both in terms of quality and quantity. This strategy will be implemented via two key activities: designing groundwater monitoring network based on field studies of geophysical, geological, hydro geological and groundwater quality variations and estimate cost by phase with reasonable timeframe; and, establishment of the network phase by phase. Strategy 4 deals with establishment of an efficient information system and flow of data among and between key institutions. The strategy is implemented through 3 key activities namely; identifying and linking relevant institutions whose contribution/support is critical to establish a data and information link mechanism and put in place coordination mechanism to facilitated access and linkage to database;

establishment/Strengthening Eritrean Water Information Centre (EWRIC) within Department of Water Resources; and, developing manuals, guidelines, formats on the collection, recording and storing of hydro meteorological and groundwater data.

17. **Barriers to securing food security and resilient livelihoods in the face of a changing climate:** The effectiveness of the baseline programs is however likely to be compromised by impacts of climate change, which although the government and its partners fully understand the significance of, the ability to factor in climate risk in these developments is hampered by the following barriers.

Barrier 1: Inadequate knowledge, awareness and skills for coping with the impacts of climate change on surface and ground water availability, agriculture and other ecosystem services, particularly under the expected intensification.

18. Being a water scarce country, Eritrea needs to monitor risks emanating from climate change to its vital water resources and the impacts of such risks to continued flows, state of its natural systems, livelihoods and economic development. At the project site level, acute water shortages are being experienced, with the majority of farmers attributing the shortage to climate change, watershed degradation and a spike in water demand (for irrigation) without accompanying water demand management systems (pausing maladaptation). In order to reduce vulnerability of the widespread spate agriculture from both floods and droughts, the country needs to take advantage of positive impacts of climate change (such as increased intensity of rain) to balance the issues of water demand (related to population and economic development), potential supply (related to rainfall patterns) and retained supply (related to rehabilitation of catchments to maximise infiltration and improving infrastructure for water storage and diversion). An early warning system combined with investment in diversion structures can capture more water into the system from increasingly frequent, more intense rainfall events by predicting and being prepared for flash floods.

19. Unfortunately, serious lack of financial resources and weak institutional capacity have hampered past efforts at assessment and regular monitoring of water resources, both underground and river flows. Eritrea faces an acute shortage of skilled and professional staff within the environment sector, especially those with the knowledge and skills for addressing climate change, and even more so for mainstreaming ecosystems based adaptation to local resource uses and development. Both National and Regional agencies do not have the technical capacity to monitor and address climate change risks, assess vulnerability, or design and implement adaptation measures. As in any Least Developed Country (LDC), specialised training programmes are limited particularly in CC issues. Although the country is investing in higher education degrees in environmental science, spanning from Meteorology, Climatology and, these are still early days, and majority of graduates still lack practical experiences.

20. Capacity deficiencies are particularly acute at the Regional and local levels. The PPG assessment will be used to quantify exact capacity deficits, but preliminary assessments indicate that over 70% of the technical stuff who are all aware of climate change matters in general, did not have adequate skills to support farmers in planning to cope with impacts of climate change on water systems. Most extension workers, especially those that have stayed in service for longer periods, do not have adequate knowledge about emerging developmental and environmental issues such climate change, resilience and vulnerabilities. There are no systematic programs for updating the skills of extension workers to keep them current with new national development issues and agendas. This is further exacerbated by the high illiteracy levels among farmers. Most smallholder farmers do not know how to read and write, making it difficult to disseminate useful information to rural masses using Information, Education and Communication (IEC) materials.

21. This capacity shortage means that although national development policies fully recognize the role of climate change and adaptation in securing national development and livelihoods, actual

implementation is still hindered by the fact that, across the board, agencies responsible for natural resources management and local economic development lack the climate risk assessment abilities needed to identify and integrate climate risks and appropriate adaptation response measures into managing the countries ground and service water as well as its interactions with agriculture, and in particular increasing land productivity in the context of agricultural led economic development. This has hampered the ability to support farmers adapt their water use to sustain irrigation under the changing climate scenarios. For example, current estimates show that the total volume of groundwater presently available without further intervention to maximize recharge is about 4.8 million cubic metres. This volume of water can irrigate about 480 ha of the Tsilima plain, which shows that presently 85 percent of the available groundwater is pumped for horticulture development. However credit available for purchasing pumps (to expand area under irrigation) continues to add to the current 365 productive hand dug wells with 404 pumps in operation. Already 407 out of a possible 480 hectares that can be irrigated from the currently available water are already under irrigation. Water is often available between four and ten meter depths depending on the season and site. With improved assessments, planning, rehabilitation of the watershed and capture, storage and distribution of water can increase the returns on investments in the irrigation practices being financed through the food security program.

Barrier 2: Insecurity of tenure compounded by inadequate skills reduces incentives for investing in long-term climate smart measures, especially in rehabilitation of the watersheds and increasing agricultural productivity

22. The IWRM identified watershed rehabilitation as a critical component of the implementation of the IWRM Action Plans, citing the fact that the current sediment yields in the highlands are currently 1350 tones/km2/year. Catchments degradation results in increased runoff, flash flooding, reduced infiltration, erosion and siltation. The food security program has a huge focus on increasing productivity of the land. Increasing productivity per unit of land is however likely to be further compromised by the effects of climate change on soil loss, associated with such high sediment loads and loss of top soil. More severe droughts are likely to lead to further degradation of the watersheds. Combined with the likely heavier rains, this may increase runoff, further reducing infiltration and ground water recharge, while increasing soil erosion and nutrient loss. The consequent loss of soil organic matter reduces the effectiveness of inorganic inputs such as fertilizer, lowering profitability, and undermining sustainability of the Food Security Strategy. To tackle these challenges, watershed must be rehabilitated to maximise water supply or IWRM will fail; community buy-in, coordination and labour mobilisation are needed to effectively rehabilitate watersheds; and, farmers must invest in inputs to maximise yield per unit of land, rather than result to extensification. However, insecurity of tenure prevents this because people are unwilling to make long-term type investments in land they will only keep for 7 years. This is also a barrier to farmers adopting even cheaper and more sustainable ways of reducing the impacts of climate change on the watershed and soil fertility – through community based landscape level adaptation measures and technologies that reduce soil erosion, increase soil fertility, store excess water during flash floods for use in irrigation, thereby mitigating the damaging effects of droughts and floods. The use of trees and shrubs in agricultural systems help to tackle the triple challenge of securing food security, mitigation and reducing vulnerability and increasing the adaptability of agricultural systems to climate change. In addition to diminishing the effects of extreme weather events such as heavy rains, droughts and wind storms, trees and shrubs can improve the effectiveness of fertilizer by increasing soil moisture and soil organic matter. Studies indicate that fertilizer is more effective in soils with high organic matter. Under conservation agriculture, trees stabilize soils, raise infiltration rates, reduce soil erosion, and, halts land degradation. Nitrogen-fixing leguminous trees and shrubs can be especially important to soil fertility where there is limited access to mineral fertilizers, or they increase the use efficiency of added inorganic fertilizers. These measures are even more effective when combined with physical

water management infrastructure such as check dams, terraces, gabions, etc,., that control floods and regulate water availability.

23. The effectiveness and sustainability of rehabilitation of the watersheds under the IWRM Action Plans will therefore be particularly affected by the current insecurity of tenure. Currently all land in Eritrea is owned by the state, under the Diessa tenure system, which provides equal access rights to all village members by transferring user rights every 5-7 years. This system serves as a serious disincentive for individual farmers to make long–term investment on land and activities on land improvement and soil and water conservation are minimal. Knowing that the land they cultivate will be given to someone else after 5 to 7 years robs farmers the incentive to make the types of investments needed to rehabilitate landscapes, prevent soil erosion or to build up and maintain soil fertility. The Government recognized the need to change the old Diessa[8] land tenure system and consequently proclaimed a new land law in 1994. The long-term land redistribution to be undertaken under this new law was supposed to provide incentives for farmers to invest in sustainable agricultural practices and increase productivity. Implementation of the land redistribution under the new law was however considered to be politically risky and the start-up was seriously delayed. The situation is changing slowly since a GEF SLM project has demonstrated the operationalization of the system in a neighbouring region. The redistribution exercise is however a costly exercise and the government still lack the financial and human resources to roll the system out using the methodology developed by the GEF project. It will be extremely difficult for the country to factor in climate risks into land use (via rehabilitation of watersheds) without addressing the insecurity of land and resource tenure, where factoring in climate smart technologies and methods are likely to require even longer term considerations and investments in landscape management.

Proposed alternative scenario

24. The proposed project will create the conditions necessary for transforming the baseline programmes described above to make them integrate measures to address additional risks associated with climate change, in order to secure gains of the food security and IWRM action plans from uncertainties related to the changing climate. This will be done by providing the knowledge, skills and other institutional capacities necessary for the baseline programmes to be built on a community based cost effective and integrated package of ecological and physical measures, implemented at a landscape level, to improve water management (and mitigate the effects of drought and floods), reduce soil erosion and increase soil fertility, and reduce vulnerability of the communities. These measures will be supported by the implementation of the 1994 Proclamation on land tenure to provide security of tenure and boost incentives for adopting and sustaining the long-term investments required for climate proofing the watershed rehabilitation, adoption of climate smart, high yielding agriculture and livestock production practises, as part of the implementation of the food security programs. The proposed project will pilot this approach in the Tsilima Plains, which is the focus of the implementation of the two baseline programs, due to its importance in increasing food security for the country. A strengthened District Extension Service System will be used to support the implementation of the project initiatives and scale it up to other districts; lessons generated will be upscaled through the information management systems of the national climate change programme, and used to influence the implementation of the two baseline programs in other parts of the country. This will be in line with the NAPA priorities 3, 4 and 5.

[8] ***Diessa:*** Land in Village ownership. The Village land is periodically redistributed amongst the Village inhabitants by the Village *Baito* (*q.v.*), generally every 5-7 years.

Outcome 1: Information on the impact of ecosystems degradation in aggravating vulnerability to climate change risks and reducing resilience of development gains understood and integrated into key decision-making processes at the local, sub-national and national levels.

25. **Baseline:** Climate proofing the implementation of the baseline programs requires effective management of the interactions between current and future climate hazards and development; which in turn needs to be informed by knowledge and information of current and projected climate risks, incorporating as far as possible scientific climate information as well as local, traditional knowledge into local adaptation planning. For water-challenged Eritrea, this needs to be supported by solid continuous knowledge gathering backed by a system for monitoring changes in contexts and in the effectiveness of responses to changing contexts, particularly for ground water. Many watersheds and ecosystems are badly degraded. Degradation is being driven by inappropriate land use practices. While it is widely accepted that healthy ecosystems provide a cost effective means of reducing vulnerability of livelihoods to climate risks, the country has limited capacity to acquire the necessary knowledge and skills to gather detailed information on climate change, its interactions with degradation of watersheds and impacts on recharge of water sources. There is even less capacity for disseminating the limited information available to land users in a timely manner and sharing it across the sectors.

26. **Adaptation alternative:** The alternative will change the baseline situation by increasing understanding of how vulnerability of livelihoods and local economies are intertwined with the state of the natural systems in the Tsilima Plains. In particular it will assess the nature of the ecosystem goods and services delivered by the key natural, agro-ecological and hydrological systems of the Plains, their vulnerabilities to climate change and the impacts of the current management practices on ecosystems qualities, vulnerabilities and ecosystem resilience, and how the state of the ecosystems services in turn affects vulnerabilities and resilience of livelihoods, the local economies and effectiveness of the baseline programs. It will in particular identify ecosystems at risk of losing their ability to recover from degradation and to continue providing necessary goods and services, and provide a comprehensive cost benefits analysis of business as usual versus adaptation measures, upon which management options should be based. Under this outcome, the project will support the effort of the IWRM action plan on increasing knowledge of ground water, including its monitoring, as described in the 3 strategies of immediate relevance to the proposed LDCF project. This will be done by increasing the capacity and innovativeness of stakeholders to factor in risks related to climate change in the process of inventorying, monitoring and utilising ground water. The project will therefore strengthen research in support of climate risk management. Innovative strategic and applied climate research has a key role to play in improving climate risk management as the country embarks on an increasingly uncertain climatic future. This research should span the continuum from daily or near-term weather and seasonal forecasting to long-term predications. The climate science will be supported by sector-specific research to understand the implications of climate change and its relationship with the sectors concerned (e.g. agriculture in the adaption project case), and to improve sectoral decision making under climate uncertainty.

27. The project will therefore support the institutions spearheading the implementation of the IWRM action plans to increase their capacity for deeper research on management of climate change, including undertaking cost benefit analysis of mainstreaming climate risk into the IWRM action plans. Potential centres of excellence that can play key roles in developing, managing, extending, and sharing knowledge on how to better manage climate-related risks (e.g. National Agricultural Research Institution (NARI), Department of Environment, Meteorology, Universities, etc), will be part of the project development process.

28. The project will also facilitate use of the knowledge gathered for the formulation of community based adaptation plans, based on a thorough and holistic analysis of resilience, supported by the

knowledge generated above. It will also develop a community based monitoring system to enable stakeholders to understand, monitor and control the changes to the important ecosystems and natural systems that could lead to undesirable shifts that increase the vulnerability of their livelihoods and local economies, and that are difficult and expensive to reverse.

29. The project will also promote systematic knowledge sharing among all stakeholders. Ecosystems based adaptation requires cooperation across institutions, ministries, communities and the private sector. Often the benefits of ecosystems based adaptation are spread across numerous sectors and most visible over the long-term while institutional decision-making tends to be focused sectorally and on shorter timescales. The project will therefore establish integrated approaches to adaptation planning and sustainable development, identifying and implementing EbA streamlining procedures. Specifically, investment in boundary institutions can help to bring climate information to bear on sectoral planning and decision making. These institutions can act as intermediaries between scientists and decision makers or between climate specialists and sectoral managers. They can translate scientific knowledge into practical guidance for the organizations that wield decision-making authority, and can help clarify the needs of decision makers so that these guide scientific enquiry. In particular, the project will capacitate the National Food Information System (NFIS) which played a crucial role in the early warning system in the past. It collected and analyzed climate data, food information, and market conditions and also produced forecasts including for the short and long rain seasons, and disseminates information to various user groups in the form of regular bulletins.

Component 2: Incentives in place leading to adoption of long-term measures for watershed rehabilitation, groundwater recharge, climate smart agricultural and livestock production practices.

30. **Baseline:** Eritrea's characteristically variable climate presents a significant challenge to its people. Around 80% of Eritrea's people are dependent on agriculture, which is almost entirely rainfed and small scale and there are no major commercial crops in the country. A further percentage of people earn their living entirely from livestock. Both farmers and pastoralists are highly dependent on the climate for their livelihoods; this is reflected in remarkable way in several government documents that GDP fluctuations follow rainfall. As reported in the NAPA, the short rains have all but disappeared. In recent years, the main rainy season starts later and finishes earlier than the historical pattern resulting in some long-cycle crops, as well as some native cultivars, disappearing from production, due to recurring crop failures. Irrigated crops are also adversely affected due to depletion and drying of water wells on which irrigation depends, as well as unusually heavy flooding during the rainy season. These circumstances are increasing the heavy toll on subsistence farmers. Poverty compounded by other factors including high population density and environmental degradation increases people's vulnerability to drought, leading to food insecurity. Insecurity of tenure is preventing the widespread adoption of long-term measures needed to climate proof measures and gains from the implementation of the food security program and the IWRM Action plans.

31. **Adaptation alternative:** Increasing food security is high priority for the government of Eritrea. This is particularly important in the Tsilima Plains, given its critical importance in the national food security, which will be exacerbated by the projected climate change impacts for the area. The project will tackle the barriers to the adoption of climate smart measures through a mix of technical assistance and investment measures. Under technical assistance, the project will provide tenure security as an incentive for investing in long-term measures for climate proofing the IWRM action plans and the food security program. This will lead to adoption of measures to improve watershed rehabilitation, physical infrastructure to treat riverbanks and beds to increase infiltration and for harvesting excess water during flash floods, as well as adoption of climate smart measures in crop and livestock production. The project will therefore upscale the lessons generated by the GEF SLM project on operationalizing the redistribution of agricultural lands

under the 1994 Land Proclamation, ensuring that over 9,000 hectares are issued to families permanently (number of households to benefit to be determined during PPG). The SLM project has demonstrated that formulation of landscape based land use plans has been an excellent basis for permanent land allocation. Long-term climate smart measures will be advocated on the basis of the land-use plans to be formulated under component 1. Under investment measures, the project will support a program of watershed rehabilitation covering over 14,000 hectares, and the treatment of water conservation reservoirs along more than 50 kilometres of the key rivers supplying the Tsilima Plains with water. Watershed rehabilitation and the climate smart agriculture will be in-line with the landscape based approach and the land-use plans formulated under component 1, and will reduce 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 water recharge measures along the river system, as well as the construction of two sub-surface dams (location to be confirmed at PPG). Depending on the specific locality, this may be replaced or supplemented by sand storage dams. 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.

32. Supplementary irrigation will be enabled by the development of small diversion structures off tributaries of the main streams, 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. With regular maintenance, they are not susceptible to siltation and can be operated and maintained by newly established or strengthened water users groups. It is envisaged that up to ten small diversion schemes will be completed, and a total of about 200 additional ha of rangelands and croplands will be equipped with flood diversion and water spreading facilities that increase soil moisture for crop/forage production.

33. In order to capitalise on the investments in water infrastructure and SWC structures to be provided, the project will support semi-sedentary livestock based-agro-pastoralists and irrigation based agro-pastoralists to adopt climate smart measures in livestock production. The extension service capacitated under component 1, will be supported to develop and transfer to farmers and livestock keepers a range of climate-resilient agricultural and livestock production technologies including drought and disease-resistant varieties, integrated crop-livestock production systems, conservation agriculture, agroforestry, rangeland management; and traditional improved fuel-efficient stoves programmes. Attention will also be paid to conserving native fodder and crop species and varieties, and to enabling their use by small-scale farmers.

Adaptation benefits

34. The total number of households expected to be involved in the pilot activities is 12,000 with a population of approximately 60,000; about 75% of which are women and children. Tree planting campaigns, access to irrigation water, climate smart agriculture and training on climate smart land management practices will increase food productivity per unit area, meeting household food security with surplus for markets. The Tsilima plain is close to and well linked to the capital city and other urban areas and has a history of trading in horticulture and milk. Watershed rehabilitation and river bank treatments will increase water recharge and water available for irrigation, doubling the hectarage under irrigation (from 400 to 800). This will also contribute to the intensification of production per unit area of land, and reduce risk of crop failure (and wastage of investments) considerably. In addition, 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.

35. Implementation of the 1994 Land Proclamation will provide the project beneficiary households with security of tenure over land, a strong incentive for investing in long-term SLM measures (number of households to obtain permanent tenure to be determined during ppg, but likely to be those occupying about 9,000 hectares of land). This is important because one of the challenges in adaptation programs is how to ensure that individuals and societies adapt beyond the programme cycle of an intervention (in this case beyond 2020). This is crucial to climate change adaptation, because adaptation is a continuous process. People need to acquire the capacity to adapt for generations to come. This project aims to meet immediate needs but also build adaptive capacity for the long-term. In addition to securing land tenure, this project will improve understanding among technical personnel and local communities on the linkages between the social and ecological systems and provide the necessary skills for application of adaptive approaches. In this regard, the communities will in particular benefit from formulating Landscape based adaptation/resilience plans. Although the project will not have the resources to finance all the components of the resilience plans, the communities will benefit from the strategic thinking that they will go through in formulating these plans, which will indeed increase their understanding of climate change and its likely impacts on current and future investments in livelihood support systems and local economic development. This is empowering, and prepares them to engage other development partners with a list of priority areas for support.

36. The project will have a range of positive environmental impacts too. 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 enhanced regeneration. In addition, establishment and rehabilitation of nursery sites and tree planting, and expanding multipurpose trees in household woodlots and community enclosure areas, will enhance ecosystem services. This will improve the ecosystem services that livelihoods depend on, 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. This will also reduce runoff and increase infiltration on both rangelands and arable areas, with associated reduction in soil erosion and land degradation.

A.2. Stakeholders. Will project design include the participation of relevant stakeholders from civil society and indigenous people? (yes ☒ /no☐) If yes, identify key stakeholders and briefly describe how they will be engaged in project design/preparation:

37. The involvement of policymakers and multiple stakeholders with distinct roles and responsibilities is critical to successful EbA as part of integrated adaptation intervention since ecosystems typically support diverse sectors and different social groups in multiple ways. Moreover, reducing climate-related risks requires multi-level stakeholder coordination and communication. Broad based consultations will be undertaken during the project planning phase (PPG), including communities, civil society and a wide variety of government departments, led by the Ministry of Water resources and Agriculture. A detailed stakeholder analysis will therefore be presented at CEO request. However, the table below presents the preliminary list of stakeholders and their expected roles and responsibilities.

Group	Indicative roles and responsibilities
Society: Local communities, private sector, civil society in area including NUEW to address gender issue	Communities will be the beneficiary but also will have the responsibility of direct implementation of project activities that will climate proof the baseline programs. The actual role of civil society groups will be defined during PPG but it is expected that they will provide support that the government agencies are not mandated to provide, in particular training. Collectively, the two groups may be

	responsible for the following: Define and implement adaptation; and Inform policy makers about local needs
Policy Makers: Ministry of National Development, Ministries of Agriculture, Land, Water & Environment with special emphasis on Land & Water Departments. Ministries of Local Government (Zoba Debub), Transport & Communication (Met Office), Labor & Public Works, etc.	Policy makers will support community engagement in the improved practices as well as ensure mainstreaming of adaptation requirements into the development processes. They may be involved as follows: Mainstream adaptation and ecosystem services; Link ecosystem and other sectors in adaptation; Develop innovative funding; Influence international polices; Strengthen the links between adaptation and mitigation; Dialogue with scientists; Understand scientific uncertainties; Finance research and monitoring; Transfer power to local communities for adaptation; Recognize local diversity; and Promote environmental education
Scientists: National Agricultural Research Institute (NARI), Universities and Colleges, Department of Environment, etc.	Provide leadership on climate science and linking it to ecosystems, management practices, resilience and vulnerability. Specifically they may quantify and value ecosystem services; Evaluate uncertainties; Work at local scales; Communicate results to non-scientists; Increase multidisciplinary; Involve society in research; Increase social science representation; Dialogue with policy makers; and Support policy design and negotiations

A.3. Gender Considerations. Are gender considerations taken into account? (yes ☒ /no☐). If yes, briefly describe how gender considerations will be mainstreamed into project preparation, taken into account the differences, needs, roles and priorities of men and women.

38. Women, children and men are all involved in agriculture and water management in different ways in Eritrea. A gender analysis will be conducted during the PPG to examine the how gender relations influence access to natural resources, management of natural resources (in particular agriculture and water management); and how these relations are likely to influence effectiveness of project implementation and achievement of results. Special attention will be paid to how gender relations are likely to promote or derail equitable distribution of costs and benefits of the project implementation and project benefits between the various gender groups (men, women, youth). Consequently, a gender strategy will be formulated, based on the findings of the assessment, to ensure the following:

- ✓ That targeting of project activities builds on positive gender relations, and it is not negatively influenced/affected by existing gender relations, especially as they relate to natural resources management, agriculture and water management;
- ✓ That costs and benefits of the project do not disrupt positive gender relations, and that benefits in particular are equitably distributed to all gender groups;
- ✓ That the implementation of the project in general is not disruptive to the positive gender relations, and that it indeed promotes equitable sharing of costs and benefits amongst all gender groups equitably;
- ✓ That the monitoring systems to be used by the project is gender sensitive, and targets and indicators are disaggregated along gender lines;
- ✓ That all training material includes chapters on the importance of understanding gender dynamics of a community; in order to avoid “gender traps” that may make the project

inefficient; it will also include training on the importance of gender equality in a community, in particular as it relates to local and national economic development

.

A.4 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):

39. A detailed analysis of risks and mitigation measures will be undertaken during PPG. A preliminary analysis is presented in the table below.

Risk description	Deg	Mitigation/ Comment
Severe drought or other extreme weather events	H	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 (*kamsin*), especially in the dry season. While the project interventions are designed specifically to address the effects of increasing climate variability, such extreme weather events could negate project 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 project activities, such as specific design of soil and water conservation measures. The project 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.
Further drop in groundwater, salinisation of wells leading to potential scarcity and competition, possibly leading to conflict	H	While the risk of further lowering of ground water levels is high, based on observed trends, a number of project activities, such as watershed rehabilitation, construction of sub-surface dams, treatment of river banks, and SWC technologies have been designed specifically to recharge groundwater levels. Thus implementation of project activities will mitigate against this risk and reduce levels of competition for this scarce resource.
Low human and institutional capacity, especially at the zoba and sub-zoba level	M	The project 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.
Delays in project implementation, and particularly in the development of infrastructure interventions	H	The PPG period will support the regional administration to carry out feasibility studies for a number of the proposed water-related infrastructure components, such as the sub-surface dam construction, and to design capacity building program to address this risk. 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 PIF formulation, and this will such ownership, will reduce this risk.
Price escalation and unavailability of commodities and materials	M	Escalating prices are beyond the control of the project 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 to be undertaken during PPG will ensure that budgets for infrastructural components are adequate. Strong Government support will guarantee that sufficient fuel resources will be available to the project.
Potential country conflict with neighbouring Ethiopia	L	Current commitments by Government suggest that Eritrea is likely to maintain stable political relationships with all its neighbours

A.5. Coordination. Outline the coordination with other relevant GEF-financed and other initiatives:

40. The project will be closely coordinated with the baseline programs and all other projects addressing similar issues. It will in particular be coordinated very closely with two other UNDP supported projects: the GEF financed SLM pilot project whose objective is "To create the enabling environment (policy, capacity, knowledge, alternatives) necessary for adoption of sustainable land management practices and alleviate environmental degradation while improving livelihoods of the farming communities of the Central Highland Zone (CHZ)". This project has developed a methodology for operationalizing the 1994 land proclamation, and redistributing land to individual owners permanently. As security of tenure is considered critical to investing in long-term natural resources management measures, the proposed LDCF project will upscale this methodology in the Tsilima Plains (in the pilot areas). The LDCF project will also collaborate very closely with the recently approved Adaptation Fund Board project which is addressing similar adaptation issues in Hamelmalo and Habero sub-zobas in a different region (Anseba Region or Zoba). The AF project is led by the Ministry of Agriculture with collaboration of all other ministries involved in this LDCF proposed project. It is likely that the two projects will share the same Steering Committee, which will ensure that the tools and methods developed under any of the two projects are shared widely, and that no duplication of investments in methodology development occurs. During the PPG, further analysis will be undertaken to identify relevant projects that should be coordinated with the current LDCF proposal and linkages will be established.

A5: INNOVATIVENESS, SUSTAINABILITY AND POTENTIAL FOR SCALING UP

41. Strengthening the resilience of small holder agriculture to climate change impacts and improvement of watersheds in the Tsilima Plains is identified as an urgent priority towards meeting food security in both the NAPA and the Food Security Strategy. The innovativeness of the proposed project is the use of knowledge based adaptation planning for increasing water availability via increased infiltration (ground water) and storing of excess water during floods to even out water demand for crop and livestock production throughout the year and across drought or unusually heavy rainfall years. Involving communities in "appropriate-technology" types of landscape based measures to manage this water imbalance is highly innovative and sustainable because adaptation measures that involve massive engineering solutions and extensive use of technologies are beyond the reach of many rural communities in Eritrea. The project's focus on developing adaptive capacity and use of nature based solutions in combination with some soft engineering processes provides practical and locally appropriate "soft" adaptation measures, which are highly cost-effective.

42. Providing security of tenure for farmers in the project area is highly innovative and supports sustainability because without it the watersheds are unlikely to be rehabilitated effectively. Rehabilitation of the watersheds is critical to the success of this project as well as IWRM and increasing food security in the country. Yet it is unlikely to be effectively done without security of tenure and requisite technical capacity for mainstreaming climate risk considerations into the rehabilitation programs. Involving communities in the formulation of the landscape based adaptation plans will further introduce sustainability because those involved are empowered to tackle climate risks via the knowledge and experience they gain by participating in these processes.

43. Under planning, the participatory approach could be replaced by a prescriptive top-down one, where the project formulates adaptation plans without the community involvement and try and enforce them. While this would probably be much cheaper and faster than the preferred

consultative approach, experience has shown that such approaches tend to be accompanied by poor implementation due to a combination of factors, chief among them inadequate ownership of the activities/initiatives by communities and poor relevance of selected measures to addressing community needs. This reduces overall impacts and long-term sustainability. Furthermore, the top-down approach constitutes a missed opportunity for community empowerment since it is now proven that CBA constitutes an effective vehicle for building resilience and addresses social drivers of vulnerability including gender inequality and other factors related to social exclusion. It will therefore complement the top-down baseline programs in an excellent manner.

44. The alternative to the comprehensive (integrated) plans would be to focus on one or two aspects of adaptation, such as rehabilitation of watersheds, or irrigation or introduction of drought tolerant crops, or a combination thereof. While this is an often used and legitimate approach to rural development, climate change is a multi-facetted challenge; in order to help communities onto a path of resilience building, it is therefore clear that a multi-faceted approach at scale is required. Besides vulnerability to the impacts of climate change has strong overlaps with poverty and marginalisation. It therefore builds stronger social capital if adaptation initiatives also empower communities to at least consider addressing the underlying development issues, since adaptation is driven by a range of different pressures–or drivers of vulnerability–acting together.

45. The project's approach has greater potential for up-scaling and replication across Eritrea, unlike the more costly structural adaptation measures. Project implementation will be through the current government and village environment management and extension structures; this will ensure ownership of the project initiatives as well as on-the-job skills development for all technical staff involved. By strengthening the capacity of research institutions to provide knowledge based advice to the extension service, the project will increase probability of replication because the research institutions have a national mandate. Similarly, the extension service has a broader catchment area then the project pilot areas; hence an empowered extension service will ensure a nation-wide use of knowledge products developed by the project.

DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1 IS THE PROJECT CONSISTENT WITH THE NATIONAL STRATEGIES AND PLANS OR REPORTS AND ASSESSEMENTS UNDER RELEVANT CONVENTIONS? (YES ☒ /NO ☐). IF YES, WHICH ONES AND HOW: NAPAS, ASGM NAPS, MIAS, NBSAPS, NCS, TNAS, NCSAS, NIPS, PRSPS, NPFE, BURS, ETC.:

46. The project is consistent with the country's PRSP. In addition to being in line with two baseline programs, the project is also in line with 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* 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.

47. The proposed project is also consistent with the country's NAPA. Eritrea has ratified, *inter alia*, 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 project 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 project addresses the NAPA priorities on water resources, forestry, agriculture, and livestock. The programme specifically seeks to develop an integrated water management and agricultural development approach to address water availability for improved food security through watershed rehabilitation combined with climate-sensitive technologies. In doing so, it will empower particularly vulnerable groups, as identified by the NAPA, to enhance their resilience to climate change and adaptive capacity. Table (Indicative Focal Area Strategy Framework) further summarizes the linkages of the proposed project to the LDCF Focal Area Objectives).

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY

A. Record of Endorsement[9] of GEF Operational Focal Point on Behalf of the Government: (Please attach the Operational Focal Point endorsement letter(s) with this template. For SGP, use this SGP OFP endorsement letter).

B. NAME	POSITION	MINISTRY	DATE *(Month, day, year)*
Mogos Wolde-Yohannis	GEF Operational Focal Point	Land, Water & Environment	April 29, 2014

B. GEF Agency Certification

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for project identification and preparation				
Agency & Coordinator	**Signature**	**Date**	**Project Contact Person**	**Telephone & email address**
Adriana Dinu Executive Coordinator and Director, a.i., UNDP GEF		Sept. 30, 2014	Veronica Muthui - RTA, EBD UNDP	+27123548140 veronica.muthui@undp.org

[9] For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required
even though there may not be a STAR allocation associated with the project.

Annex 1 major drainage basin of Eritrea and their estimated runoff yield in Billion Cubic Meters (BCM). *Source: Water Resource Department, Water Balance Framework for analysis and planning, 2007.*

Basin	**Area (Km2)**		**Average Annual Yield (BCM)**
	Eritrea	**Total**	
Mereb-Gash	17,256	23,176	176 1.423
Barka-Anseba	41,920	41,920	0.932
Red Sea	44,376	44,376	0.961
Danakil Basin	8,905	10,485	0.422
Setit	7,292	68,255	6.23
Total			**9.967**

C. Additional GEF Project Agency Certification *(Applicable Only to newly accredited GEF Project Agencies)* For newly accredited GEF Project Agencies, please download and fill up the required **GEF Project Agency Certification of Ceiling Information Template** to be attached as an annex to the PIF.